



Town of Apple Valley



Priority Project

Water Quality Management Plan

For:

Redwood West - Warehouse

GRADING PERMIT # (Pending)

BUILDING PERMIT # (Pending)

APN: 0463-213-01 & 0463-213-32

Prepared for:

Redwood West

John Pomer Owner/Developer

john@redwoodwest.com

220 Newport Center Dr. #11-557

Newport Beach, CA 92660

Prepared by:

Merrell Johnson Companies

22221 U.S. Highway 18

Apple Valley, CA 92307

760-240-8000

Submittal Date: 9/28/2023 (PRELIMINARY)

Revision No. and Date:

Revision No. and Date:

Final Approval Date: _____

Project Owner's Certification

This Town of Apple Valley Water Quality Management Plan (WQMP) has been prepared for:

RW AV, LLC by Merrell Johnson Companies.

The WQMP is intended to comply with the requirements of the Town of Apple Valley and the Phase II Small MS4 General Permit for the Mojave River Watershed. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the Phase II Small MS4 Permit and the intent of the Town of Apple Valley's compliance efforts. Once the undersigned transfers its interest in the property, its successors in interest and the Town of Apple Valley shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

Project Data			
Permit/Application Number(s):	CUP# (Pending)	Grading Permit Number(s):	GRADING PERMIT # (Pending)
Tract/Parcel Map Number(s):	#	Building Permit Number(s):	BUILDING PERMIT # (Pending)
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			0463-213-01 & 0463-213-32
Owner's Signature			
Owner Name:	Redwood West		
Title	Owner/Developer		
Company	Redwood West		
Address	220 Newport Center Dr. #11-557 Newport Beach, CA 92660		
Email	john@redwoodwest.com		
Telephone #	.		
Signature	(pending site design review)	Date	

Preparer's Certification

Project Data			
Permit/Application Number(s):	CUP# (Pending)	Grading Permit Number(s):	GRADING PERMIT # (Pending)
Tract/Parcel Map Number(s):	#	Building Permit Number(s):	BUILDING PERMIT # (Pending)
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			0463-213-01 & 0463-213-32

“The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan were prepared under my oversight and meet the requirements of the California State Water Resources Control Board Order No. 2013-0001-DWQ.

Engineer:	E. Cary Packer R.C.E	PE Stamp Below
Title	Associate Engineer	
Company	Merrell Johnson Companies	
Address	22221 U.S. Highway 18	
Email	Cary.Packer@MerrellJohnson.com	
Telephone #	760-240-8000	
Signature	(pending site design review)	
Date		

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MOJAVE RIVER WATERSHED Water Quality Management Plan (WQMP)

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Section I - Introduction

This WQMP template has been prepared specifically for the Phase II Small MS4 General Permit in the Mojave River Watershed. This location is within the jurisdiction of the Lahontan Regional Water Quality Control Board (LRWQCB). This document should not be confused with the WQMP template for the Santa Ana Phase I area of San Bernardino County.

WQMP preparers must refer to the MS4 Permit for the Mojave Watershed WQMP template and Technical Guidance (TGD) document found at: <http://cms.sbcounty.gov/dpw/Land/NPDES.aspx> to find pertinent arid region and Mojave River Watershed specific references and requirements.

Section 1		Discretionary Permit(s)													
Form 1-1 Project Information															
Project Name	Redwood West - Warehouse														
Project Owner Contact Name:	John Pomer														
Mailing Address:	220 Newport Center Dr. #11-557 Newport Beach, CA 92660	Email Address: john@redwoodwest.com	Telephone: .												
Permit/Application Numbers(s):	CUP# (Pending)	Tract/Parcel Map Number(s):	#												
Additional Information/Comments:	This "PRELIMINARY" design is conceptual and does not currently include all pending studies and data. Intended Appendices are marked "pending".														
Description of Project:	<p><u>Existing conditions include:</u> Merging 2 undeveloped adjoining lots into one 90.15 acre facility. Native creosote bushes (approximately) 2-3 feet tall, and sporadic 5 - 6 feet in spacing.</p> <p><u>Proposed Conditions include:</u> The site design shall divert run-on from the east into a concrete ditch and pipe away from the facility's operational surface and under the parking area to daylight and comeingle with historical flow.</p> <p>Facility's proposed surfaces are as follows:</p> <table border="0"> <tr> <td>New Building (Roof)</td> <td>1,346,270 Sq. Ft.</td> </tr> <tr> <td>New Trash Enclosure Roofs (4)</td> <td>640 Sq. Ft.</td> </tr> <tr> <td>New Impervious Concrete /Paving</td> <td>2,187,507 Sq. Ft.</td> </tr> <tr> <td>New Curbed Landscape (Self-treating)</td> <td>257,620 Sq. Ft.</td> </tr> <tr> <td>New Amended Soils (Infiltration)</td> <td>135,093 Sq. Ft.</td> </tr> <tr> <td>TOTAL WQMP (sq. ft.)</td> <td>3,927,130</td> </tr> </table> <p style="text-align: right;">90.15 acres</p>			New Building (Roof)	1,346,270 Sq. Ft.	New Trash Enclosure Roofs (4)	640 Sq. Ft.	New Impervious Concrete /Paving	2,187,507 Sq. Ft.	New Curbed Landscape (Self-treating)	257,620 Sq. Ft.	New Amended Soils (Infiltration)	135,093 Sq. Ft.	TOTAL WQMP (sq. ft.)	3,927,130
New Building (Roof)	1,346,270 Sq. Ft.														
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New Curbed Landscape (Self-treating)	257,620 Sq. Ft.														
New Amended Soils (Infiltration)	135,093 Sq. Ft.														
TOTAL WQMP (sq. ft.)	3,927,130														
Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.	No formal conditions have been issued at this time.														

Section 2 Project Description

2.1 Project Information

The WQMP shall provide the information listed below. The information provided for Conceptual/ Preliminary WQMP should give sufficient detail to identify the major proposed site design and LID BMPs and other anticipated water quality features that impact site planning. Final Project WQMP must specifically identify all BMP incorporated into the final site design and provide other detailed information as described herein.

The purpose of this information is to help determine the applicable development category, pollutants of concern, watershed description, and long term maintenance responsibilities for the project, and any applicable water quality credits. This information will be used in conjunction with the information in Section 3, Site Description, to establish the performance criteria and to select the LID BMP or other BMP for the project or other alternative programs that the project will participate in, which are described in Section 4.

2.1.1 Project Sizing Categorization

If the Project is greater than 5,000 square feet, and not on the excluded list as found on Section 1.4 of the TGD, the Project is a Regulated Development Project.

If the Project is creating and/or replacing greater than 2,500 square feet but less than 5,000 square feet of impervious surface area, then it is considered a Site Design Only project. This criterion is applicable to all development types including detached single family homes that create and/or replace greater than 2,500 square feet of impervious area and are not part of a larger plan of development.

Form 2.1-1 Description of Proposed Project					
1 Regulated Development Project Category (Select all that apply):					
<input checked="" type="checkbox"/>	#1 New development involving the creation of 5,000 ft ² or more of impervious surface collectively over entire site	<input type="checkbox"/>	#2 Significant re-development involving the addition or replacement of 5,000 ft ² or more of impervious surface on an already developed site	<input type="checkbox"/>	#3 Road Project – any road, sidewalk, or bicycle lane project that creates greater than 5,000 square feet of contiguous impervious
<input type="checkbox"/>	#4 LUPs – linear underground/overhead projects that has a discrete location with 5,000 sq. ft. or more new constructed impervious surface				
<input type="checkbox"/>	Site Design Only (Project Total Square Feet > 2,500 but < 5,000 sq.ft.) Will require source control Site Design Measures. Use the “PCMP” Template. Do not use this WQMP Template.				
2	Project Area (ft ²):	3,927,130	3	Number of Dwelling Units:	0
			4	SIC Code:	4225
5	Is Project going to be phased? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
<i>If yes, ensure that the WQMP evaluates phase as a distinct DA, requiring LID BMPS to address runoff at time of completion.</i>					

Notes:

Item # 4 SIC Code description is General Warehousing and Storage

2.2 Property Ownership/Management

Describe the ownership/management of all portions of the project and site. State whether any infrastructure will transfer to public agencies (City, County, Caltrans, etc.) after project completion. State if a homeowners or property owners association will be formed and be responsible for the long-term maintenance of project stormwater facilities. Describe any lot-level stormwater features that will be the responsibility of individual property owners.

Form 2.2-1 Property Ownership/Management

Describe property ownership/management responsible for long-term maintenance of WQMP stormwater facilities:

**Redwood West
220 Newport Center Dr. #11-557
Newport Beach, CA 92660**

**John Pomer
john@redwoodwest.com**

is the Land Owner and Developer of the project, and will over see the construction.

The Owner will continue site and facility management after construction is completed and occupancy is approved.

The Owner may assign or employ an onsite manager that will assist in maintenance and upkeep of the day to day operations and who will inform the owner of any necessary actions.

Although tasks may be assigned and interests shared, the sole financial and legal responsibility (care and maintenance of the BMPs will be the Owner's until the land is sold or transfers to another.

Right of way improvements made by the Owner are per the Town of Apple Valley requirements and will remain the Town's to maintain and care for.

2.3 Potential Stormwater Pollutants

Best Management Practices (BMP) measures for pollutant generating activities and sources shall be designed consistent with recommendations from the CASQA Stormwater BMP Handbook for New Development and Redevelopment (or an equivalent manual). Pollutant generating activities must be considered when determining the overall pollutants of concern for the Project as presented in Form 2.3-1.

Determine and describe expected stormwater pollutants of concern based on land uses and site activities (refer to Table 3-2 in the TGD for WQMP).

Form 2.3-1 Pollutants of Concern			
Pollutant	Please check: E=Expected, N=Not Expected		Additional Information and Comments
	E	N	
Pathogens (Bacterial / Virus)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Expected due to uncovered parking of visitor parking; bacterial indicators of pavement runoff.
Nutrients - Phosphorous	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minimal: Due to landscape. Drought tolerant and zeriscape shall decrease runoff from planter areas.
Nutrients - Nitrogen	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minimal: Due to landscape. Drought tolerant and zeriscape shall decrease runoff from planter areas.
Noxious Aquatic Plants	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minimal to none: Potential conditions due to drought tolerant landscaping, however arid conditions and there are no near-by water bodies that would be affected by algae/organic matter as a result of site runoff.
Sediment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Expected: Surrounding development may minimize although strong winds occasionally create wind-blown transfer.
Metals	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Expected: Due to uncovered parking and daily traffic of trucks/trailers, loading-parking of delivery vehicles.
Oil and Grease	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Expected due to uncovered parking, traffic, and vehicles on site.
Trash/Debris	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Expected: Due to parking, loading, and traffic. Strong winds occasionally create wind-blown transfer.
Pesticides / Herbicides	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Expected to be minimal: Due to landscaping and general care of the facility. Minimal applications are expected due to no food/beverage operations active on site.
Organic Compounds	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Pesticides/Herbicides. No other Organic Compounds expected on site as part of operations.
Other:	<input type="checkbox"/>	<input type="checkbox"/>	
Other:	<input type="checkbox"/>	<input type="checkbox"/>	

Section 3 Site and Watershed Description

Describe the project site conditions that will facilitate the selection of BMPs through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and sub-watershed Drainage Management Areas (DMAs)) is conveyed to the site outlet(s). Refer to Section 3.2 in the TGD for WQMP. The form below is provided as an example. Then complete Forms 3.2 and 3.3 for each DA on the project site. **If the project has more than one drainage area for stormwater management, then complete additional versions of these forms for each DA / outlet. A map presenting the DMAs must be included as an appendix to the WQMP document.**

Form 3-1 Site Location and Hydrologic Features			
Site coordinates take GPS measurement at approximate center of site	Latitude: 34.611645	Longitude: -117.19531	Thomas Bros Map page 4207
1 San Bernardino County climatic region: <input checked="" type="checkbox"/> Desert			
2 Does the site have more than one drainage area (DA): <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <i>If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached</i>			
<pre> graph TD DA1A[DA1: DMA A: Rooftop thru downspouts] --> DA1C1[DA1: DMA C - Paved] DA1A --> DA1C2[DA1: DMA C - Paved] DA1C1 --> PT1((PT)) DA1C2 --> PT2((PT)) PT1 --> DMA4[DMA D: Infiltration Large Basin] PT2 --> DMA4 DMA4 --> Outlet[Outlet to Historical] </pre>			
<u>DRAINAGE AREAS</u>			
<u>1</u> Entire Site to Pre-Treatment then Basin			
<u>Proposed Surface Areas</u>	<u>Descriptions type/function</u>		
Landscaped (drought tolerant):	Landscape Islands that are surrounded by 6" curb (self treating). These surface types will be landscaped per Town's requirements.		
Roof:	Warehouse roof will downspout to an appropriate sized outlet and easily visible to detect optimal function. Trash Enclosure dripline to adjacent landscape surface		
Concrete / Asphalt Paving and impervious surfaces:	Parking, traffic areas, and all other impervious surfaces (e.g., sidewalks, bay parking) exposed to traffic pollutants.		
Treatment BMPs (Infiltration basins)	Surface Landscaped Basin		

Form 3-2: Existing Hydrologic Characteristics for Drainage Management Areas 1 - 3				
For Drainage Management Area 1's sub-watershed DMA, provide the following information:	Entire Undeveloped Site			totals
1 DMA drainage area (ft ²)	370,260	910,404	2,646,466	3,927,130
2 Existing site impervious area (ft ²)	0	0	0	
3 Antecedent moisture condition <i>For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/2_0100412_map.pdf</i>	II	II	II	
4 Hydrologic soil group <i>Refer to County Hydrology Manual Addendum for Arid Regions – http://www.sbcounty.gov/dpw/floodcontrol/pdf/2_0100412_addendum.pdf</i>	A	C	D	
5 Longest flowpath length (ft)	735	826	962	
6 Longest flowpath slope (ft/ft)	0.0204	0.0182	0.0177	
7 Current land cover type(s) <i>Select from Fig C-3 of Hydrology Manual</i>	Barren	Barren	Barren	
8 Pre-developed pervious area condition: <i>Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating</i>	Poor <50% cover with mostly weeds	Poor <50% cover with mostly weeds	Poor <50% cover with mostly weeds	

Notes: Existing topography is relatively uniform sheet flow from the northeast to southwest across undeveloped land. Information for Item 3 provided as Appendix A, AMC Maps, and Item 4 is provided as Appendix B, Web Soils Survey.

Form 3-3 Watershed Description for Drainage Area					
<p>Receiving waters</p> <p>Refer to SWRCB site:</p> <p>http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml</p>	<p>Project will discharge to Town of Apple Valley MS4 within the Bell Mountain Wash. See Appendix C.2 and C.3.</p> <p>Larger storms and street flow will potentially take flows to Mojave River (Upper Narrows to Lower Narrows) approximately 7 miles from the project across undeveloped and soft shoulder roads. See Appendix C.1</p>				
<p>Applicable TMDLs</p> <p>http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml</p>	<p>Per 2020-2022 California Intergrated Report 303(d) & 305(b) Report, found:</p> <p>https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html</p> <p>5: "listed but TMDL still required/not yet completed, for at least one of the pollutants being listed in the segment"</p>				
<p>303(d) listed impairments</p> <p>http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml</p>	<p>Fluoride (Toxic Inorganics), Manganese (metals), Oxygen, Dissolved (Nutrients), Sodium (Salinity/Chlorides), Sulfates (Toxic Inorganics), Total Dissolved Solids (TSS)</p>				
<p>Environmentally Sensitive Areas (ESA)</p> <p>Refer to Watershed Mapping Tool –</p> <p>http://sbcounty.permitrack.com/WAP</p>	<p>Desert Tortoise - Category 3 See Appendix A.3</p>				
<p>Hydromodification Assessment</p>	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Yes Complete Hydromodification Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-9 in submittal</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>No</td> </tr> </table>	<input checked="" type="checkbox"/>	Yes Complete Hydromodification Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-9 in submittal	<input type="checkbox"/>	No
<input checked="" type="checkbox"/>	Yes Complete Hydromodification Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-9 in submittal				
<input type="checkbox"/>	No				

Notes: Information above provided as Appendix shown.

Section 4 Best Management Practices (BMP)

4.1 Source Control BMPs and Site Design Measures

The information and data in this section are required for both Regulated Development and Site Design Only Projects. Source Control BMPs and Site Design BMP Measures are the basis of site-specific pollution management.

4.1.1 Source Control BMPs

Non-structural and structural source control BMP are required to be incorporated into all new development and significant redevelopment projects. Form 4.1-1 and 4.1-2 are used to describe specific source control BMPs used in the WQMP or to explain why a certain BMP is not applicable. Table 7-3 of the TGD for WQMP provides a list of applicable source control BMP for projects with specific types of potential pollutant sources or activities. The source control BMP in this table must be implemented for projects with these specific types of potential pollutant sources or activities.

The preparers of this WQMP have reviewed the source control BMP requirements for new development and significant redevelopment projects. The preparers have also reviewed the specific BMP required for project as specified in Forms 4.1-1 and 4.1-2. All applicable non-structural and structural source control BMP shall be implemented in the project.

The identified list of source control BMPs correspond to the CASQA Stormwater BMP Handbook for New Development and Redevelopment.

Form 4.1-1 Non-Structural Source Control BMPs				
Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N1	Education of Property Owners, Tenants and Occupants on Stormwater BMPs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>Property Owner shall ensure that facility manager(s) in charge of the site is/are aware of the site's BMP function and maintenance requirements. This includes, but not limited to, familiarizing themselves with the system's function, placement and network, maintenance schedules, and contracting professional personnel.</p> <p>Employee training, including but not limited to, site good-house keeping, proper materials use, storage and disposal, establishing protocols for spills/leak detection and clean-up shall be scheduled with two-weeks of new hire and annually reminder.</p>
N2	Activity Restrictions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>Activities are minimized to site operations only. Owner shall contract a licensed professional when using and applying pesticides, and herbicides.</p>
N3	Landscape Management BMPs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>Landscape management includes weed maintenance, irrigation system maintenance and replacing unhealthy vegetation.</p> <p>Owner shall contract licensed professionals familiar with local and state regulations.</p>
N4	BMP Maintenance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>Owner shall ensure maintenance logs and inspections are stored onsite, and available upon request.</p> <p>The basin shall remain at design elevations to ensure capacity. Landscape within the basin shall remain healthy and weed free. No ponding shall be evident after 72 hours after rainfall has stopped to ensure infiltration is per original design and vector/mosquito hazards are avoided.</p>
N5	Title 22 CCR Compliance (How development will comply)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>There are no outdoor hazardous waste materials or storage designed at this site/facility, and this site's SIC Code does not describe the manufacturing or use of materials described in Title 22 CCR. In the event medical and biohazard waste is onsite, it shall be handled and disposed of in accordance with Local, State, and Federal requirements relevant to Health & Safety of Hazardous materials. Owner shall provide a licensed waste hauler for said materials.</p>

MOJAVE RIVER WATERSHED Water Quality Management Plan (WQMP)

N6	Local Water Quality Ordinances	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>On-site facility and on-site operations shall follow the most stringent of any overlapping water quality ordinances applicable to the site (e.g., WQMP, Industrial General Permit, local and state conservation, N.P.D.E.S discharge, etc.).</p> <p>Off-site design of right of way and street improvements shall be approved by the Town of Apple Valley in accordance with MS4 permit.</p> <p>Channel design and water quality objective is to eliminate the facilities operational pollutants from comingling with potential run-on from the north. The channel has been separated from the WQMP, but will remain the Owner's responsibility for care and maintenance.</p>
N7	Spill Contingency Plan	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>The Owner and facility site manager(s) shall ensure appropriate spill-kits, materials and clean-up tools are readily available and employees are knowledgeable in safety protocols, and proper disposal requirements.</p>
N8	Underground Storage Tank Compliance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>No underground storage tank is proposed for this site.</p>
N9	Hazardous Materials Disclosure Compliance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>The Owner and facility site manager(s) shall comply and provide required documentation and / or obtain proper permits in accordance with all local, state and federal laws meeting local fire protection enforcement agencies standards for hazardous materials and hazardous waste materials anticipated or suspected within the facility/site.</p>

Form 4.1-1 Non-Structural Source Control BMPs				
Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N10	Uniform Fire Code Implementation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	This project's site plan shall be reviewed by the Town of Apple Valley various departments and shall provide the proper permits. Storage, use and handing of any flammable and non-flammable materials, and/or compressed gasses shall be in accordance with local, state, and federal regulations.
N11	Litter/Debris Control Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>Facility shall adhere to local waste control regulations (including hazardous waste and/or recycling programs) at time of occupancy. Operations and Maintenance Program shall address Good Housekeeping practices which will include regular scheduled waste pick-up and disposal by a licensed waste hauler.</p> <p>Trash enclosure(s) are designed per Town of Apple Valley standards and shall remain in good condition to ensure protection of wind and precipitation. Regular sweeping and cleaning of the structure(s) shall be conducted to ensure protection form run-off, vector and rodent potentials.</p> <p>Outdoor trash containers (such as those in employees break-areas, and convenient to daily operations) shall be securely lidded, leak/damage free, properly labeled (if recyclable) and secure from tipping, and wind.</p> <p>All trash and debris (including wind-blown) shall be removed from site and from perimeters of site on a regular basis.</p>
N12	Employee Training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Within 2 months of new hire and annually for all employees. See N1.
N13	Housekeeping of Loading Docks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Part of grounds maintenance and good house keeping practices, area(s) will be swept and visually inspected for stains and debris. Regular cleaning shall take place. See N15.
N14	Catch Basin Inspection Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Part of grounds maintenance and good house keeping practices, inlets and surface grates shall be inspected and cleared of debris or any blockage.

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N15	Vacuum Sweeping of Private Streets and Parking Lots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Part of grounds maintenance and good house keeping practices, and shall be scheduled by Owner/Site Manager(s) to keep site orderly.
N16	Other Non-structural Measures for Public Agency Projects	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not a Public Agency Project
N17	Comply with all other applicable NPDES permits	<input type="checkbox"/>	<input type="checkbox"/>	<p>This project is subject to the Construction General Permit where Water Discharge Identification (WDID) provisions apply while the project is under construction.</p> <p>In the event the facility's operations become subject to the General Industrial Permit a WDID shall be obtained by the Owner.</p> <p>This facility's owner's and operation manager's are dedicated to maintaining and complying with local, state and federal regulations, including but not limited to those mentioned above and run-on/run-off diversion channel built as part of this project.</p>

Form 4.1-2 Structural Source Control BMPs				
Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
S1	Provide storm drain system stencilling and signage (CASQA New Development BMP Handbook SD-13)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Glued (epoxy) plate, stamped message on steel grates, or stenciled painted message near inlet will be applied.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	There is no raw, loose or hazardous materials expected to be stored outdoors. Parking of truck trailers is described in N11, N13, & N15 as good house keeping.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Trash enclosure will have permanent roofing as per Town of Apple Valley standards. Waste containers shall be covered (lid), and area maintained regularly. Site design has trash area with significant distance from treatment system to detect visual pollutants.
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control (Statewide Model Landscape Ordinance; CASQA New Development BMP Handbook SD-12)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Irrigation system and controllers shall adhere to local and state conservation standards and shall drought tolerant items per Town of Apple Valley plant list. Resetting irrigation controls shall be in accordance to season changes and regularly observed for needed repairs.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	6-inch curb will surround parking islands and finished surfaces will remain more than 4-inches from top of curb. Any other (non-curb ,including curb-cut openings, where impervious surfaces transition to pervious) surfaces shall provide a minimum of 2-inches below and drop in elevation to promote impervious to pervious dissipation. Design upkeep shall be part of regular landscaping maintenance.

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S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Basin slopes shall include surface covering that may provide wind erosion as well as energy dissipation (rill-erosion control) at inlets (openings) to basin. Inlets and curb-openings shall include larger rip-rap gravels per Civil and hydrologic designs.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Per architectural building plans, loading doors are set at truck height where trailers are backed up so that unloading and loading are indoors as much as possible. This will limit the spill of delivery goods outdoors.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The exterior grade and impervious slope of the heavy truck areas does not provide for a dead sump or containment. Therefore loading areas shall be regularly inspected for spills and stains. Regular sweeping and spill absorbent materials shall be part of regular good housekeeping practices. The vegetated basin will provide biotreatment.
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	There are no vehicle washing as part of their operation(s).
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No outdoor processing on this project.

4-4.b

Form 4.1-2 Structural Source Control BMPs				
Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No outdoor designated area and not expected to have as day-to-day operations.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	No outdoor or covered commercial fueling is expected on this site. However, small loading equipment (e.g., fork-lifts, tow tractors, carts, etc.), that are to be fuel powered shall be done in a designated area by trained personnel with appropriate spill kits and containment materials in place.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	There are no significant sloped portions not part of the BMP described in S6.
S14	Wash water control for food preparation areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No food preparations on this site.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No community car washing on this site.

4.1.2 Site Design BMPs

As part of the planning phase of a project, the site design practices associated with new LID requirements in the Phase II Small MS4 Permit must be considered. Site design BMP measures can result in smaller Design Capture Volume (DCV) to be managed by both LID and hydromodification control BMPs by reducing runoff generation.

As is stated in the Permit, it is necessary to evaluate site conditions such as soil type(s), existing vegetation and flow paths will influence the overall site design.

Describe site design and drainage plan including:

- . A narrative of site design practices utilized or rationale for not using practices
- . A narrative of how site plan incorporates preventive site design practices
- . A narrative of site design practices utilized or rationale for not using practices are included in WQMP

Refer to Section 5.2 of the TGD for WQMP for more details.

Form 4.1-3 Site Design Practices Checklist		
Site Design Practices		
<i>If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be selected to meet targets</i>		
Minimize impervious areas:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Explanation: Site design adhered to the minimal drive widths and centered the building for perimeter landscaping. Each parking isle includes landscape.		
Maximize natural infiltration capacity; Including improvement and maintenance of soil:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Explanation: Infiltration Test (pending) supersedes Appendix B.		
Preserve existing drainage patterns and time of concentration:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Explanation: Drainage will be directed around the building which creates longer flow path than existing conditions. New basins at the lowest elevations of the site also increase the Time of Concentration		
Disconnect impervious areas. Including rerouting of rooftop drainage pipes to drain stormwater to storage or infiltration BMPs instead of to storm drain :	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Explanation: Roof downspouts and drains will route roof drainage directly underground and pipes will outflow to pervious retention basin.		
Use of Porous Pavement.:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Explanation: Porous pavement was not in this site design. Surrounding areas are undeveloped and maintenance is not practical.		
Protect existing vegetation and sensitive areas:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Explanation: No substantial (existing) vegetation. There is spare low growth invasive weeds (site appears to be previously graded). Existing trees not part of project will be protected.		
Re-vegetate disturbed areas. Including planting and preservation of drought tolerant vegetation. :	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Explanation: Per the Construction General Permit all disturbed areas shall be returned to pre-disturbance stabilization. There will be drought tolerant landscaping. Refer to Landscaping Plans.		

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	Yes	No
Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Explanation: Landscaping and basin areas will not be compacted. See Erosion Control Plans.		
Utilize naturalized/rock-lined drainage swales in place of underground piping or imperviously lined swales:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Explanation: Hardscape drainage channels are designed for the 100yr storm.		
Stake off areas that will be used for landscaping to minimize compaction during construction	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Explanation: During construction, shown on Erosion Control Plans, landscape and rain garden will be off - limits to heavy equipment travel, or lossening compacted soil activities are required.		
Use of Rain Barrels and Cisterns, Including the use of on-site water collection systems.:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Explanation: Not feasible to site conditions		
Stream Setbacks. Includes a specified distance from an adjacent stream: :	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Explanation: There are no named streams adjacent to site.		

It is noted that, in the Phase II Small MS4 Permit, site design elements for green roofs and vegetative swales are required. Due to the local climatology in the Mojave River Watershed, proactive measures are taken to maximize the amount of drought tolerant vegetation. It is not practical in this region to have green roofs or vegetative swales. As part of site design the project proponent should utilize locally recommended vegetation types for landscaping. Typical landscaping recommendations are found in following local references:

San Bernardino County Special Districts:

Guide to High Desert Landscaping

<http://www.specialdistricts.org/Modules/ShowDocument.aspx?documentid=795>

Recommended High-Desert Plants -

<http://www.specialdistricts.org/modules/showdocument.aspx?documentid=553>

Mojave Water Agency:

Desert Ranch: <http://www.mojavewater.org/files/desertranchgardenprototype.pdf>

Summertree: <http://www.mojavewater.org/files/Summertree-Native-Plant-Brochure.pdf>

Thornless Garden: <http://www.mojavewater.org/files/thornlessgardenprototype.pdf>

Mediterranean Garden: <http://www.mojavewater.org/files/mediterraneangardenprototype.pdf>

Lush and Efficient Garden: <http://www.mojavewater.org/files/lushandefficientgardenprototype.pdf>

Alliance for Water Awareness and Conservation (AWAC) outdoor tips –

<http://hdawac.org/save-outdoors.html>

4.2 Treatment BMPs

After implementation and design of both Source Control BMPs and Site Design BMP measures, any remaining runoff from impervious DMAs must be directed to one or more on-site, treatment BMPs (LID or biotreatment) designed to infiltrate, evapotranspire, and/or bioretain the amount of runoff specified in Permit Section E.12.e (ii)(c) Numeric Sizing Criteria for Storm Water Retention and Treatment.

4.2.1 Project Specific Hydrology Characterization

The purpose of this section of the Project WQMP is to establish targets for post-development hydrology based on performance criteria specified in Section E.12.e.ii.c and Section E.12.f of the Phase II Small MS4 Permit. These targets include runoff volume for water quality control (referred to as LID design capture volume), and runoff volume, time of concentration, and peak runoff for protection from hydromodification.

If the project has more than one outlet for stormwater runoff, then complete additional versions of these forms for each DA / outlet.

It is noted that in the Phase II Small MS4 Permit jurisdictions, the LID BMP Design Capture Volume criteria is based on the 2-year rain event. The hydromodification performance criterion is based on the 10-year rain event.

Methods applied in the following forms include:

For LID BMP Design Capture Volume (DCV), San Bernardino County requires use of the P6 method (Form 4.2-1) For pre- and post-development hydrologic calculation, San Bernardino County requires the use of the Rational Method (San Bernardino County Hydrology Manual Section D). Forms 4.2-2 through Form 4.2-5 calculate hydrologic variables including runoff volume, time of concentration, and peak runoff from the project site pre- and post-development using the Hydrology Manual Rational Method approach. For projects greater than 640 acres (1.0 mi²), the Rational Method and these forms should not be used. For such projects, the Unit Hydrograph Method (San Bernardino County Hydrology Manual Section E) shall be applied for hydrologic calculations for hydromodification performance criteria.

Refer to Section 4 in the TGD for WQMP for detailed guidance and instructions.

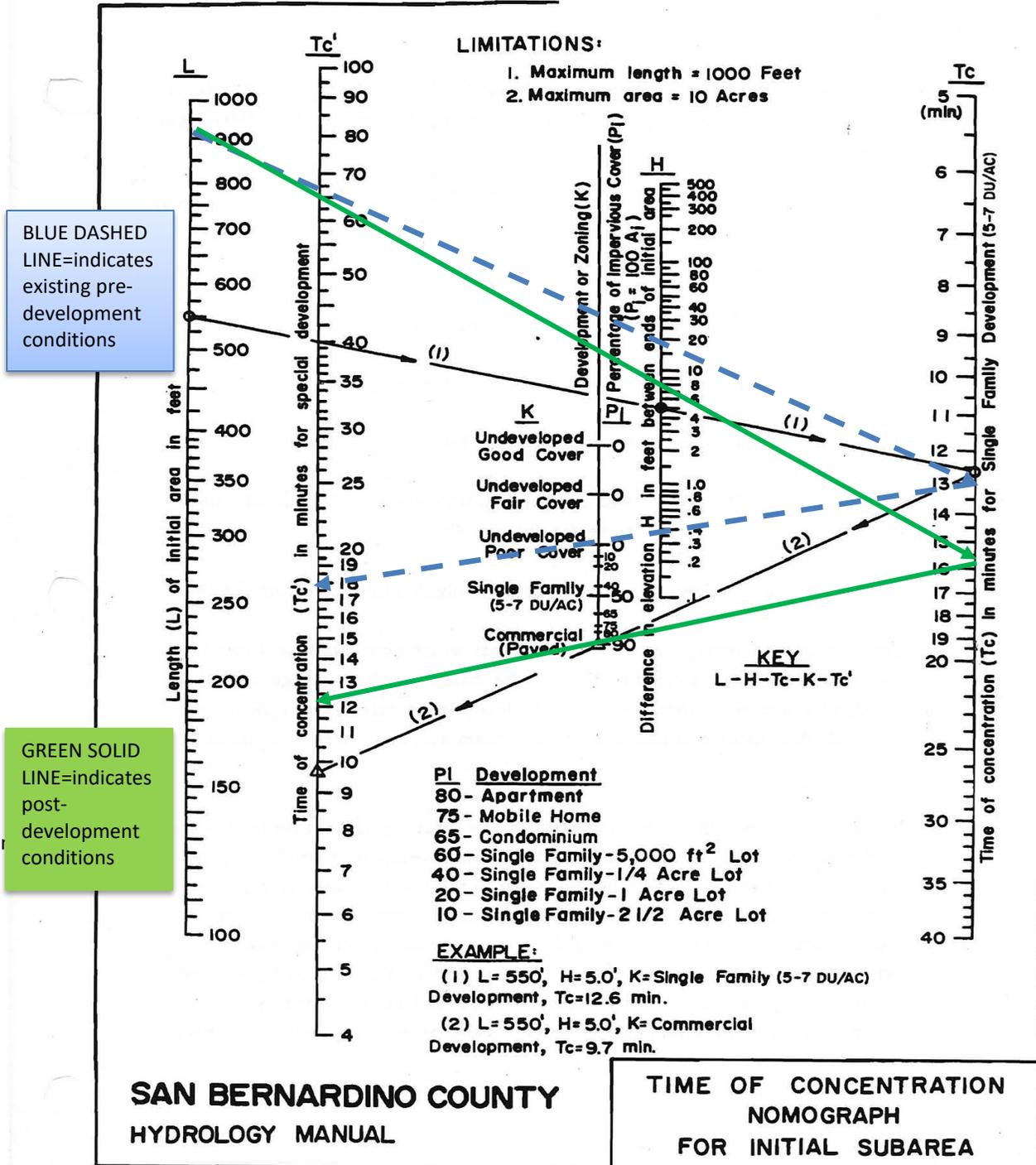
Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 1 & 2)			
1 Project area DA 1 (ft ²):	3,927,130	2 Imperviousness after applying preventative site design practices (Imp%):	3,534,417 90.00%
		3 Runoff Coefficient (Rc):	0.730 <small>$Rc = 0.858(Imp\%)^3 - 0.78(Imp\%)^2 + 0.774(Imp\%) + 0.04$</small>
4 Determine 1-hour rainfall depth for a 2-year return period P2yr-1hr (in):			0.348
			http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html
5 Compute P6, Mean 6-hr Precipitation (inches):			0.431
<small>$P6 = \text{Item 4} * C1$, where C1 is a function of site climatic region specified in Form 3-1 Item 1 (Desert = 1.2371)</small>			
6 Drawdown Rate			
<small>Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.</small>		24-hrs	
		<input checked="" type="checkbox"/> 48-hrs	
7 Compute design capture volume, DCV (ft ³):			201,971
<small>$DCV = 1/12 * [\text{Item 1} * \text{Item 3} * \text{Item 5} * C2]$, where C2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)</small>			
<small>Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2</small>			

Form 4.2-2 Summary of Hydromodification Assessment (DA1)			
Is the change in post- and pre- condition flows captured on-site? :		<input checked="" type="checkbox"/>	Yes
<small>If "Yes", then complete Hydromodification assessment of site hydrology for 10yr storm event using Forms 4.2-3 through 4.2-5 and insert results below (Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual- Addendum 1)</small>		<input type="checkbox"/>	No
<small>If "No," then proceed to Section 4.3 BMP Selection and Sizing</small>			
Condition	Runoff Volume (ft ³)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	1 421,224 <small>Form 4.2-3 Item 12</small>	2 18.40 <small>Form 4.2-4 Item 13</small>	3 49.17 <small>Form 4.2-5 Item 10</small>
Post-development	4 472,569 <small>Form 4.2-3 Item 13</small>	5 12.10 <small>Form 4.2-4 Item 14</small>	6 85.39 <small>Form 4.2-5 Item 14</small>
Difference	7 51,345 <small>Item 4 – Item 1</small>	8 6.30 <small>Item 2 – Item 5</small>	9 36.22 <small>Item 6 – Item 3</small>
Difference (as % of pre-developed)	10 12% <small>Item 7 / Item 1 %</small>	11 315% <small>Item 8 / Item 2 %</small>	12 74% <small>Item 9 / Item 3 %</small>

NOTES: Refer to Added Work sheet for all Drainage Area

Form 4.2-3 HCOC Assessment for Runoff Volume (DA1 & 2)						
Weighted Curve Number Determination: for Pre-developed DA	<u>Entire Project</u>			DMA D	DMA E	Totals
1a Land Cover Type	Barren	Barren	Barren	N/A	N/A	
2a Hydrologic Soil Group (HSG)	A	C	D	N/A	N/A	
3a DMA Area ft ² <i>Sum of areas of DMA should equal area of DA</i>	370,260	910,404	2,646,466	0	0	3,927,130
4 Curve Number (CN) <i>use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP</i>	78	91	93	0	0	0
Weighted Curve Number Determination: Post-developed DA	<u>Entire Project</u>					
1b Land Cover Type	DMA A New Building (Roof)	DMA B New Impervious Concrete /Paving	DMA C New Curbed Landscape (Self-treating)	DMA D New Amended Soils (Infiltration)	DMA E	Totals
2b Hydrologic Soil Group (HSG)	N/A	N/A	D	A		
3b DMA Area ft ² <i>sum of areas of DMA should equal area of</i>	1,346,910	2,187,507	257,620	135,093		3,927,130
4b Curve Number (CN) <i>use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP</i>	98	98	75	32		
5 Pre-Developed area-weighted CN: 91	7 Pre-developed soil storage capacity, S (in): $S=(1000/item\ 5) - 10$ 0.97				9 Initial abstraction, I_a (in): $I_a=0.2*Item\ 7$ 0.19	
6 Post Developed area weighted CN: 93	8 Post developed soil storage capacity, S (in): $S=(1000/Item\ 6) - 10$ 0.74				10 Initial abstraction, I_a (in): $I_a = 0.2*Item\ 8$ 0.15	
11 Precipitation for 10 yr, 24 hr storm (in): Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html						2.13
12 Pre-developed Volume (ft ³): $V_{pre}=(1/12)*(Item\ sum\ of\ Item\ 3) * [Item\ 11- Item\ 9]^2 / ((Item\ 11 - Item\ 9 + Item\ 7))$						421,223.51
13 Post developed Volume (ft ³): $V_{pre}=(1/12) * (Item\ sum\ of\ Item\ 3) * [(Item\ 11 - Item\ 10)^2 / ((Item\ 11 - Item\ 10 + Item\ 8))$						472,568.51
14 Volume Reduction needed to meet hydromodification requirement, (ft ³): $V_{hydro} = (Item\ 13 * 0.95) - Item\ 12$						27,716.6

Form 4.2-4 HCOC Assessment for Time of Concentration (DA 1 & 2)						
Compute time of concentration for pre and post developed conditions for each DA (For projects using the Hydrology Manual complete the form below)						
Variables	Pre-developed			Post-developed		
	<u>Native-Undeveloped</u>	DMA B	DMA C	<u>New Impervious Concrete /Paving</u>	DMA C	DMA D
1 Length of flowpath (ft) <i>Use Form 3-2 Item 5 for pre-developed condition</i>	962			930		
2 Change in elevation (ft)	17			8		
3 Slope (ft/ft), <i>So = Item 2 / Item 1</i>	0.018			0.009		
4 Land cover	Barren			Commercial		
5 Initial DMA Time of Concentration (min) <i>Appendix C-1 of the TGD for WQMP</i>	18.4			12.1		
6 Length of conveyance from DMA outlet to project site outlet (ft) <i>May be zero if DMA outlet is at project site outlet</i>	0			0		
7 Cross-sectional area of channel (ft ²)	0			0		
8 Wetted perimeter of channel (ft)	0			0		
9 Manning's roughness of channel (n)	0			0		
10 Channel flow velocity (ft/sec) <i>$V_{fps} = (1.49 / \text{Item } 9) * (\text{Item } 7 / \text{Item } 8)^{0.67} * (\text{Item } 3)^{0.5}$</i>	0			0		
11 Travel time to outlet (min) <i>$T_t = \text{Item } 6 / (\text{Item } 10 * 60)$</i>	0			0		
12 Total time of concentration (min) <i>$T_c = \text{Item } 5 + \text{Item } 11$</i>	18.40			12.10		
13 Pre-developed time of concentration (min):	<i>Minimum of Item 12 pre-developed DMA</i>					18.40
14 Post-developed time of concentration (min):	<i>Minimum of Item 12 post-developed DMA</i>					12.10
15 Additional time of concentration needed to meet HCOC requirement (min): <i>14</i>	<i>$T_{c-HCOC} = (\text{Item } 13 * 0.95) - \text{Item } 14$</i>					5.4
Notes: Refer to follow sheet (Figure D-1 Time of Concentration Nomograph) from the Hydrology Manual that was used to determine #5 of this Form.						



BLUE DASHED LINE=indicates existing pre-development conditions

GREEN SOLID LINE=indicates post-development conditions

Figure D-1

Form 4.2-5 Hydromodification Assessment for Peak Runoff (DA 1)

Compute peak runoff for pre- and post-developed conditions

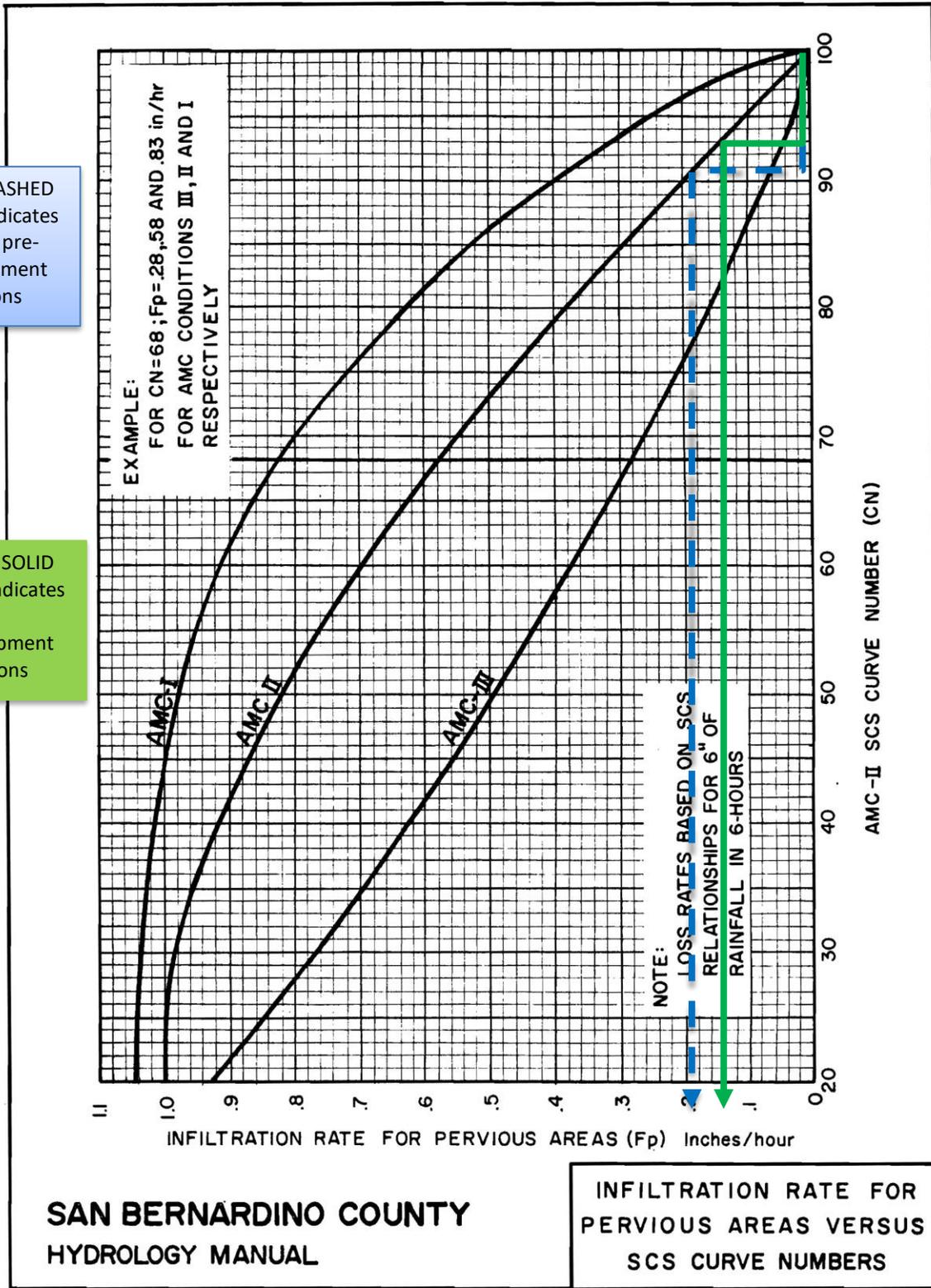
Variables	Pre-developed DA to Project Outlet <i>(Use additional forms if more than 3 DMA)</i>			Post-developed DA to Project Outlet <i>(Use additional forms if more than 3 DMA)</i>		
	DA1	DA2	-	DA1 - PAVED	DMA East	DMA West
1 Rainfall Intensity for storm duration equal to time of concentration/ <i>$peak = 10^{(LOG Form 4.2-1 Item 4 - 0.7 LOG Form 4.2-4 Item 5 /60)}$</i>	0.80	0.80	0.00	1.07	1.07	1.07
2 Drainage Area of each DMA (Acres) <i>For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)</i>	90.15	0.00	0.00	90.15	37.74	33.42
3 Ratio of pervious area to total area <i>For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)</i>	1.00	#DIV/0!	0.00	0.10	0.10	0.10
4 Pervious area infiltration rate (in/hr) <i>Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP</i>	0.19	0.4	0	0.15	0.15	0.15
5 Maximum loss rate (in/hr) <i>$F_m = Item 3 * Item 4$ Use area-weighted F_m from DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)</i>	0.19	#DIV/0!	0.00	0.02	0.02	0.02
6 Peak Flow from DMA (cfs) <i>$Q_p = Item 2 * 0.9 * (Item 1 - Item 5)$</i>	49.17	#DIV/0!	0.00	85.39	35.75	31.65
7 Time of concentration adjustment factor for other DMA to site discharge point <i>Form 4.2-4 Item 12 DMA / Other DMA upstream of site discharge point (If ratio is greater than 1.0, then use maximum value of 1.0)</i>	DMA A	<i>n/a</i>	0	0	<i>n/a</i>	0.00
	DMA B	0.00	<i>n/a</i>	0	0	<i>n/a</i>
	DMA C	0	0	0	0	0.00
8 Pre-developed Q_p at T_c for DMA A: <i>$Q_p = Item 6_{DMAA} + [Item 6_{DMAB} * (Item 1_{DMAA} - Item 5_{DMAB}) / (Item 1_{DMAB} - Item 5_{DMAB}) * Item 7_{DMAA/2}] + [Item 6_{DMAC} * (Item 1_{DMAA} - Item 5_{DMAC}) / (Item 1_{DMAC} - Item 5_{DMAC}) * Item 7_{DMAA/3}]$</i>						49.17
9 Pre-developed Q_p at T_c for DMA B: <i>$Q_p = Item 6_{DMAB} + [Item 6_{DMAA} * (Item 1_{DMAB} - Item 5_{DMAA}) / (Item 1_{DMAA} - Item 5_{DMAA}) * Item 7_{DMAB/1}] + [Item 6_{DMAC} * (Item 1_{DMAB} - Item 5_{DMAC}) / (Item 1_{DMAC} - Item 5_{DMAC}) * Item 7_{DMAB/3}]$</i>						#DIV/0!
10 Pre-developed Q_p at T_c for DMA C: <i>$Q_p = Item 6_{DMAC} + [Item 6_{DMAA} * (Item 1_{DMAC} - Item 5_{DMAA}) / (Item 1_{DMAA} - Item 5_{DMAA}) * Item 7_{DMAC/1}] + [Item 6_{DMAB} * (Item 1_{DMAC} - Item 5_{DMAB}) / (Item 1_{DMAB} - Item 5_{DMAB}) * Item 7_{DMAC/2}]$</i>						0.00
10 Peak runoff from pre-developed condition confluence analysis (cfs): <i>Maximum of Item 8, 9, and 10 (including additional forms as needed)</i>						49.17
11 Post-developed Q_p at T_c for DMA A: <i>Same as Item 8 for post-developed values</i>						85.39
12 Post-developed Q_p at T_c for DMA B: <i>Same as Item 9 for post-developed values</i>						35.75
13 Post-developed Q_p at T_c for DMA C: <i>Same as Item 10 for post-developed values</i>						31.65
14 Peak runoff from post-developed condition confluence analysis (cfs): <i>Maximum of Item 11, 12, and 13 (including additional forms as needed)</i>						85.39
15 Peak runoff reduction needed to meet Hydromodification Requirement (cfs): <i>$Q_{p-hydro} = (Item 14 * 0.95) - Item 10$</i>						31.95

Notes:

Refer to following sheet (Figure C-6, Infiltration Rate Graph from the Hydrology Manual) that established #4 of this Form. #10 and #14 are the maximums of #6.

BLUE DASHED LINE=indicates existing pre-development conditions

GREEN SOLID LINE=indicates post-development conditions



C-15

Figure C-6

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12-Apr

4.3 BMP Selection and Sizing

Complete the following forms for each project site DA to document that the proposed treatment (LID/Bioretenion) BMPs conform to the project DCV developed to meet performance criteria specified in the Phase II Small MS4 Permit (WQMP Template Section 4.2). For the LID DCV, the forms are ordered according to hierarchy of BMP selection as required by the Phase II Small MS4 Permit (see Section 5.3 in the TGD for WQMP). The forms compute the following for on-site LID BMP:

- Site Design Measures (Form 4.3-2)
- Retention and Infiltration BMPs (Form 4.3-3) or
- Biotreatment BMPs (Form 4.3-4).

Please note that the selected BMPs may also be used as dual purpose for on-site, hydromodification mitigation and management.

At the end of each form, additional fields facilitate the determination of the extent of mitigation provided by the specific BMP category, allowing for use of the next category of BMP in the hierarchy, if necessary.

The first step in the analysis, using Section 5.3.2 of the TGD for WQMP, is to complete Forms 4.3-1 and 4.3-3) to determine if retention and infiltration BMPs are infeasible for the project. For each feasibility criterion in Form 4.3-1, if the answer is “Yes,” provide all study findings that includes relevant calculations, maps, data sources, etc. used to make the determination of infeasibility.

Next, complete Form 4.3-2 to determine the feasibility of applicable Site Design BMPs, and, if their implementation is feasible, the extent of mitigation of the DCV.

If no site constraints exist that would limit the type of BMP to be implemented in a DA, evaluate the use of combinations of LID BMPs, including all applicable Site Design BMPs to maximize on-site retention of the DCV. If no combination of BMP can mitigate the entire DCV, implement the single BMP type, or combination of BMP types, that maximizes on-site retention of the DCV within the minimum effective area.

If the combination of site design, retention and/or infiltration BMPs is unable to mitigate the entire DCV, then the remainder of the volume-based performance criteria that cannot be achieved with site design, retention and/or infiltration BMPs must be managed through biotreatment BMPs. If biotreatment BMPs are used, then they must be sized to provide equivalent effectiveness based on Template Section 4.3.4.

4.3.1 Exceptions to Requirements for Bioretention Facilities

Contingent on a demonstration that use of bioretention or a facility of equivalent effectiveness is infeasible, other types of biotreatment or media filters (such as tree-box-type biofilters or in-vault media filters) may be used for the following categories of Regulated Projects:

- 1) Projects creating or replacing an acre or less of impervious area, and located in a designated pedestrian-oriented commercial district (i.e., smart growth projects), and having at least 85% of the entire project site covered by permanent structures;
- 2) Facilities receiving runoff solely from existing (pre-project) impervious areas; and
- 3) Historic sites, structures or landscapes that cannot alter their original configuration in order to maintain their historic integrity.

Form 4.3-1 Infiltration BMP Feasibility (DA 1)		
Feasibility Criterion – Complete evaluation for each DA on the Project Site		
1 Would infiltration BMP pose significant risk for groundwater related concerns? <i>Refer to Section 5.3.2.1 of the TGD for WQMP</i> If Yes, Provide basis: (attach)	<u>Yes</u> <input type="checkbox"/>	<u>No</u> <input checked="" type="checkbox"/>
2 Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? (Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert): <ul style="list-style-type: none"> • The location is less than 50 feet away from slopes steeper than 15 percent • The location is less than eight feet from building foundations or an alternative setback. • A study certified by a geotechnical professional or an available watershed study determines that If Yes, Provide basis: (attach)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3 Would infiltration of runoff on a Project site violate downstream water rights? If Yes, Provide basis: (attach)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4 Is proposed infiltration facility located on hydrologic soil group (HSG) D soils or does the site geotechnical investigation indicate presence of soil characteristics, which support categorization as D soils? If Yes, Provide basis: (attach)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5 Is the design infiltration rate, after accounting for safety factor of 2.0, below proposed facility less than 0.3 in/hr (accounting for soil amendments)? If Yes, Provide basis: (attach)	<input type="checkbox"/>	<input type="checkbox"/>
6 Would on-site infiltration or reduction of runoff over pre-developed conditions be partially or fully inconsistent with watershed management strategies as defined in the WAP, or impair beneficial uses? <i>See Section 3.5 of the TGD for WQMP and WAP</i> If Yes, Provide basis: (attach)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7 Any answer from Item 1 through Item 3 is “Yes”: <i>If yes, infiltration of any volume is not feasible onsite. Proceed to Form 4.3-4, Harvest and Use BMP. If no, then proceed to Item 8 below.</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8 Any answer from Item 4 through Item 6 is “Yes”: <i>If yes, infiltration is permissible but is not required to be considered. Proceed to Form 4.3-2, Hydrologic Source Control BMP. If no, then proceed to Item 9, below.</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9 All answers to Item 1 through Item 6 are “No”: <i>Infiltration of the full DCV is potentially feasible, LID infiltration BMP must be designed to infiltrate the full DCV to the MEP. Proceed to Form 4.3-2, Hydrologic Source Control BMP.</i>		

NOTES:

Item #5 is blank during the "Preliminary" submittal, until an Infiltration Test is completed.

4.3.2 Site Design BMP

Section E.12.e. of the Small Phase II MS4 Permit emphasizes the use of LID preventative measures; and the use of Site Design Measures reduces the portion of the DCV that must be addressed in downstream BMPs. Therefore, all applicable Site Design Measures shall be provided except where they are mutually exclusive with each

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other, or with other BMPs. Mutual exclusivity may result from overlapping BMP footprints such that either would be potentially feasible by itself, but both could not be implemented. Please note that while there are no numeric standards regarding the use of Site Design BMPs. If a project cannot feasibly meet BMP sizing requirements or cannot fully address hydromodification, feasibility of all applicable Site Design BMPs must be part of demonstrating that the BMP system has been designed to retain the maximum feasible portion of the DCV. Complete Form 4.3-2 to identify and calculate estimated retention volume from implementing site design BMP. Refer to Section 5.4 in the TGD for more detailed guidance.

Form 4.3-2 Site Design Hydrologic Source Control BMPs (DA 1)				
1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP <input checked="" type="checkbox"/> Yes <i>If yes, complete Items 2-5;</i> <input type="checkbox"/> No <i>If no, proceed to Item 6</i>	Roof Northwest Corner	Roof Northeast Corner	Roof Southwest Corner	Roof Southeast Corner
	Adjacent Landscaped Area	Adjacent Landscaped Area	Adjacent Landscaped Area	Adjacent Landscaped Area
2 Total impervious area draining to pervious area (ft ²)	6,720	6,720	6,720	6,720
3 Ratio of pervious area receiving runoff to impervious area	0.12	0.12	0.17	0.17
4 Retention volume achieved from impervious area dispersion (ft ³) <i>V = Item 2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff</i>	33.7	33.7	48.0	48.0
5 Sum of retention volume achieved from impervious area dispersion (ft ³): <i>Vretention = Sum of Item 4 for all BMPs</i>				163
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): <input checked="" type="checkbox"/> Yes <i>if yes, complete Items 7- 13 for aggregate of all on-lot infiltration BMP in each DA;</i> <input type="checkbox"/> No <i>If no, proceed to Item 14</i>	Landscaped Rain Gardens	Landscaped Rain Gardens	Landscaped Rain Gardens	Landscaped Rain Gardens
7 Ponding surface area (ft ²)	810	810	1,152	1,152
8 Ponding depth (ft)	0.25	0.25	0.25	0.25
9 Surface area of amended soil/gravel (ft ²)	810	810	1,152	1,152
10 Average depth of amended soil/gravel (ft)	1.50	1.50	1.50	1.50
11 Average porosity of amended soil/gravel	0.25	0.25	0.25	0.25
12 Retention volume achieved from on-lot infiltration (ft ³) <i>Vretention = (Item 7 * Item 8) + (Item 9 * Item 10 * Item 11)</i>	506	506	720	720
13 Runoff volume retention from on-lot infiltration (ft ³): <i>Vretention = Sum of Item 12 for all BMPs</i>				2,452
14 Implementation of Street Trees: <input type="checkbox"/> Yes <i>If yes, complete Items 22-25.</i> <input checked="" type="checkbox"/> No <i>If no, proceed to Item 26</i>	DA	DA	DA	DA
	BMP Type	BMP Type	BMP Type	BMP Type
15 Number of Street Trees				
16 Average canopy cover over impervious area (ft ²)				
17 Runoff volume retention from street trees (ft ³) <i>Vretention = Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches</i>				
18 Runoff volume retention from street tree BMPs (ft ³): <i>Vretention = Sum of Item 24 for all BMPs</i>				0
19 Total Retention Volume from Site Design Hydrologic Source Control BMPs: <i>Sum of Items 5, 13, 20, 25 and 29</i>				2,616

Notes:

Site Design Methods described in Form 4.1-3 and those applied in design are calculated in Form 4.3-3 where infiltration rate of native soils is applied to the limited drawdown time.

4.3.3 Infiltration BMPs

Use Form 4.3-3 to compute on-site retention of runoff from proposed retention and infiltration BMPs. Volume retention estimates are sensitive to the percolation rate used, which determines the amount of runoff that can be infiltrated within the specified drawdown time. The infiltration safety factor reduces field measured percolation to account for potential inaccuracy associated with field measurements, declining BMP performance over time, and compaction during construction. Appendix C of the TGD for WQMP provides guidance on estimating an appropriate safety factor to use in Form 4.3-3.

If site constraints limit the use of BMPs to a single type and implementation of retention and infiltration BMPs mitigate no more than 40% of the DCV, then they are considered infeasible and the Project Proponent may evaluate the effectiveness of BMPs lower in the LID hierarchy of use (Section 5.5 of the TGD for WQMP)

If implementation of infiltrations BMPs is feasible as determined using Form 4.3-1, then LID infiltration BMPs shall be implemented to the MEP (section 4.1 of the TGD for WQMP).

4.3.3.1 Allowed Variations for Special Site Conditions

The bioretention system design parameters of this Section may be adjusted for the following special site conditions:

- 1) Facilities located within 10 feet of structures or other potential geotechnical hazards established by the geotechnical expert for the project may incorporate an impervious cutoff wall between the bioretention facility and the structure or other geotechnical hazard.
- 2) Facilities with documented high concentrations of pollutants in underlying soil or groundwater, facilities located where infiltration could contribute to a geotechnical hazard, and facilities located on elevated plazas or other structures may incorporate an impervious liner and may locate the underdrain discharge at the bottom of the subsurface drainage/storage layer (this configuration is commonly known as a “flow-through planter”).
- 3) Facilities located in areas of high groundwater, highly infiltrative soils or where connection of underdrain to a surface drain or to a subsurface storm drain are infeasible, may omit the underdrain.
- 4) Facilities serving high-risk areas such as fueling stations, truck stops, auto repairs, and heavy industrial sites may be required to provide adequate pretreatment to address pollutants of concern unless these high-risk areas are isolated from storm water runoff or bioretention areas with no chance of spill migration.

Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA 1)				
DCV Required Form 4.2-1, Item #7 (ft3):		201,971		
(minus) Volume obtained in Site Design BMPs Form 4.3-2 (ft3)		2,616		
1 Remaining LID DCV not met by site design HSC BMP (ft3):		199,355		
BMP Type Use columns to the right to compute runoff volume retention from proposed infiltration BMP - Use additional forms for more BMPs	Southern Large Basin		DA3	DA
2 Infiltration rate of underlying soils (in/hr)	0.05	0.0	0.00	0.00
3 Infiltration safety factor	2	2	2	2.0
4 Design percolation rate (in/hr) <i>P_{design} = Item 2 / Item 3</i>	0.025	0.0	0.0	0.0
5 Pondered water drawdown time (hr) <i>Copy Item 6 in Form 4.2-1</i>	48	48	48	48
6 Maximum ponding depth (ft) <i>6 ft maximum per City code</i>	0.0	0.0	0.0	0.00
7 Ponding Depth (ft) <i>d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6</i>	0.10	0.00	0.00	0.00
8 Infiltrating surface area, <i>SA_{BMP} (ft²)</i>	135,093	0	0	0.00
9 Amended soil depth, d _{media} (ft) <i>Only included in certain BMP types</i>	2.0	0.00	0.00	0.00
10 Amended soil porosity	0.35	0.00	0.00	0.00
11 Gravel depth, d _{media} (ft) <i>Only included in certain BMP types</i>	2.00	0.00	0.00	0.00
12 Gravel porosity	0.40	0.40	0.40	0.00
13 Duration of storm as basin is filling (hrs) <i>Typical ~ 3hrs</i>	3	3	3	0.00
14 Above Ground Retention Volume (ft3) <i>V_{retention} = Item 8 * [Item 7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]</i>	216,993	0	0	
15 Underground Retention Volume (ft3) <i>Volume determined using manufacturer's specifications and calculations</i>				
16 Total Retention Volume from LID Infiltration BMPs: <i>(Sum of Items 14 and 15 for all infiltration BMP included in plan)</i>	216,993			
17 Fraction of DCV achieved with infiltration BMP: <i>% Retention% = Item 16 / Form 4.2-1 Item 7</i>				109%
18 Is full LID DCV retained on-site with combination of hydrologic source control and LID retention and infiltration BMPs?				<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Note:

Item #2 is "PRELIMINARY" and pending Infiltration Study.

Item #8 is given the High Water Surface Area only and not the entire surrounding landscaped surface.

4.3.4 Biotreatment BMPs

Biotreatment BMPs may be considered if the full LID DCV cannot be met by maximizing retention and infiltration. A key consideration when using biotreatment BMP is the effectiveness of the proposed BMP in addressing the pollutants of concern for the project (see Table 5-5 of the TGD for WQMP).

Use Form 4.3-4 to summarize the potential for volume based and/or flow based biotreatment options to biotreat the remaining unmet LID DCV. Biotreatment computations are included as follows:

Use Form 4.3-5 to compute biotreatment in small volume based biotreatment BMP (e.g. bioretention w/underdrains);

Use Form 4.3-6 to compute biotreatment in large volume based biotreatment BMP (e.g. constructed wetlands);

Use Form 4.3-7 to compute sizing criteria for flow-based biotreatment BMP (e.g. bioswales)

Form 4.3-4 Selection and Evaluation of Biotreatment BMP (DA 1)				
1 Remaining LID DCV not met by site design, or infiltration, BMP for potential biotreatment (ft ³):	0	List pollutants of concern <i>Copy from Form 2.3-1.</i>	See 2.3-1	
2 Biotreatment BMP Selected <i>(Select biotreatment BMP(s) necessary to ensure all pollutants of concern are addressed through Unit Operations and Processes, described in Table 5-5 of the TGD for WQMP)</i>	Volume-based biotreatment <i>Use Forms 4.3-5 and 4.3-6 to compute treated volume</i>		Flow-based biotreatment <i>Use Form 4.3-7 to compute treated volume</i>	
	<input type="checkbox"/>	Bioretention with underdrain	<input type="checkbox"/>	Vegetated swale
	<input type="checkbox"/>	Planter box with underdrain	<input type="checkbox"/>	Vegetated filter strip
	<input type="checkbox"/>	Constructed wetlands	<input type="checkbox"/>	Proprietary biotreatment
	<input type="checkbox"/>	Wet extended detention		
<input type="checkbox"/>	Dry extended detention			
3 Volume biotreated in volume based biotreatment BMP (ft ³): <i>Form 4.3-5 Item 15 + Form 4.3-6 Item 13</i>	0			
4 Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft ³): <i>Item 1 – Item 3</i>	0			
5 Remaining fraction of LID DCV for sizing flow based biotreatment BMP: <i>% Item 4 / Item 1</i>	0%			
6 Flow-based biotreatment BMP capacity provided (cfs): <i>Use Figure 5-2 of the TGD for WQMP to determine flow capacity required to provide biotreatment of remaining percentage of unmet LID DCV (Item 5), for the project's precipitation zone (Form 3-1 Item 1)</i>	0			
7 Metrics for MEP determination:	No additional Biotreatment necessary. See 4.3-8 for Conformance Summary.			
<ul style="list-style-type: none"> • Provided a WQMP with the portion of site area used for suite of LID BMP equal to minimum thresholds in Table 5-7 of the TGD for WQMP for the proposed category of development: <i>If maximized on-site retention BMPs is feasible for partial capture, then LID BMP implementation must be optimized to retain and infiltrate the maximum portion of the DCV possible within the prescribed minimum effective area. The remaining portion of the DCV shall then be mitigated using biotreatment BMP.</i> 				

Form 4.3-5 Volume Based Biotreatment (DA 1) Bioretention and Planter Boxes with Underdrains			
Biotreatment BMP Type <i>(Bioretention w/underdrain, planter box w/underdrain, other comparable BMP)</i>	DA 1	DA 2	DA 3
1 Pollutants addressed with BMP <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP</i>	0		
2 Amended soil infiltration rate <i>Typical ~ 5.0</i>	5.0		
3 Amended soil infiltration safety factor <i>Typical ~ 2.0</i>	2.0		
4 Amended soil design percolation rate (in/hr) <i>P_{design} = Item 2 / Item 3</i>	0		
5 Ponded water drawdown time (hr) <i>Copy Item 6 from Form 4.2-1</i>	48		
6 Maximum ponding depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>	0		
7 Ponding Depth (ft) <i>d_{BMP} = Minimum of (1/12 * Item 4 * Item 5) or Item 6</i>	0		
8 Amended soil surface area (ft ²)	0		
9 Amended soil depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>	0		
10 Amended soil porosity, <i>n</i>	0		
11 Gravel depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>	0		
12 Gravel porosity, <i>n</i>	0		
13 Duration of storm as basin is filling (hrs) <i>Typical ~ 3hrs</i>	3		
14 Biotreated Volume (ft ³) <i>V_{biotreated} = Item 8 * [(Item 7/2) + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]</i>	0		
15 Total biotreated volume from bioretention and/or planter box with underdrains BMP: <i>Sum of Item 14 for all volume-based BMPs included in this form</i>	0	0	0

Notes: Not Used. LID requirements met.

Form 4.3-6 Volume Based Biotreatment (DA 1) – Constructed Wetlands and Extended Detention				
Biotreatment BMP Type <i>Constructed wetlands, extended wet detention, extended dry detention, or other comparable proprietary BMP. If BMP includes multiple modules (e.g. forebay and main basin), provide separate estimates for storage and pollutants treated in each module.</i>	DA DMA BMP TYPE		DA DMA BMP TYPE	
	Forebay	Basin	Forebay	Basin
1 Pollutants addressed with BMP forebay and basin <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes</i>				
2 Bottom width (ft)	0	0	0	0
3 Bottom length (ft)	0	0	0	0
4 Bottom area (ft ²) <i>A_{bottom} = Item 2 * Item 3</i>	0	0	0	0
5 Side slope (ft/ft)	0	0	0	0
6 Depth of storage (ft)	0	0	0	0
7 Water surface area (ft ²) <i>A_{surface} = (Item 2 + (2 * Item 5 * Item 6)) * (Item 3 + (2 * Item 5 * Item 6))</i>	0	0	0	0
8 Storage volume (ft ³) <i>For BMP with a forebay, ensure fraction of total storage is within ranges specified in BMP specific fact sheets, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i> <i>V = Item 6 / 3 * [Item 4 + Item 7 + (Item 4 * Item 7)^0.5]</i>	0	0	0	0
9 Drawdown Time (hrs) <i>Copy Item 6 from Form 2.1</i>	48		48	
10 Outflow rate (cfs) <i>Q_{BMP} = (Item 8 forebay + Item 8 basin) / (Item 9 * 3600)</i>	0.00		0.00	
11 Duration of design storm event (hrs) <i>All default shown in Table 5-6 of the TGD for detention types</i>	3		3	
12 Biotreated Volume (ft ³) <i>V_{biotreated} = (Item 8 forebay + Item 8 basin) + (Item 10 * Item 11 * 3600)</i>	0		0	
13 Total biotreated volume from constructed wetlands, extended dry detention, or extended wet detention : <i>(Sum of Item 12 for all BMP included in plan)</i>				0

Notes: Not Used. LID requirements met.

Form 4.3-7 Flow Based Biotreatment (DA 1)			
Drainage Areas	DA	DA	DA
Biotreatment BMP Type :	DMA	DMA	DMA
<i>Vegetated swale, vegetated filter strip, or other comparable proprietary BMP</i>			
1 Pollutants addressed with BMP <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in TGD Table 5-5</i>			
2 Flow depth for water quality treatment (ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>	0		
3 Bed slope (ft/ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>	0		
4 Manning's roughness coefficient	0		
5 Bottom width (ft) <i>$b_w = (Form\ 4.3-5\ Item\ 6 * Item\ 4) / (1.49 * Item\ 2^{1.67} * Item\ 3^{0.5})$</i>	-		
6 Side Slope (ft/ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>	0		
7 Cross sectional area (ft ²) <i>$A = (Item\ 5 * Item\ 2) + (Item\ 6 * Item\ 2^{0.5})$</i>	-		
8 Water quality flow velocity (ft/sec) <i>$V = Form\ 4.3-5\ Item\ 6 / Item\ 7$</i>	-		
9 Hydraulic residence time (min) <i>Pollutant specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			0.04
10 Length of flow based BMP (ft) <i>$L = Item\ 8 * Item\ 9 * 60$</i>	-		
11 Water surface area at water quality flow depth (ft ²) <i>$SA_{top} = (Item\ 5 + (2 * Item\ 2 * Item\ 6)) * Item\ 10$</i>	-		
Notes: Not used			

4.3.5 Conformance Summary

Complete Form 4.3-8 to demonstrate how on-site LID DCV is met with proposed site design, infiltration, and/or biotreatment BMP. The bottom line of the form is used to describe the basis for infeasibility determination for on-site LID BMP to achieve full LID DCV, and provides methods for computing remaining volume to be addressed in an alternative compliance plan. If the project has more than one outlet, then complete additional versions of this form for each outlet.

Form 4.3-8 Conformance Summary and Alternative Compliance Volume Estimate (DA 1)										
1 Total LID DCV for the Project DA (ft ³):	<i>Copy Item 7 in Form 4.2-1</i>	201,971								
2 On-site retention with site design BMP (ft ³):	<i>Copy Item 19 in Form 4.3-2</i>	2,616								
3 On-site retention with LID infiltration BMP (ft ³):	<i>Copy Item 16 in Form 4.3-3</i>	216,993								
4 On-site biotreatment with volume based biotreatment BMP (ft ³):	<i>Copy Item 3 in Form 4.3-4</i>	0								
5 Flow capacity provided by flow based biotreatment BMP (cfs):	<i>Copy Item 6 in Form 4.3-4</i>	0								
6 LID BMP performance criteria are achieved if answer to any of the following is "Yes":		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;"><u>Yes</u></th> <th style="width: 50%; text-align: center;"><u>No</u></th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </tbody> </table>	<u>Yes</u>	<u>No</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<u>Yes</u>	<u>No</u>									
<input checked="" type="checkbox"/>	<input type="checkbox"/>									
<input checked="" type="checkbox"/>	<input type="checkbox"/>									
<input checked="" type="checkbox"/>	<input type="checkbox"/>									
<input checked="" type="checkbox"/> Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: <i>If yes, sum of Items 2, 3, and 4 is greater than Item 1</i>										
<input checked="" type="checkbox"/> Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: <i>If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3-5 Item 6 and Items 2, 3 and 4 are maximized</i>										
<input checked="" type="checkbox"/> On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: <i>If yes, Form 4.3-1 Items 7 and 8 were both checked yes</i>										
7 If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:										
<input checked="" type="checkbox"/> Combination of Site Design, retention and infiltration, and biotreatment BMPs provide less than full LID DCV capture: <i>Checked "Yes" if Form 4.3-4 Item 7 is checked yes, Form 4.3-4 Item 6 is zero, and sum of Items 2,3,4, and 5 is less than 1. If so, apply water quality credits and calculate volume for alternative compliance,</i> $V_{alt} = (Item\ 1 - Item\ 2 - Item\ 3 - Item\ 4 - Item\ 5) * (100 - Form\ 2.4-1\ Item\ 2)\%$		N/A								
<input checked="" type="checkbox"/> Facilities, or a combination of facilities, of a different design than in Section E.12.e.(ii)(f) may be permitted if all of the following Phase II Small MS4 General Permit 2013-0001-DWQ55 February 5, 2013 measures of equivalent effectiveness are demonstrated:										
1) Equal or greater amount of runoff infiltrated or evapotranspired;		N/A								
2) Equal or lower pollutant concentrations in runoff that is discharged after biotreatment;		N/A								
3) Equal or greater protection against shock loadings and spills;		N/A								
4) Equal or greater accessibility and ease of inspection and maintenance		N/A								
Notes:										

4.3.6 Hydromodification Control BMP Conformance Summary

Use Form 4.3-9 to compute the remaining runoff volume retention, after Site Design BMPs are implemented, needed to address hydromodification, and the increase in time of concentration and decrease in peak runoff necessary to meet targets for protection of waterbodies with a potential hydromodification. Describe the proposed hydromodification treatment control BMP. Section 5.6 of the TGD for WQMP provides additional details on selection and evaluation of hydromodification control BMP.

Form 4.3-9 Hydromodification Control BMPs (DA 1)			
1 Volume reduction needed for HCOC performance criteria (ft ³): <i>(Form 4.2-2 Item 4 * 0.95) – Form 4.2-2 Item 1</i>	27,717	2 On-site retention with site design hydrologic source control, infiltration, and harvest and use LID BMP (ft ³): <i>Sum of Form 4.3-8 Items 2, 3, and 4 Evaluate option to increase implementation of on-site retention in Forms 4.3-2, 4.3-3, and 4.3-4 in excess of LID DCV toward achieving HCOC volume reduction</i>	219,609
3 Remaining volume for HCOC volume capture (ft ³): <i>Item 1 – Item 2</i>	(191,893)	4 Volume capture provided by incorporating additional on-site or off-site retention BMPs (ft ³):	0
5 Is Form 4.2-2 Item 11 less than or equal to 5%: <i>If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:</i>		<u>Yes</u>	<u>No</u>
Demonstrate increase in time of concentration achieved by proposed LID site design, LID BMP, and additional on-site or off-site retention BMP		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Increase time of concentration by preserving pre-developed flow path and/or increase travel time by reducing slope and increasing cross-sectional area and roughness for proposed on-site conveyance facilities		<input checked="" type="checkbox"/>	<input type="checkbox"/>
6 Form 4.2-2 Item 12 less than or equal to 5%: <i>If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:</i>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Demonstrate reduction in peak runoff achieved by proposed LID site design, LID BMPs, and additional on-site or off-site retention BMPs		<input checked="" type="checkbox"/>	<input type="checkbox"/>

Notes:

Hydromodification requirements have been met, and exceed as shown in Item #3.
Increased Time of Concentration is met by retaining project flows on site in landscaped basin.
Peak Runoff is reduced by increasing the path of travel around the building, underground, and through pretreatment vortex system before daylighting into a landscaped surface basin..
Once the basins are fully saturated the overflow for larger storms will release towards the south (original run-off location and direction as pre-development).
Refer to Onsite Hydrology Study for Software calculations that address the 100yr storm.

4.4 Alternative Compliance Plan (if applicable)

Describe an alternative compliance plan (if applicable) for projects not fully able to infiltrate, or biotreat the DCV via on-site LID practices. A project proponent must develop an alternative compliance plan to address the remainder of the LID DCV. Depending on project type some projects may qualify for water quality credits that can be applied to reduce the DCV that must be treated prior to development of an alternative compliance plan (see Form 2.4-1, Water Quality Credits). Form 4.3-9 Item 8 includes instructions on how to apply water quality credits when computing the DCV that must be met through alternative compliance.

Alternative Designs — Facilities, or a combination of facilities, of a different design than in Permit Section E.12.e.(ii)(f) may be permitted if all of the following measures of equivalent effectiveness are demonstrated:

- 1) Equal or greater amount of runoff infiltrated or evapotranspired;
- 2) Equal or lower pollutant concentrations in runoff that is discharged after biotreatment;
- 3) Equal or greater protection against shock loadings and spills;
- 4) Equal or greater accessibility and ease of inspection and maintenance

The Project Proponent will need to obtain written approval for an alternative design from the Lahontan Regional Water Board Executive Officer (see Section 6 of the TGD for WQMP).

Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

All BMPs included as part of the project WQMP are required to be maintained through regular scheduled inspection and maintenance (refer to Section 8, Post Construction BMP Requirements, in the TGD for WQMP). Fully complete Form 5-1 summarizing all BMP included in the WQMP. Attach additional forms as needed. The WQMP shall also include a detailed Operation and Maintenance Plan for all BMP and a Maintenance Agreement. The Maintenance Agreement must also be attached to the WQMP.

Note that at time of Project construction completion, the Maintenance Agreement must be completed, signed, notarized and submitted to the County Stormwater Department

Form 5-1 BMP Inspection and Maintenance (use addition forms as necessary)			
BMP	Responsible Party(s)	Inspection / Maintenance Activities Required	Minimum Frequency of Activities
Site Good Housekeeping	Owner	Owner to assign or contract a Property management service or assign an individual with the site's Good housekeeping needs to ensure grounds maintenance.	Action (as needed)
		Owner shall develop a site schedule to include, but not limited to: Trash contracted waste pick-up and disposal services per Town of Apple Valley standards, Onsite and perimeter weed removal and vector controls, KEEPING RECORDS of all site maintenance and inspections.	
Drainage Controls and BMP Basins	Owner and assigned site manager(s)	Strom drain inlet inspection to ensure each inlet is free of blockage, Roof downspout inspections to ensure free of blockage,	Monthly Minimum
		Inspection of channels and slopes to ensure structure and stability, Inspection of basin to ensure depth and capacity remain as designed, After rain inspection of basins to ensure no ponding water remains after 48 hours.	Twice Annually (Before Rainy Season, and After)

MOJAVE RIVER WATERSHED Water Quality Management Plan (WQMP)

<p>Education of Property Owners, Onsite Manager(s), and Site Care Takers of Grounds and Stormwater BMPs</p>	<p>Owner and assigned site care manager(s)</p>	<p>Site General Good-Housekeeping and Ground Maintenance, including, but not limited to:</p> <p>Landscape Maintenance and cuttings not entering the storm drain inlets by sweeping or blower,</p> <p>Inspect Landscaping vegetation remains healthy, and weed-free,</p> <p>Ensure Effective Irrigation Controls and timers are set per City's requirements,</p> <p>Replace vegetation and broken sprinklers,</p> <p>Replacing landscape coverings (gravels and rip-rap) where erosion or movement has occurred.</p> <p>Care takers and assigned site managing personnel shall bring concerns to Owner and have permission and means to repair/replace as needed. Repairs or replacements of drainage design features shall not be in contrary to original design and function.</p>	<p>Action (as needed)</p>
<p>Pollution Prevention Controls and Good Housekeeping</p>	<p>Owner and assigned site care manager(s)</p>	<p>Site Manager shall visually inspect the site and address pollutant potentials, any reoccurring obstructions, and new pollutants.</p> <p>Pollutant potentials may include (but not limited to):</p> <p>Outdoor employee break (rest/smoking) area. Ensure readily available and appropriate waste containers and proper disposal.</p> <p>Excessive leaf shedding near storm drain inlets that could easily clog the inlet(s). Replacements shall be approved by Town of Apple Valley and on the approved plant list.</p> <p>Repair or removal of leaky equipment used/stored outdoors or providing drippans. Drip pans shall be secure from wind-blow away and shall provide 6" or more freeboard at all times.</p> <p>Loading areas and long-haul truck parking/stopping areas require additional visual observations, stewardship and potentially more conveniently located waste containers. All walk-up waste containers shall be secure from tipping, wind blow-over and securely lidded.</p>	<p>Weekly (monthly minimum)</p>

Section 6 WQMP Attachments

6.1. Site Plan and Drainage Plan

Include a site plan and drainage plan sheet set containing the following minimum information:

- . Project location
- . Site boundary
- . Land uses and land covers, as applicable
- . Suitability/feasibility constraints
- . Structural Source Control BMP locations
- . Site Design Hydrologic Source Control BMP locations
- . LID BMP details
- . Drainage delineations and flow information
- . Drainage connection

6.2. Electronic data Submittal

Minimum requirements include submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open. If the local jurisdiction requires specialized electronic document formats (as described in their Local Implementation Plan), this section will describe the contents (e.g., layering, nomenclature, geo-referencing, etc.) of these documents so that they may be interpreted efficiently and accurately.

6.3. Post Construction Electronic data Submittal

Attach all O&M Plans and Maintenance Agreements for BMP to the WQMP.

6.4. Other Support Documentation

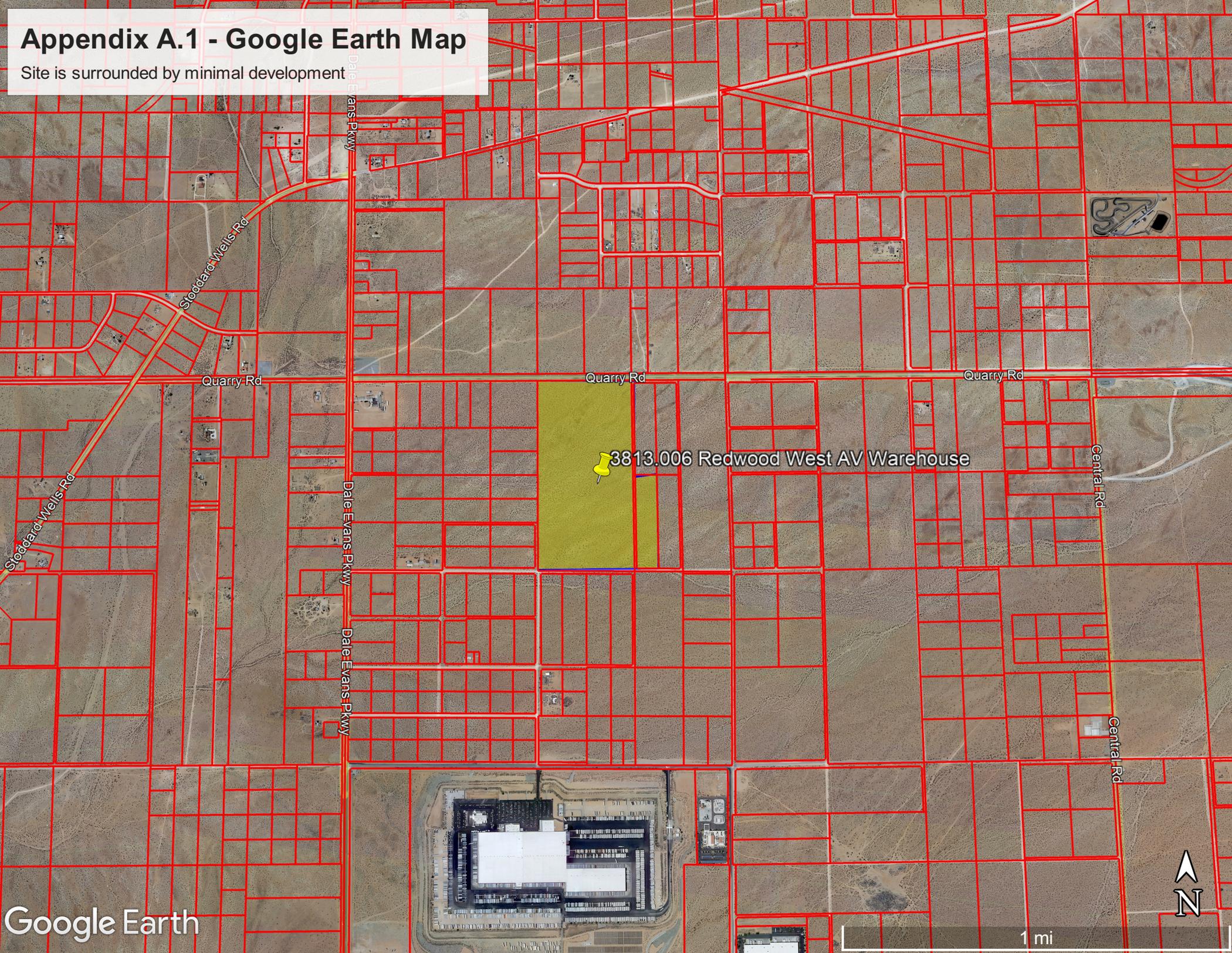
- . BMP Education Materials
- . Activity Restriction - C,C&R's & Lease Agreements

Appendix A: Antecedent Moisture Condition (AMC) Maps

- Appendix A.1: Google Earth Map
- Appendix A.2: Town of Apple Valley Zoning Map with Project Site
- Appendix A.3: San Bernardino County Environmentally Sensitive Area Map

Appendix A.1 - Google Earth Map

Site is surrounded by minimal development



3813.006 Redwood West AV Warehouse



Stormwater Facility Mapping Tool

Search: 34.611645, -117.195310

Project Site

Layers

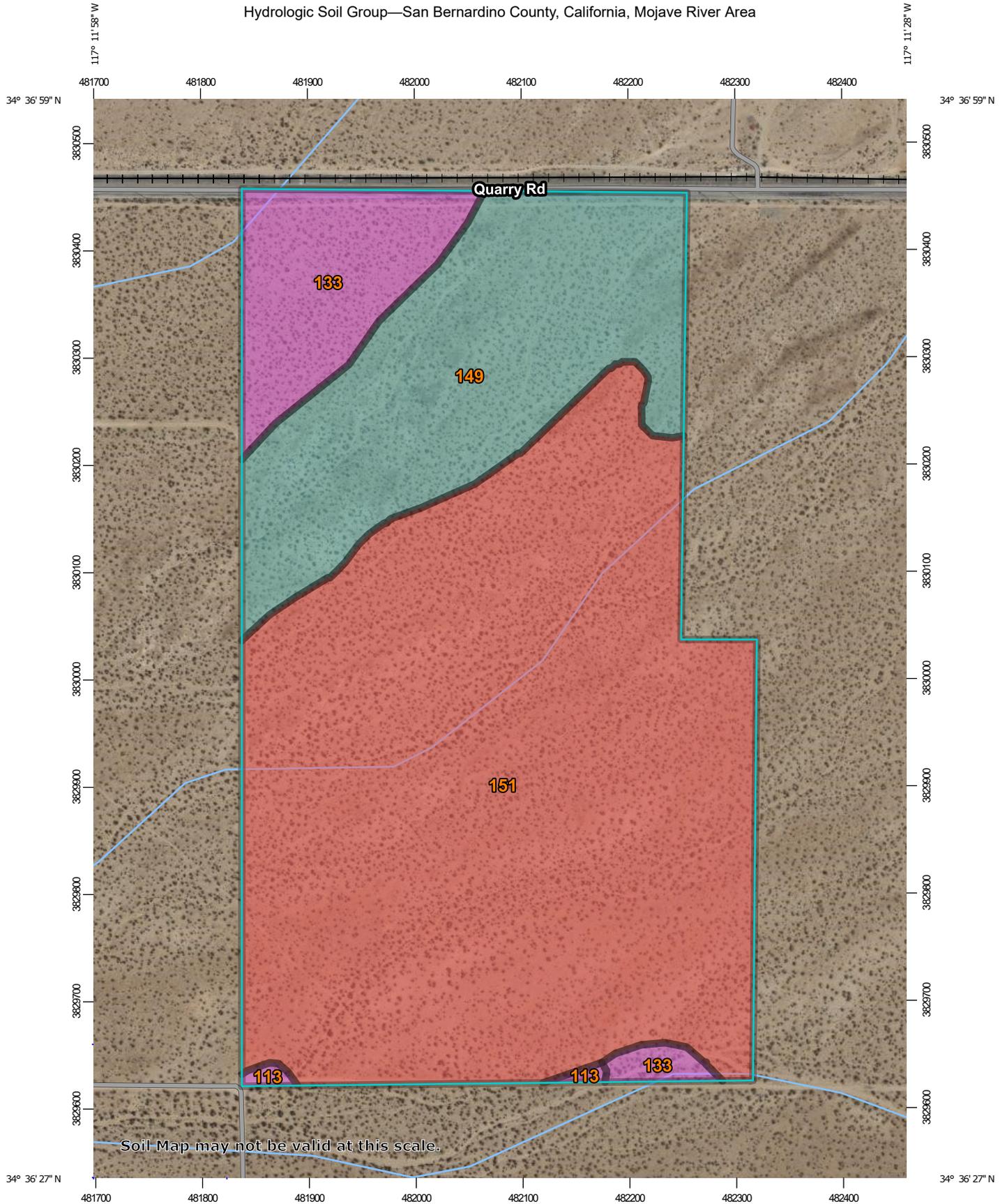
- Base Data
- Stormwater Data
- Habitat/Species
 - Desert Tortoise Habitat
 - Category 1
 - Category 2
 - Category 3
 - Ash Gray Indian Paintbrush
 - Bear Valley Sandwort
 - Calif Taraxacum
 - Cushenbury Buckwheat
 - Cushenbury Oxytheca
 - Cushenbury Milkvetch
 - Mtn Bladderpod
 - Parish Daisy
 - San Bernardino Bluegrass
 - So Mtn Wild Buckwheat
 - California Gnatcatcher
 - Willow Flycatcher
 - Least Bell Vireo
 - Bald Eagle Habitat
 - Bonytail Chub

Scale: 2mi

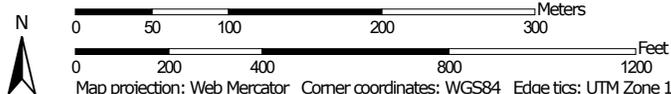
Coordinates: 34.5772 -117.1271 Degrees

Appendix B: Hydrologic Soil Group Data

Hydrologic Soil Group—San Bernardino County, California, Mojave River Area



Map Scale: 1:4,910 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: San Bernardino County, California, Mojave River Area
 Survey Area Data: Version 14, Sep 1, 2022

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

Date(s) aerial images were photographed: Mar 17, 2022—Jun 12, 2022

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
113	CAJON SAND, 2 TO 9 PERCENT SLOPES	A	0.3	0.4%
133	HELENDALE-BRYMAN LOAMY SANDS, 2 TO 5 PERCENT SLOPES*	A	8.5	9.2%
149	MIRAGE-JOSHUA COMPLEX, 2 TO 5 PERCENT SLOPES*	C	20.9	22.7%
151	NEBONA-CUDDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*	D	62.5	67.7%
Totals for Area of Interest			92.3	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

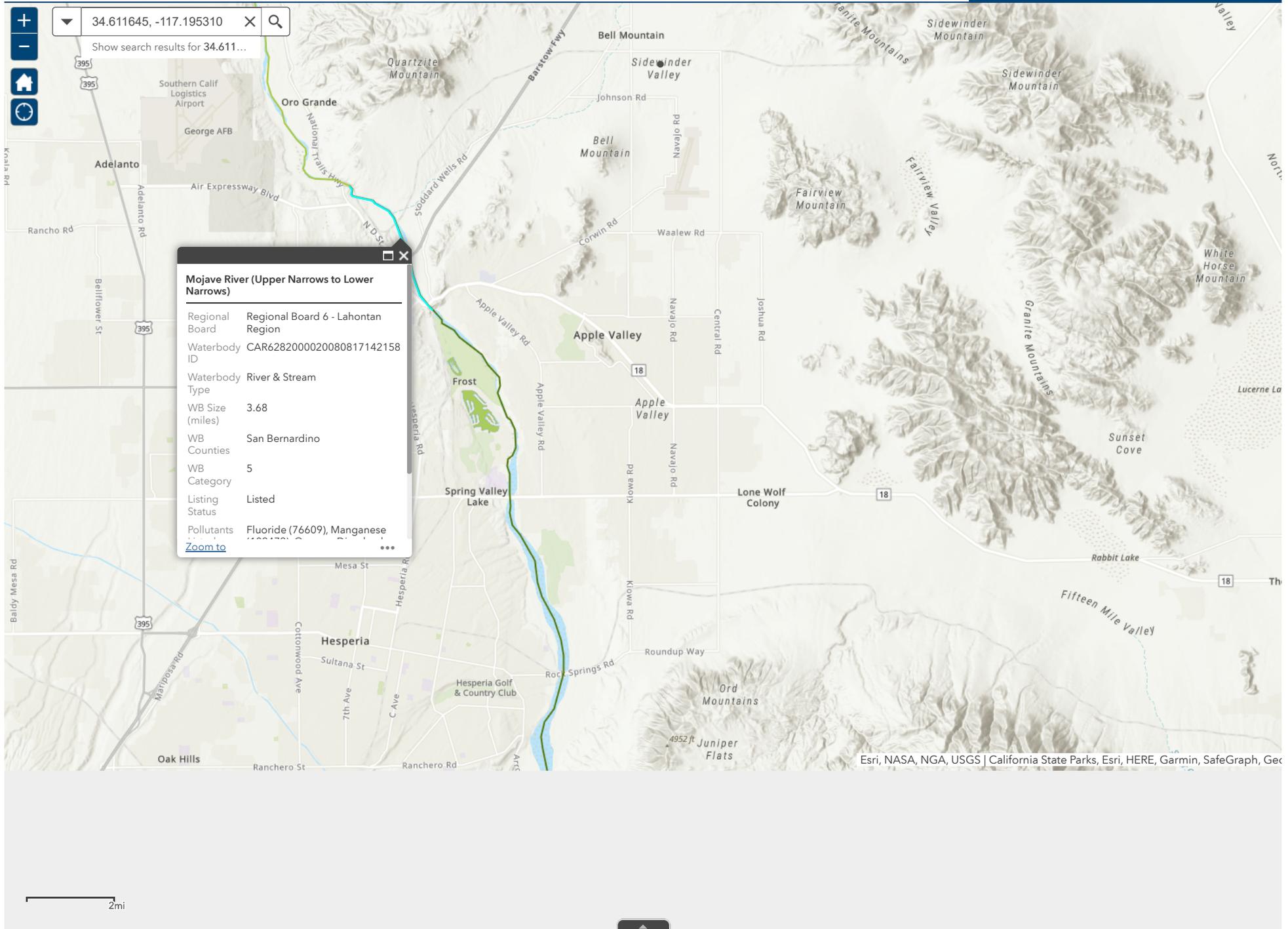
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix C: State Water Resources Control Board 303(d) Map in relation to site

- Appendix C.1: Google Map of surface flow 7.0 miles
- Appendix C.2: FASS Site Map
- Appendix C.3: GAMA Watershed Map
- Appendix C.4: Aquifer Risk Map



Esri, NASA, NGA, USGS | California State Parks, Esri, HERE, Garmin, SafeGraph, Ge...

Appendix C.1 - Google Map Surface Flow

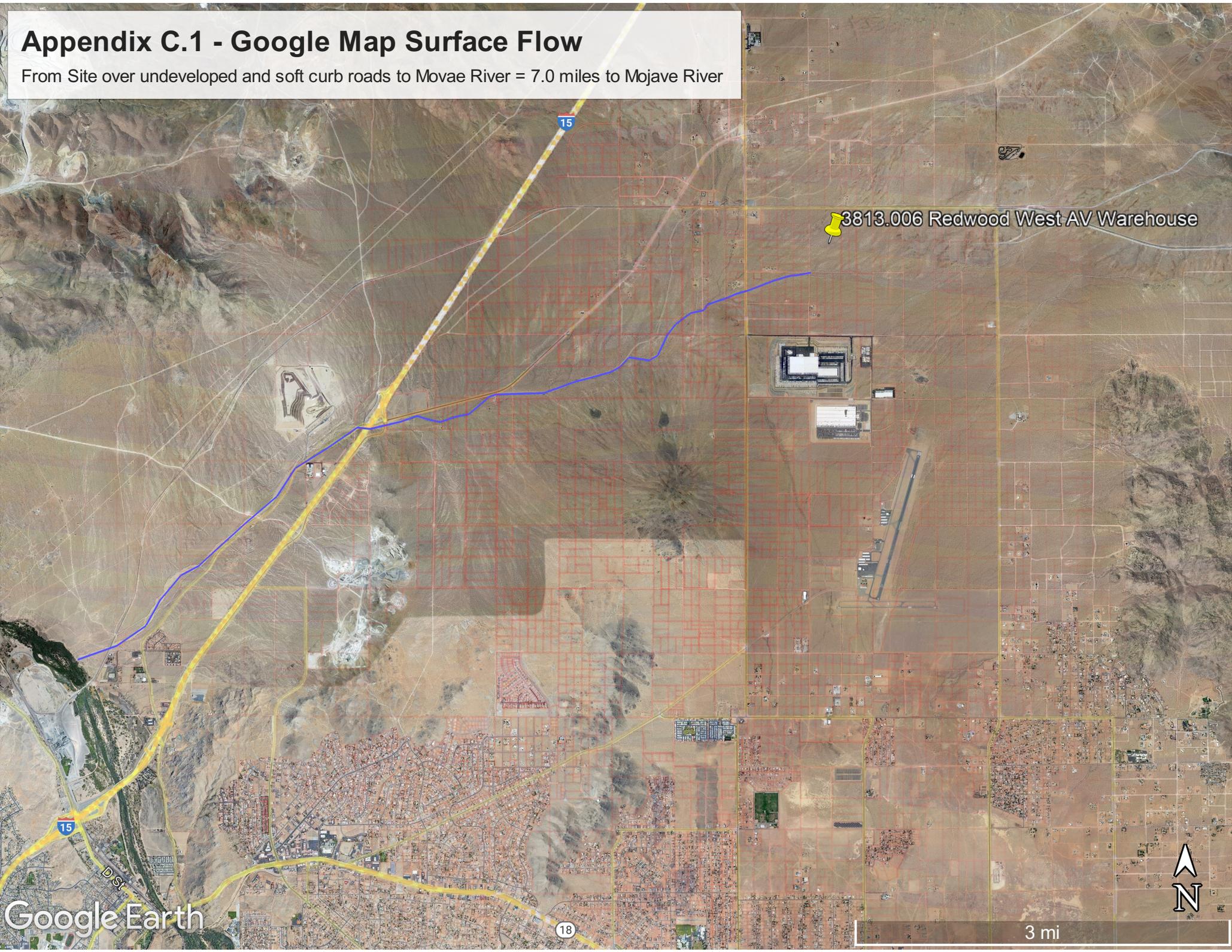
From Site over undeveloped and soft curb roads to Mojave River = 7.0 miles to Mojave River

3813.006 Redwood West AV Warehouse

Google Earth



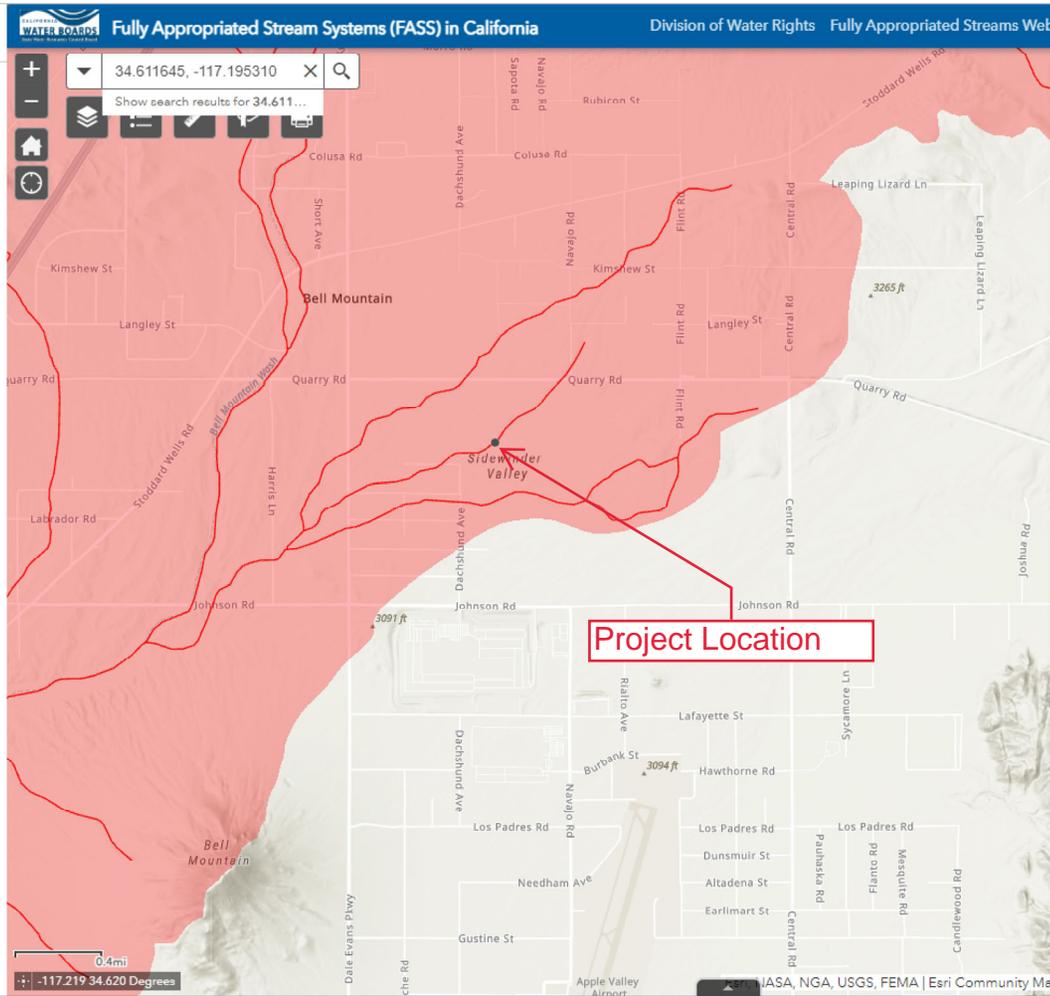
3 mi



STREAM SYSTEMS DECLARED FULLY APPROPRIATED BY THE STATE WATER BOARD



This interactive map displays information regarding fully appropriated stream systems (FASS) in California. On November 19, 1998, the State Water Resources Control Board (State Water Board) adopted [Water Right Order 98-08](#), which was based on prior decisions and orders that determined no water remains available for appropriation from certain sources during specified months. [Exhibit A of Water Right Order 98-08](#) defines the critical reaches of each FASS listing, including the seasons in which water is unavailable for appropriation. The FASS Streams layer is for general reference purposes only; potential



Quick Reference

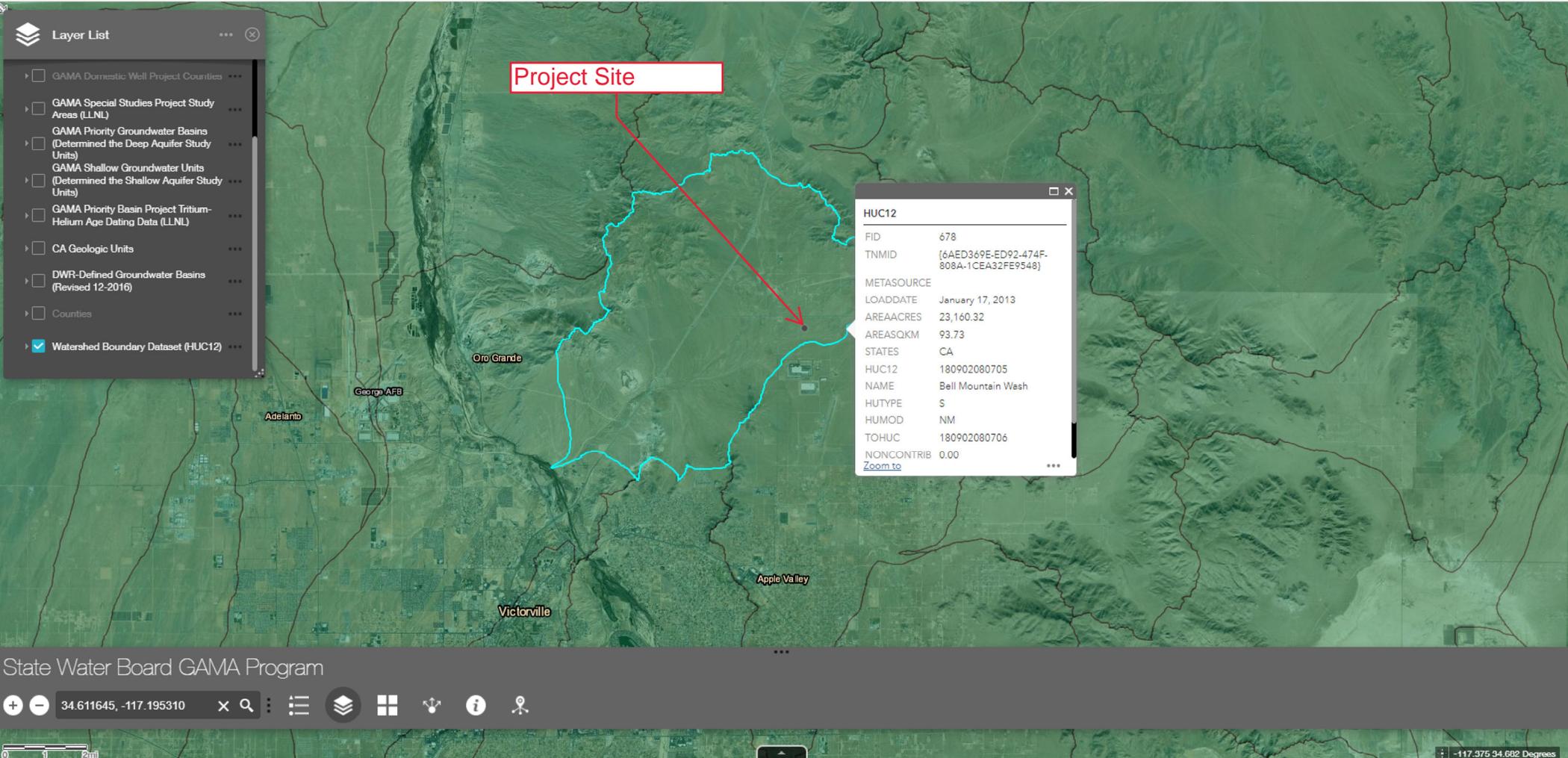
GETTING STARTED

Below are some quick tips for getting started with the interactive map. Other useful information, including detailed instructions, can be found in the left sidebar. Note: The interactive map performs best when using Google Chrome web browser.

- Upon opening the map, colored watersheds and streams represent the following:
 - **Red:** fully appropriated year-round
 - **Blue:** fully appropriated part of the year (seasonal)
- Click on the icon to display the legend. A layer must be turned on in order for it to appear in the legend.
- Click on the icon to display the list of layers available for the map.
- Either zoom in to a location of interest or search for a location using the search bar function.
- Click on a point of interest to see the information associated with the fully appropriated stream systems located within the general watershed boundaries of the identified location. The associated watershed will appear with an aqua-colored outline. If multiple records exist, make sure to click through the pop-up boxes to see all information related to that location.

App State ✕

Click to restore the map extent and layers visibility where you left off.



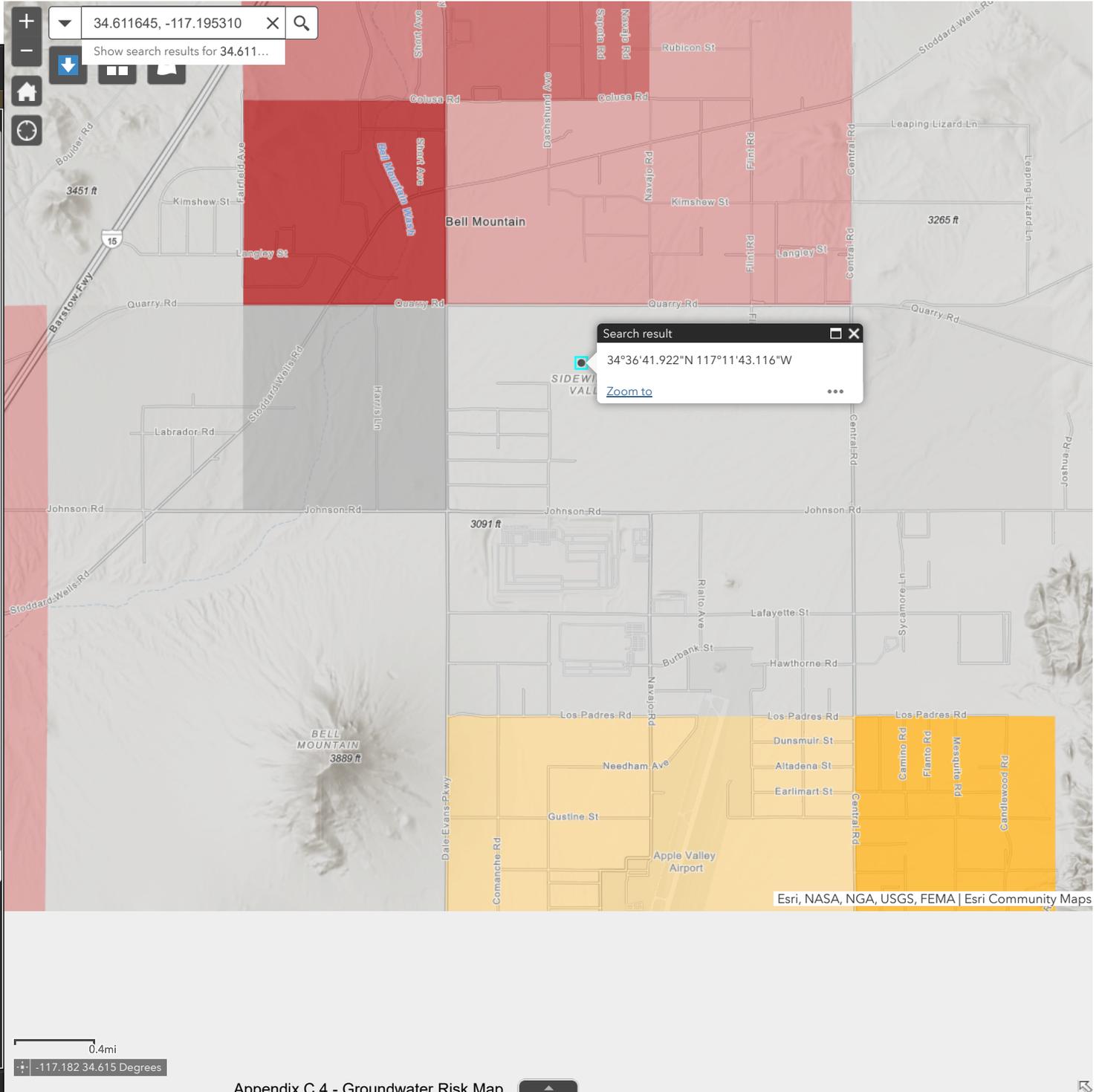
Appendix C.3 - Watershed Map

Water Boards
 San Joaquin Water Board
 San Joaquin County Water Board

Layer List

Layers

- Census Areas - Block Groups
- Census Areas - Census Tracts
- Domestic Well Completion Reports (OSWCR)
- State Small Water Systems (DDW)
- Public Water System Boundaries (DDW)
- Groundwater Level Percentile (DWR)
- CalEnviroScreen 4.0 (OEHHA)
- Reference Boundaries
- Water Quality Risk**
 - Source Data (All Contaminants)
 - Water Quality Risk by Section (All Contaminants)**
 - High Risk (> MCL)
 - Medium Risk (80%-100% MCL)
 - Low Risk (
 - Unknown Risk
 - 0 - 1
 - 1 - 10
 - 10 - 119
 - Individual Contaminant Risk
- GroundwaterLevelPercentileClass_gdb -



Appendix C.4 - Groundwater Risk Map

Appendix D: NOAA Precipitation Frequency Estimates Sheet



NOAA Atlas 14, Volume 6, Version 2
Location name: Apple Valley, California, USA*
Latitude: 34.6116°, Longitude: -117.1953°
Elevation: 3085 ft**



* source: ESRI Maps
 ** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.083 (0.068-0.101)	0.116 (0.096-0.143)	0.163 (0.134-0.200)	0.203 (0.165-0.252)	0.261 (0.206-0.335)	0.309 (0.239-0.405)	0.360 (0.271-0.483)	0.416 (0.305-0.573)	0.496 (0.349-0.712)	0.562 (0.383-0.835)
10-min	0.118 (0.098-0.145)	0.166 (0.137-0.204)	0.233 (0.191-0.287)	0.291 (0.237-0.361)	0.375 (0.295-0.480)	0.443 (0.342-0.580)	0.516 (0.389-0.692)	0.596 (0.437-0.821)	0.711 (0.500-1.02)	0.806 (0.548-1.20)
15-min	0.143 (0.118-0.176)	0.201 (0.166-0.247)	0.282 (0.232-0.347)	0.352 (0.287-0.437)	0.453 (0.357-0.581)	0.536 (0.414-0.701)	0.624 (0.471-0.837)	0.721 (0.529-0.993)	0.860 (0.605-1.23)	0.975 (0.663-1.45)
30-min	0.196 (0.162-0.241)	0.276 (0.227-0.339)	0.387 (0.317-0.476)	0.483 (0.393-0.599)	0.621 (0.489-0.796)	0.734 (0.567-0.961)	0.856 (0.645-1.15)	0.988 (0.724-1.36)	1.18 (0.830-1.69)	1.34 (0.909-1.98)
60-min	0.248 (0.204-0.304)	0.348 (0.286-0.428)	0.488 (0.401-0.601)	0.609 (0.496-0.756)	0.784 (0.617-1.00)	0.927 (0.715-1.21)	1.08 (0.814-1.45)	1.25 (0.914-1.72)	1.49 (1.05-2.14)	1.69 (1.15-2.50)
2-hr	0.351 (0.289-0.430)	0.474 (0.390-0.582)	0.645 (0.529-0.795)	0.792 (0.644-0.982)	1.00 (0.789-1.28)	1.17 (0.904-1.53)	1.35 (1.02-1.81)	1.55 (1.13-2.13)	1.82 (1.28-2.62)	2.05 (1.39-3.04)
3-hr	0.426 (0.351-0.522)	0.568 (0.467-0.698)	0.764 (0.627-0.941)	0.931 (0.758-1.16)	1.17 (0.921-1.50)	1.36 (1.05-1.78)	1.56 (1.18-2.10)	1.78 (1.30-2.45)	2.09 (1.47-3.00)	2.34 (1.59-3.47)
6-hr	0.579 (0.477-0.710)	0.765 (0.629-0.939)	1.02 (0.835-1.25)	1.23 (1.00-1.53)	1.53 (1.21-1.96)	1.77 (1.37-2.32)	2.02 (1.52-2.71)	2.29 (1.68-3.16)	2.67 (1.88-3.83)	2.97 (2.02-4.41)
12-hr	0.742 (0.611-0.910)	0.986 (0.811-1.21)	1.31 (1.08-1.62)	1.59 (1.29-1.97)	1.97 (1.55-2.52)	2.27 (1.75-2.97)	2.58 (1.94-3.46)	2.91 (2.13-4.01)	3.37 (2.37-4.83)	3.73 (2.54-5.54)
24-hr	0.975 (0.864-1.12)	1.31 (1.16-1.51)	1.76 (1.56-2.03)	2.13 (1.87-2.48)	2.64 (2.24-3.18)	3.04 (2.53-3.74)	3.46 (2.80-4.35)	3.89 (3.06-5.03)	4.48 (3.39-6.05)	4.95 (3.61-6.91)
2-day	1.15 (1.02-1.32)	1.58 (1.40-1.82)	2.14 (1.89-2.47)	2.60 (2.28-3.03)	3.23 (2.74-3.89)	3.72 (3.09-4.58)	4.23 (3.43-5.33)	4.76 (3.75-6.16)	5.48 (4.14-7.39)	6.04 (4.41-8.44)
3-day	1.25 (1.11-1.44)	1.73 (1.53-1.99)	2.36 (2.09-2.73)	2.88 (2.52-3.35)	3.59 (3.04-4.32)	4.14 (3.43-5.08)	4.70 (3.81-5.92)	5.28 (4.16-6.84)	6.09 (4.60-8.22)	6.72 (4.90-9.38)
4-day	1.33 (1.18-1.53)	1.84 (1.63-2.12)	2.52 (2.22-2.91)	3.07 (2.69-3.58)	3.83 (3.24-4.61)	4.42 (3.66-5.43)	5.02 (4.06-6.32)	5.64 (4.44-7.30)	6.49 (4.91-8.76)	7.16 (5.23-10.0)
7-day	1.45 (1.28-1.66)	1.99 (1.76-2.29)	2.71 (2.40-3.13)	3.30 (2.90-3.85)	4.12 (3.49-4.96)	4.75 (3.95-5.84)	5.40 (4.38-6.80)	6.08 (4.79-7.87)	7.00 (5.30-9.46)	7.73 (5.65-10.8)
10-day	1.53 (1.36-1.76)	2.10 (1.86-2.41)	2.85 (2.52-3.29)	3.47 (3.04-4.04)	4.33 (3.67-5.22)	5.00 (4.15-6.15)	5.69 (4.61-7.17)	6.41 (5.05-8.30)	7.40 (5.60-9.99)	8.18 (5.98-11.4)
20-day	1.75 (1.56-2.02)	2.41 (2.14-2.78)	3.30 (2.91-3.81)	4.03 (3.53-4.70)	5.06 (4.29-6.09)	5.87 (4.87-7.21)	6.70 (5.43-8.44)	7.58 (5.97-9.82)	8.80 (6.65-11.9)	9.76 (7.12-13.6)
30-day	1.98 (1.76-2.28)	2.73 (2.42-3.15)	3.76 (3.32-4.34)	4.62 (4.04-5.37)	5.82 (4.93-7.01)	6.78 (5.62-8.33)	7.77 (6.29-9.78)	8.82 (6.94-11.4)	10.3 (7.76-13.9)	11.4 (8.34-16.0)
45-day	2.33 (2.07-2.68)	3.22 (2.86-3.71)	4.45 (3.93-5.14)	5.49 (4.81-6.40)	6.97 (5.91-8.39)	8.16 (6.77-10.0)	9.40 (7.62-11.8)	10.7 (8.44-13.9)	12.6 (9.50-17.0)	14.0 (10.3-19.6)
60-day	2.56 (2.27-2.94)	3.53 (3.12-4.06)	4.87 (4.31-5.63)	6.03 (5.28-7.02)	7.68 (6.51-9.24)	9.02 (7.48-11.1)	10.4 (8.45-13.1)	11.9 (9.41-15.5)	14.1 (10.6-19.0)	15.8 (11.5-22.1)

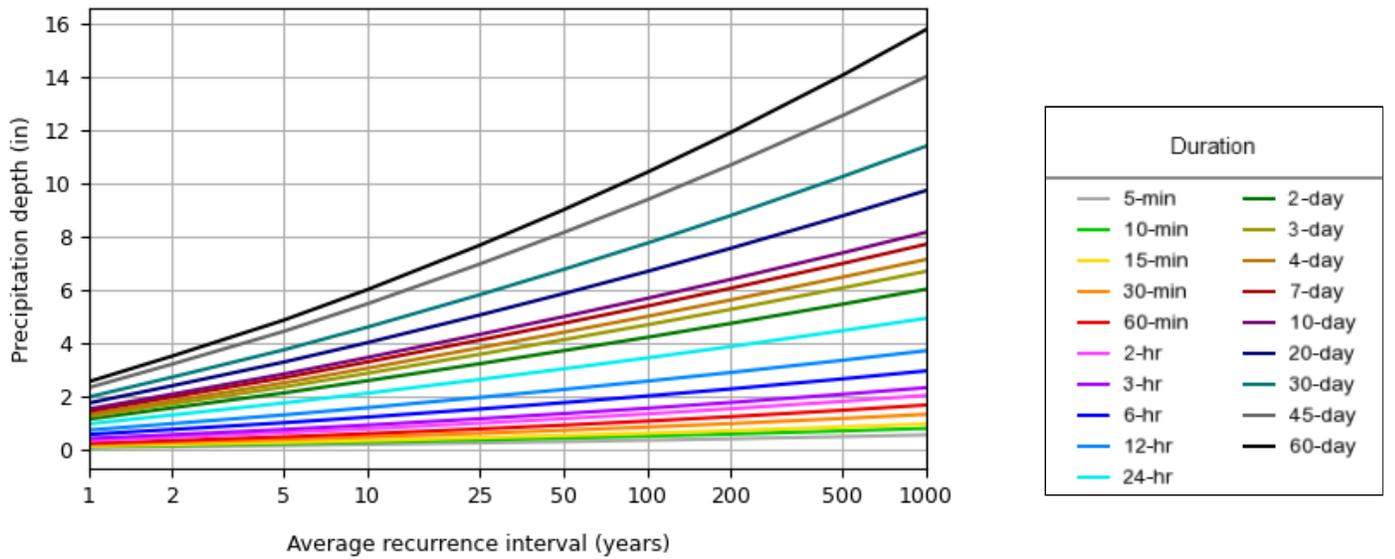
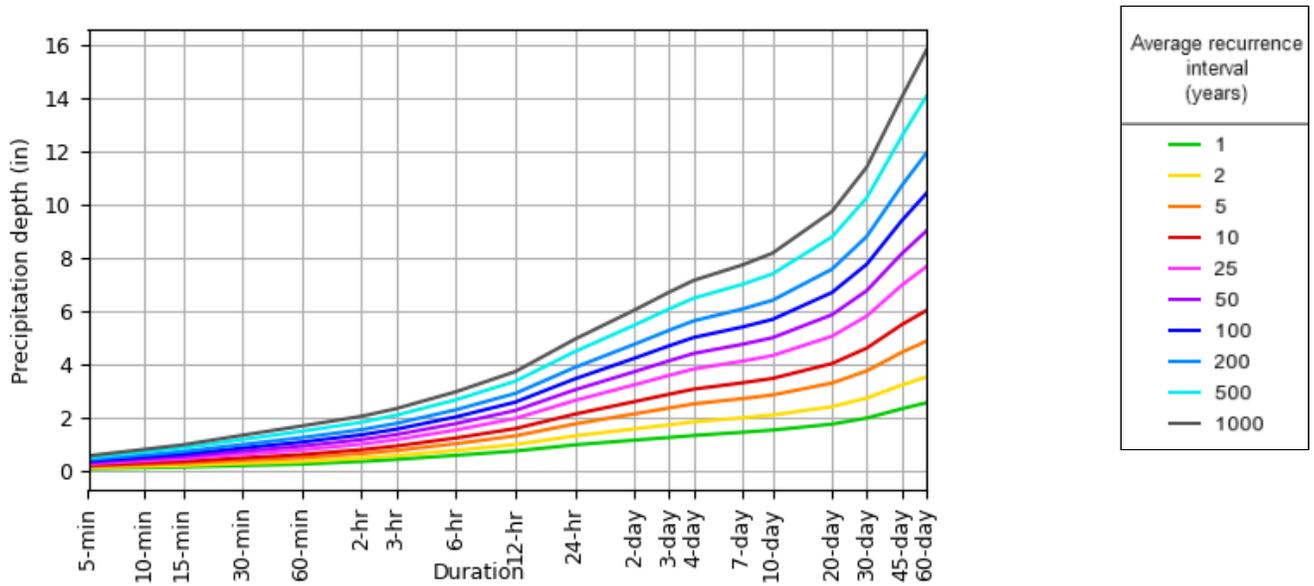
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average 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

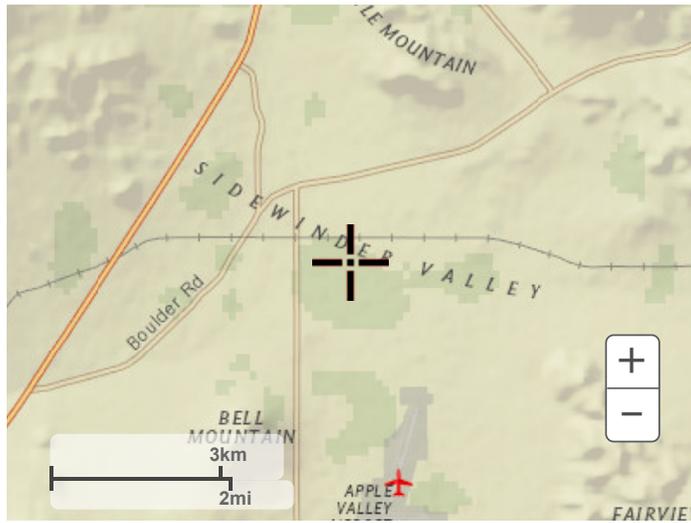
Latitude: 34.6116°, Longitude: -117.1953°



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Maps & aerials

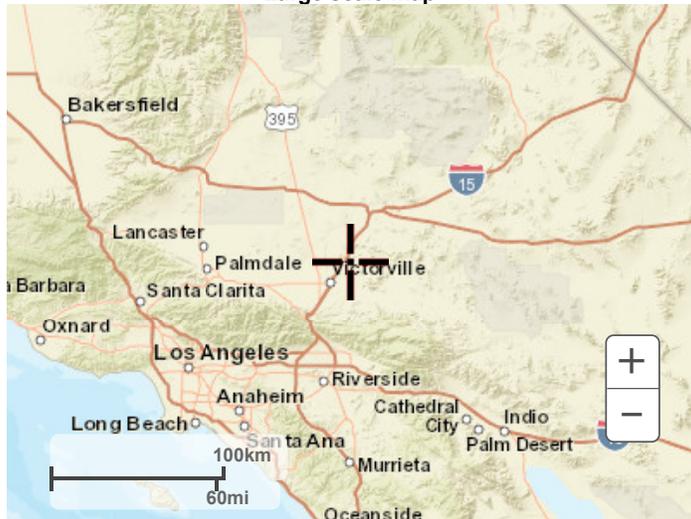
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



[Back to Top](#)

[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)

Appendix E: Pre-Project Site Photos

Appendix E - Pre-development Site Photos

At northeast corner of pl. On Quarry Rd facing south at east pl



Appendix E.1 - Pre-development Site Photos

At northeast corner of pl. On Quarry Rd facing southwest at north pl.



Appendix E.2 - Pre-development Site Photos

At northwest corner of pl. On Quarry Rd facing southeast at west pl.



Appendix E.3 - Pre-development Site Photos

At southwest corner of pl. Intersection of Cordova Rd. & Dachshund Rd. facing northeast at southwest project corner.



Appendix E.4 - Pre-development Site Photos

At southwest corner of pl. Intersection of Cordova Rd. & Dachshund Rd. facing north at west pl and Dachshund Rd.



Appendix E.5 - Pre-development Site Photos

At southwest corner of pl. Intersection of Cordova Rd. & Dachshund Rd. facing east at south pl and Cordova Rd.



Appendix F: Infiltration Test Study

(pending)

Appendix G: Geotechnical Report Study

(pending)

Appendix H: CASQA BMP Fact Sheets

Site Design BMPs

Development

- SD-10 Site Design & Landscape Planning
- SD-11 Minimizing and Disconnection Impervious Areas
- SD-12 Efficient Irrigation and Planting
- SD-20 Storm Drain Signage
- SD-22 Spill Prevention Control and Cleanup
- SD-31 Maintenance Bays & Docks
- SD-32 Trash Storage Areas
- SD-40 Building and Grounds Maintenance

Source Control BMPs

Industrial-Commercial

- SC-10 Non-Stormwater Discharges
- SC-11 Spill Prevention Control and Cleanup
- SC-30 Outdoor Loading and Unloading
- SC-34 Waste Handling and Disposal
- SC-41 Building and Grounds Maintenance
- SC-42 Building Repair and Construction
- SC-43 Parking Area Maintenance
- SC-44 Drainage Area Maintenance

Treatment Control BMPs

Development

- TC-11 Infiltration Basin
- TC-22 Extended Detention Basin
- TC-32 Bioretention

Manufactured BMPs

Development

- (refer to Appendix J for manufacture's specifications)
- MP-20 Bioretention
- MP-51 Hydrodynamic Separator
- MP-52 Drain Inlet Inserts
- MP-53 Water Quality Inlet

Appendix I: BMP Maintenance Guides

Treatment Control Maintenance

Industrial-Commercial

- TCM-11 Infiltration Basin Maintenance
- TCM-22 Extended Detention Basin Maintenance
- TCM-32 Bioretention Maintenance
- TCM-50 Water Quality Inlet
- TCM-60 Multiple Systems Maintenance

Manufactured Proprietary Maintenance

Industrial-Commercial

- MPM-20 Bioretention
- MPM-51 Gravity Separator

Appendix J: Fact Sheets for Proprietary Treatment Systems

**Appendix K: Blank Inspection and Maintenance Forms
(Commercial & Industrial Sites)**



Town of Apple Valley Engineering
Department 14955 Dale Evans
Parkway Apple Valley, CA 92307
(760) 240-7000

Structural Post-Construction BMPs Annual Self-Certification Form

This self-certification form must be completed by the site owner/operator annually by June 30th of each year to be in compliance with the Town's Storm Water ordinances and NDPEs Permit Order No. 2013-0001-DWQ. The purpose of this form is to verify the effectiveness of structural post-construction best management practices (BMPs) in removing pollutants of concern from storm water runoff and/or reducing hydromodification impacts as designed and to verify the maintenance of BMPs.

Date Prepared:

Parcel No.:

Site Name:

Tract No.:

Site Address:

Site Owner/Operator:

Phone:

FIELD OBSERVATIONS AND MAINTENANCE

Please list and describe observations of the condition, maintenance plan and maintenance frequency of structural post-construction BMPs on site. Please attach proof of maintenance performed, if applicable.

BMP 1:

Latitude:

Longitude:

Observations:

Maintenance Plan:

Maintenance Frequency:

BMP 2:

Latitude:

Longitude:

Observations:

Maintenance Plan:

Maintenance Frequency:

BMP 3:

Latitude:

Longitude:

Observations:

Maintenance Plan:

Maintenance Frequency:

BMP 4:

Latitude:

Longitude:

Observations:

Maintenance Plan:

Maintenance Frequency:

BMP 5:

Latitude:

Longitude:

Observations:

Maintenance Plan:

Maintenance Frequency:

BMP 6:

Latitude:

Longitude:

Observations:

Maintenance Plan:

Maintenance Frequency:

*If needed, please attach pages for additional BMPs

CERTIFICATION:

As the owner/operator responsible for the above site, I certify that I have inspected all structural post construction BMPs required per the approved Permit No. 2013-0001-DWQ and all BMP's are effective and maintained.

Signature:

Date of Signature:

Printed Name:

Title:

Phone Number:

**Worksheet No.1
ACTIVITIES ASSESSMENT CHECKLIST**

Name of Reviewer:	Date:		
ACTIVITIES - Check each activity present at site	EFFECTIVENESS		
	HIGH	MOD.	LOW
<input type="checkbox"/> Non-storm water discharges to drains. Describe BMPs in place:			
<input type="checkbox"/> Spill Prevention, Control and Cleanup. Describe BMPs in place:			
<input type="checkbox"/> Vehicle and equipment fueling. Describe BMPs in place:			
<input type="checkbox"/> Vehicle and equipment washing and steam cleaning. Describe BMPs in place:			
<input type="checkbox"/> Vehicle and equipment maintenance and repair. Describe BMPs in place:			
<input type="checkbox"/> Outdoors loading/unloading of liquid materials. Describe BMPs in place:			
<input type="checkbox"/> Outdoor container storage of liquids. Describe BMPs in place:			
<input type="checkbox"/> Outdoor process equipment operations and maintenance. Describe BMPs in place:			
<input type="checkbox"/> Outdoor storage of raw materials, products and byproducts. Describe BMPs in place:			
<input type="checkbox"/> Waste handling and disposal. Describe BMPs in place:			
<input type="checkbox"/> Contaminated or erodible surface areas. Describe BMPs in place:			
<input type="checkbox"/> Building and grounds maintenance. Describe BMPs in place:			
<input type="checkbox"/> Building repair, remodeling, and construction. Describe BMPs in place:			
<input type="checkbox"/> Parking/Storage Area Maintenance. Describe BMPs in place:			

SPILLS INVENTORY

Worksheet No. 4
Completed By:
Title:
Date:

Instructions: Record below all significant spills and significant leaks of toxic or hazardous pollutants that have occurred at the facility in the five years prior to the effective date of the permit.

Definitions: Significant spills include, but are not limited to, releases of oil or hazardous substances in excess of reportable quantities.

1st Year Prior

Date (month/day/year)	Check Box		Location (as indicated on site map)	Description			Response Procedure	Preventive Measures Taken
	Spill	Leak		Type of Material	Quantity	Source, If Known		

2nd Year Prior

Date (month/day/year)	Check Box		Location (as indicated on site map)	Description			Response Procedure	Preventive Measures Taken
	Spill	Leak		Type of Material	Quantity	Source, If Known		

3rd Year Prior

Date (month/day/year)	Check Box		Location (as indicated on site map)	Description			Response Procedure	Preventive Measures Taken
	Spill	Leak		Type of Material	Quantity	Source, If Known		

**Unauthorized Non-Stormwater Discharge Elimination
Documentation**

Worksheet No. 6

Completed by: _____

Title: _____

Date: _____

Directions: Use this worksheet to document steps taken to eliminate unauthorized NSWDs identified in Worksheet 5

Identify Outfall at which NSWD was identified	Description of Probable Source(s)	Description of Approach to Eliminating Source(s)	Anticipated Date for Completion

Worksheet No. 7 CHECKLIST FOR CONSIDERATION OF MINIMUM BMPs																																																																																																																																																																																					
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are all equipment and systems used outdoors that may spill or leak pollutants identified?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are the identified equipment and systems identified to detect leaks or conditions that may result in the development of leaks?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is an appropriate schedule established for maintenance of identified equipment and systems?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is there a spill prevention and response team?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are procedures established for prompt maintenance and repair of equipment, and maintenance of systems when conditions exist that may result in the development of spills or leaks?																																																																																																																																																																																		
Spill and Leak Prevention and Response																																																																																																																																																																																					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are procedures and/or controls established to minimize spills and leaks?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are spill and leak response procedures developed and implemented to prevent industrial materials from discharging through the storm water conveyance system and cleaned promptly and disposed of properly?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are all necessary and appropriate spill and leak response equipment, location(s) of spill and leak response equipment, and spill or leak response equipment maintenance procedures identified and described?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are appropriate spill and leak response personnel identified and trained?																																																																																																																																																																																		
Material Handling and Waste Management																																																																																																																																																																																					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is handling of industrial materials or wastes that can be readily mobilized by contact with storm water prevented or minimized during a storm event?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is all stored non-solid industrial materials or wastes that can be transported or dispersed by the wind or contact with storm water contained?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are industrial waste disposal containers and industrial material storage containers that contain industrial materials covered when not in use?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is run-on and storm water generated from within the facility diverted away from all stockpiled materials?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are all spills of industrial materials/ or wastes that occur during handling cleaned in accordance with the spill response procedures?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is any outdoor material/ or waste handling equipment or containers that can be contaminated by contact with industrial materials or wastes observed and cleaned as appropriate?																																																																																																																																																																																		
Erosion and Sediment Controls (for each erodible surface facility location identified in the SWPPP)																																																																																																																																																																																					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are effective wind erosion controls implemented?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is effective stabilization provided for inactive areas, finished slopes, and other erodible areas prior to a forecasted storm event?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are effective perimeter controls maintained and stabilize all site entrances and exits stabilized to sufficiently control discharges of erodible materials from discharging or being tracked off the site?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is run-on and storm water generated from within the facility diverted away from all erodible materials?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If sediment basins are implemented, do they comply with the design storm standards in Section X.H.6 of the General Permit?																																																																																																																																																																																		
Employee Training Program																																																																																																																																																																																					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are all team members implementing the various compliance activities of the General Permit properly trained to implement the requirements of the General Permit?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have appropriate training manuals or training materials been prepared or acquired?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have the personnel that need to be trained, their responsibilities, and the type of training they shall receive been identified?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Has a training schedule been provided?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is documentation maintained of all completed training classes and the personnel that received training in the SWPPP?																																																																																																																																																																																		
Quality Assurance and Record Keeping																																																																																																																																																																																					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have management procedures been developed and implemented to ensure that appropriate staff implements all elements of the SWPPP, including the Monitoring Implementation Plan?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Has a method of tracking and recording the implementation of BMPs identified in the SWPPP been developed?																																																																																																																																																																																		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is there a system to maintain the BMP implementation records, training records, and records related to any spills and clean-up related response activities for a minimum of five (5) years?																																																																																																																																																																																		
Any items checked "No" require consideration in the selection of BMPs. N/A = Not Applicable.																																																																																																																																																																																					

Appendix L: Town of Apple Valley Conditions of Approval Letter(s)

Appendix M: Copies of the current Grading Plans (approval in progress)

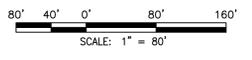
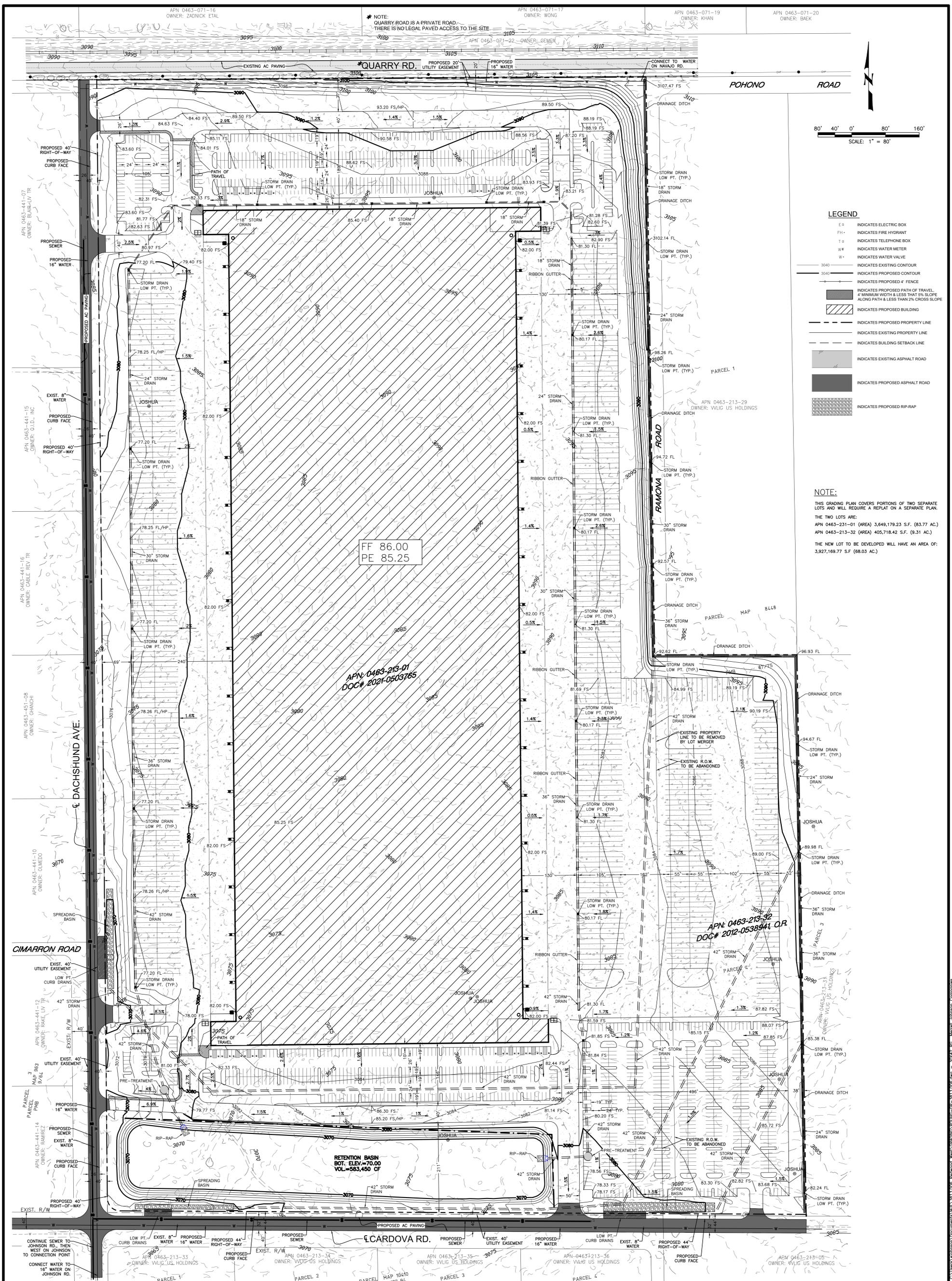
APN 0463-071-16
OWNER: ZADNICK ETAL

APN 0463-071-17
OWNER: WONG

APN 0463-071-19
OWNER: KHAN

APN 0463-071-20
OWNER: BAEK

* NOTE:
QUARRY ROAD IS A PRIVATE ROAD
THERE IS NO LEGAL PAVED ACCESS TO THE SITE



LEGEND

- E₁ INDICATES ELECTRIC BOX
- FH₁ INDICATES FIRE HYDRANT
- T₁ INDICATES TELEPHONE BOX
- W₁ INDICATES WATER METER
- W₂ INDICATES WATER VALVE
- 3040 INDICATES EXISTING CONTOUR
- 3040 INDICATES PROPOSED CONTOUR
- INDICATES PROPOSED 4' FENCE
- INDICATES PROPOSED PATH OF TRAVEL
4' MINIMUM WIDTH & LESS THAN 2% SLOPE
ALONG PATH & LESS THAN 2% CROSS SLOPE
- INDICATES PROPOSED BUILDING
- INDICATES PROPOSED PROPERTY LINE
- INDICATES EXISTING PROPERTY LINE
- INDICATES BUILDING SETBACK LINE
- INDICATES EXISTING ASPHALT ROAD
- INDICATES PROPOSED ASPHALT ROAD
- INDICATES PROPOSED RIP-RAP

NOTE:

THIS GRADING PLAN COVERS PORTIONS OF TWO SEPARATE LOTS AND WILL REQUIRE A REPEAT ON A SEPARATE PLAN.
 THE TWO LOTS ARE:
 APN 0463-231-01 (AREA) 3,649,179.23 S.F. (83.77 AC.)
 APN 0463-231-32 (AREA) 405,718.42 S.F. (9.31 AC.)
 THE NEW LOT TO BE DEVELOPED WILL HAVE AN AREA OF:
 3,927,169.77 S.F. (88.03 AC.)

FF 86.00
PE 85.25

APN: 0463-213-01
DOC# 2021-0503765

APN: 0463-213-32
DOC# 2012-0538941, C.R.

RETENTION BASIN
BOT. ELEV.=70.00
VOL.=563,450 CF

NOT FOR CONSTRUCTION

OWNER:
 BUTTERFLY EQUITY PARTNERS AND/OR
 RW APPLEVALLEY II AND/OR LINKUP, LLC
 220 NEWPORT CENTER DRIVE, STE 11-557
 NEWPORT BEACH, CA 92660

DATE	DELTA	REVISION DESCRIPTION	APPROVAL DATE	BY



MERRELL JOHNSON ENGINEERING, INC.
 22221 U.S. HIGHWAY 8, APPLE VALLEY, CA 92307
 760 240 8000 | MERRELLJOHNSON.COM

CONCEPTUAL GRADING PLAN
WAREHOUSE
 CARDOVA RD & DACHSHUND AVE.
 68.2 ACRES
 FOR
 REDWOOD WEST

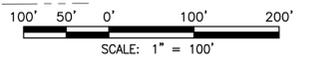
DRAWN BY:
 EKI
 DATE:
 9/18/23
 JOB NO.
 3813.006
 SHEET
 1 OF 1

9/18/2023 11:00am 18 September 2023 C:\Users\johanson\Documents\2023\09\18\006\Warehouse\2023-09-18\006.dwg - 3042 - 60 Merrell Johnson Company

Appendix N: Landscape Plans

(pending and separate submittal)

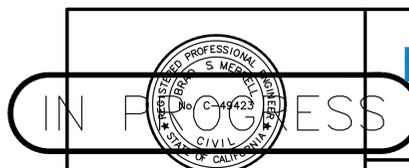
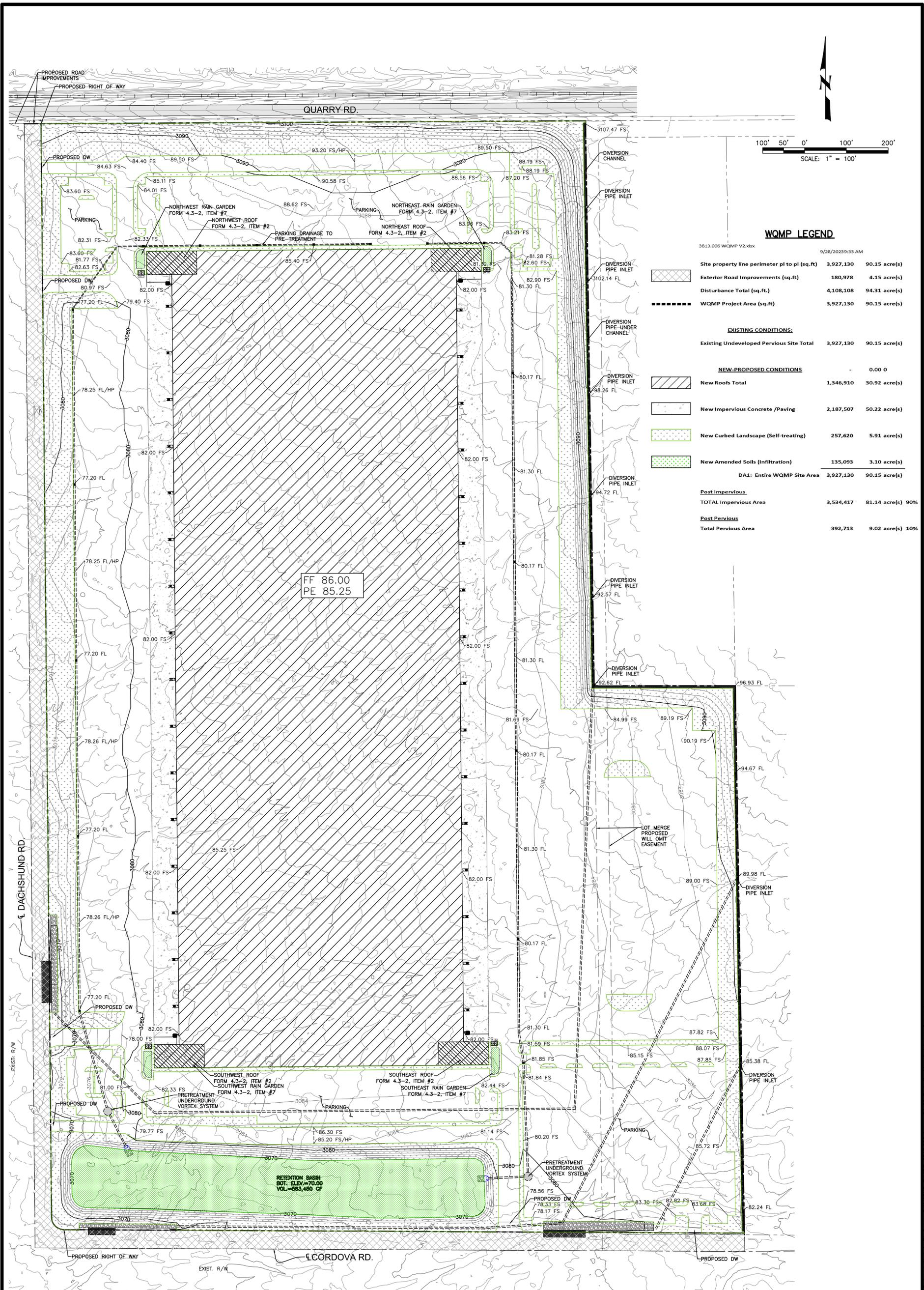
END OF REPORT



WQMP LEGEND

3813.006 WQMP V2.xlsx 9/28/2023 9:33 AM

Site property line perimeter pl to pl (sq.ft)	3,927,130	90.15 acre(s)
Exterior Road Improvements (sq.ft)	180,978	4.15 acre(s)
Disturbance Total (sq.ft.)	4,108,108	94.31 acre(s)
WQMP Project Area (sq.ft)	3,927,130	90.15 acre(s)
EXISTING CONDITIONS:		
Existing Undeveloped Pervious Site Total	3,927,130	90.15 acre(s)
NEW-PROPOSED CONDITIONS		
New Roofs Total	1,346,910	30.92 acre(s)
New Impervious Concrete /Paving	2,187,507	50.22 acre(s)
New Curbed Landscape (Self-treating)	257,620	5.91 acre(s)
New Amended Soils (Infiltration)	135,093	3.10 acre(s)
DA1: Entire WQMP Site Area	3,927,130	90.15 acre(s)
Post Impervious		
TOTAL Impervious Area	3,534,417	81.14 acre(s) 90%
Post Pervious		
Total Pervious Area	392,713	9.02 acre(s) 10%



MERRELL JOHNSON

BRAD S. MERRELL R.C.E. 49423

MERRELL JOHNSON ENGINEERING, INC.
22221 U.S. HIGHWAY 18, APPLE VALLEY, CA 92307
760 240 8000 | MERRELLJOHNSON.COM

CONCEPTUAL WQMP EXHIBIT
WAREHOUSE
CORDOVA RD & DACHSHUND AVE.
90.1 ACRES

FOR:
REDWOOD WEST

DRAWN BY:
EKJ/JMC
DATE:
9/29/23
JOB NO.
3813.006
SHEET
1 of 1

Joy 10/20/23 2:28 September 2023 P:\3813006 Redwood West (ALIA Quarry RD) WQMP Exhibit - 3813006.dwg - 24266 Porcari - Merrell Johnson Companies