MOJAVE RIVER WATERSHED

Water Quality Management Plan

For:

FIRE STATION 305

PREFABRICATED METAL STORAGE BUILDING

APN 3039-351-09, PM. NO. 18615

Prepared for:

San Bernardino County Project & Facilities Management Department

8331 Caliente Road

Hesperia, CA 92344

(760) 948-7458

Prepared by:

Engineering Resources Of Southern California Inc.

1861 W. Redlands Blvd.

Redlands, CA 92733

(909) 890-1255

Submittal Date: February 2024

Revision No. and Date: Insert No and Current Revision Date

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Revision No. and Date: Insert No and Current Revision Date

Final Approval Date:_____

Project Owner's Certification

This Mojave River Watershed Water Quality Management Plan (WQMP) has been prepared for San Bernardino County by Engineering Resources Of Southern california Inc. The WQMP is intended to comply with the requirements of the San Bernardino County 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 San Bernardino County (unincorporated areas of Phelan, Oak Hills, Spring Valley Lake and Victorville) and the incorporated cities of Hesperia and Victorville and the Town of Apple Valley. Once the undersigned transfers its interest in the property, its successors in interest and the city/county/town 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):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):	18615	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			303935109

Owner's Signature	
Owner Name:	Bertral Washington
Title	Deputy Chief of Administration
Company	San Bernardino County Fire Protection District
Address	157 W. 5th Street, 2nd Floor San Bernardino, CA 92415
Email	bwashington@sbcfire.org
Telephone #	(909) 387-5974
Signature	Date 10/18/2023

Preparer's Certification

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):	18615	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			3039-351-09

"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: Matt Brudin		PE Stamp Below
Title	Principal Engineer	
Company	Engineering Resources	
Address	1861 W. Redlands Blvd, Redlands Ca 92373	
Email	MATT@ERSCINC.COM	
Telephone #	909-890-1255	
Signature		
Date	10/18/2023	

Table of Contents

Forms

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	Fire Station 305-Prefabricated Metal Storage Building				
Project Owner Contact Name:					
Mailing Address:		E-mail Address:		Telephone:	
Permit/Application Number(s):		Tract/Parcel Map Number(s):	18615		
Additional Information/ Comments:					
Description of Project:	Fire Station 305 will undergo construction to erect a brand-new prefabricated metal building spanning approximately 4,000 square feet. Additionally, the construction of pavement area of 10,482 square feet will be constructed to complement the building. This facility will serve as a dedicated space to house fire trucks and store related equipment. The total disturbing area is approximately 25,670 sq. ft.				
Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.					

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):

☒ #1 New development involving the creation of 5,000 ft^2 or more of impervious surface collectively over entire site	☒ #2 Significant re-development involving the addition or replacement of 5,000 ft^2 or more of impervious surface on an already developed site	☐ #3 Road Project – any road, sidewalk, or bicycle lane project that creates greater than 5,000 square feet of contiguous impervious surface	☐ #4 LUPs – linear underground/overhead projects that has a discrete location with 5,000 sq. ft. or more new constructed impervious surface

☐ 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 (ft2):	25,670	**3** Number of Dwelling Units:	1	**4** SIC Code:	9224

5 Is Project going to be phased? Yes ☐ No ☒ *If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion.*

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:

Bertral Washington, Deputy chief of Administration

San Bernardino County Fire Protection District

157 W. 5th Street, 2nd Floor San Bernardino, CA 92415

(909) 387-5974

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
Pathogens (Bacterial / Virus)	E ☒	N ☐	See table 3-2 in the TG for WQM
Nutrients - Phosphorous	E ☒	N ☐	See table 3-2 in the TG for WQMP
Nutrients - Nitrogen	E ☒	N ☐	See table 3-2 in the TG for WQM
Noxious Aquatic Plants	E ☒	N ☐	See table 3-2 in the TG for WQM
Sediment	E ☒	N ☐	See table 3-2 in the TG for WQM
Metals	E ☒	N ☐	See table 3-2 in the TG for WQM
Oil and Grease	E ☒	N ☐	See table 3-2 in the TG for WQM
Trash/Debris	E ☒	N ☐	See table 3-2 in the TG for WQM
Pesticides / Herbicides	E ☒	N ☐	See table 3-2 in the TG for WQM
Organic Compounds	E ☒	N ☐	See table 3-2 in the TG for WQM
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	

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 34.4016	Longitude -117.403	Thomas Bros Map page
1 San Bernardino County climatic region: ☒ Desert			
2 Does the site have more than one drainage area (DA): Yes☐ No☒ *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*			

Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA
DA1 DMA C flows to DA1 DMA A	*Ex. Bioretention overflow to vegetated bioswale with 4' bottom width, 5:1 side slopes and bed slope of 0.01. Conveys runoff for 1000' through DMA 1 to existing catch basin on SE corner of property*
DA1 DMA A to Outlet 1	
DA1 DMA B to Outlet 1	
DA2 to Outlet 2	

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1

For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA A	DMA B	DMA C	DMA D
1 DMA drainage area (ft^2)	25,670			
2 Existing site impervious area (ft^2)	0			
3 Antecedent moisture condition *For desert areas, use* *http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf*	II			
4 Hydrologic soil group *Refer to County Hydrology Manual Addendum for Arid Regions – http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_addendum.pdf*	A			
5 Longest flowpath length (ft)	1[illegible]7			
6 Longest flowpath slope (ft/ft)	0.01			
7 Current land cover type(s) *Select from Fig C-[illegible] of Hydrology Manual*	32			
8 Pre-developed pervious area condition: *Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50%* ***Attach photos of site to support rating***	75%			

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1 (use only as needed for additional DMA w/in DA 1)				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA E	DMA F	DMA G	DMA H
1 DMA drainage area (ft^2)				
2 Existing site impervious area (ft^2)				
3 Antecedent moisture condition *For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf*				
4 Hydrologic soil group *County Hydrology Manual Addendum for Arid Regions – http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_addendum.pdf*				
5 Longest flowpath length (ft)				
6 Longest flowpath slope (ft/ft)				
7 Current land cover type(s) *Select from Fig C-3 of Hydrology Manual*				
8 Pre-developed pervious area condition: *Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% attach photos of site to support rating*				

Form 3-3 Watershed Description for Drainage Area

Receiving waters Refer to SWRCB site: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml	Mojave River
Applicable TMDLs *http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml*	5A
303(d) listed impairments *http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml*	Fluoride, Sodium, Sufates,Magana ese, xige , dissolved, total disolved solids
Environmentally Sensitive Areas (ESA) *Refer to Watershed Mapping Tool –* *http://sbcounty.permitrack.com/WAP*	None
Hydromodification Assessment	☒ Yes *Complete Hydromodification Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-9 in submittal* ☐ No

Section 4 Best Management Practices (BMP)

4.1 Source Control BMPs and Site Design BMP 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	☒	☐	The owner will implement good housekeeping practices. The owner will periodically provide environmental awareness education materials, made available by the municipalities to all members, and perform education training before and after the rainy season.
N2	Activity Restrictions	☐	☒	No POA
N3	Landscape Management BMPs	☐	☐	Implement CASQA BMP handbook SC-73 guidance. At a minimum, owner shall ensure landscape management BMPs are implemented(specify) including application of fertilizers/pesticides by licensed persons.
N4	BMP Maintenance	☒	☐	Owner is responsible. See form 5-1.
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No hazardous waste will be store on project site.
N6	Local Water Quality Ordinances	☒	☐	Local Water Quality Ordinances will be addressed by implementation of this WQMP.
N7	Spill Contingency Plan	☒	☐	Outdoor washing and cleaning runoff shall be capture by onsite storm drain and discharge into the proposed the onsite BMPs, (Locate spill cleanup materials, such as absorbents, where they will be readily accessible), vehicle maintenance and repair will be indoor whenever feasible, use drop cloths and drip pans. Parking areas post "No littering" signs and enforce anti littering laws. Minimum use absorbent materials on oily spots prior to sweeping or washing and dispose of used absorbents appropriately.
N8	Underground Storage Tank Compliance	☐	☒	No underground tank within the project site.

Form 4.1-1 Non-Structural Source Control BMPs				
N9	Hazardous Materials Disclosure Compliance	☒	☐	No Hazardous Materials will be management in the site

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	☐	☒	No fueling hazardous waste will be stored on the project site
N11	Litter/Debris Control Program	☒	☐	Implement trash management and littler control daily and during landscape maintenance. Trash will be cleaned as need it. No heavy equipment will be allowed to use during BMPs cleaning.
N12	Employee Training	☒	☐	Owner shall train every new employee on WQMP requirements with latest updated education materials within 3 months of hiring and hold employee training on WQMP requirements on an annual basis.
N13	Housekeeping of Loading Docks	☐	☒	No loading docks are proposed.
N14	Catch Basin Inspection Program	☒	☐	The owners will have at least 80% of drainage inspected, cleaned and maintained on an annual basis with 100% of the facilities included in a two-year period.
N15	Vacuum Sweeping of Private Streets and Parking Lots	☒	☐	Keep all parking areas clean and orderly. Remove debris, litter, and sediments in a timely fashion, Post “No Littering” signs and enforce antilitter laws. Clean out and cover litter receptacles frequently to prevent spillage, Provide an adequate number of litter receptacles.
N16	Other Non-structural Measures for Public Agency Projects	☐	☒	No requirement by the local jurisdiction.
N17	Comply with all other applicable NPDES permits	☒	☐	The site will comply with the NPDES permits.

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)	☒	☐	Implement CASQA BMP handbook SD-13 guidance. Legibility of markers and signs will be maintained year around.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	☐	☒	No outdoor material storage area proposed.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	☐	☒	No waste storage proposed.
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)	☐	☒	No landscape areas proposed.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	☐	☒	No landscape areas proposed
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	☐	☒	No steep slopes and channel proposed with the project site.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	☐	☒	No proposed dock areas within the project site.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	☐	☒	No maintenance bays or Docks proposed.
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	No vehicle wash areas proposed in the project site.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	☐	☒	No processing areas proposed.

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)	☐	☒	No wash areas proposed.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	☐	☒	No fueling area proposed.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	☐	☒	No hillside landscape proposed.
S14	Wash water control for food preparation areas	☐	☒	No food establishments proposed.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	☐	☒	No carwash racks proposed.

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
- Include an attached Site Plan layout which shows how preventative site design 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 *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*
Minimize impervious areas: Yes ☐ No ☒ Explanation: The runoff generated by the FS305 garage building and parking area will be directed through the surface and discharged into a bioretention system.
Maximize natural infiltration capacity; Including improvement and maintenance of soil: Yes ☒ No ☐ Explanation: Bioretention basin was proposed to maximize the natural infiltration.The bioretention bmp aims to promote the infiltration of storm runoff from the site.
Preserve existing drainage patterns and time of concentration: Yes ☐ No ☐ Explanation:
Disconnect impervious areas. Including rerouting of rooftop drainage pipes to drain stormwater to storage or infiltration BMPs instead of to storm drain : Yes ☒ No ☐ Explanation: Implemented area will be draining into a proposed Bioretention basin.
Use of Porous Pavement.: Yes ☐ No ☒ Explanation: No pourous paveent proposed.
Protect existing vegetation and sensitive areas: Yes ☒ No ☐ Explanation: No vegetation or sensitive areas exist within the project site.
Re-vegetate disturbed areas. Including planting and preservation of drought tolerant vegetation. : Yes ☐ No ☒ Explanation: No landscape has been proposed.

Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes ☒ No ☐ Explanation: No compaction is permitted within its limits of the bioretention basin construction. The limits of these bioretention basin are to be marked off during construction.
Utilize naturalized/rock-lined drainage swales in place of underground piping or imperviously lined swales: Yes ☒ No ☐ Explanation: The runoff generated by the site will flow freely over the proposed pavement and ultimately discharge into the proposed Bioretention basin.
Stake off areas that will be used for landscaping to minimize compaction during construction : Yes ☐ No ☒ Explanation: No landscape has been proposed.
Use of Rain Barrels and Cisterns, Including the use of on-site water collection systems.: Yes ☐ No ☒ Explanation: No rain barrels have been proposed.
Stream Setbacks. Includes a specified distance from an adjacent steam: : Yes ☐ No ☒ Explanation: No steam adjacent to the 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, evaportranspire, 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 P_6 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 mi^2) 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)

[1] Project area DA 1 (ft^2): 25,670	[2] Imperviousness after applying preventative site design practices (Imp%): 56.42	[3] Runoff Coefficient (Rc): _0.382 *$R_c = 0.858(Imp\%)^{\wedge 3} - 0.78(Imp\%)^{\wedge 2} + 0.774(Imp\%) + 0.04$*

[4] Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.484 http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

[5] Compute P_6, Mean 6-hr Precipitation (inches): 0.5988

*P_6 = Item 4 * C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Desert = 1.2371)*

[6] Drawdown Rate *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.*	24-hrs ☐ 48-hrs ☒

[7] Compute design capture volume, DCV (ft^3): 962

*DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.58, 48-hr = 1.963)*
Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2

Form 4.2-2 Summary of Hydromodification Assessment (DA 1)

Is the change in post- and pre- condition flows captured on-site? : Yes ☒ No ☐

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)*

If "No," then proceed to Section 4.3 BMP Selection and Sizing

Condition	Runoff Volume (ft^3)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	[1] 412 *Form 4.2-3 Item 12*	[2] 6 *Form 4.2-4 Item 13*	[3] 0.50 *Form 4.2-5 Item 10*
Post-developed	[4] 2,265 *Form 4.2-3 Item 13*	[5] 6.5 *Form 4.2-4 Item 14*	[6] 0.91 *Form 4.2-5 Item 14*
Difference	[7] *1,852* *Item 4 – Item 1*	[8] *-0.50* *Item 2 – Item 5*	[9] *0.41* *Item 6 – Item 3*
Difference (as % of pre-developed)	[10] *450%* *Item 7 / Item 1*	[11] *-8.33%* *Item 8 / Item 2*	[12] *81%* *Item 9 / Item 3*

Form 4.2-3 Hydromodification Assessment for Runoff Volume (DA 1)

Weighted Curve Number Determination for: Pre-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1a Land Cover type	Commer.							
2a Hydrologic Soil Group (HSG)	A							
3a DMA Area, ft^2 *sum of areas of DMA should equal area of DA*	25,670							
4a Curve Number (CN) *use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	32							
Weighted Curve Number Determination for: Post-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1b Land Cover type	Commer.							
2b Hydrologic Soil Group (HSG)	A							
3b DMA Area, ft^2 *sum of areas of DMA should equal area of DA*	25,670							
4b Curve Number (CN) *use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	85.36							

5 Pre-Developed area-weighted CN: 32	**7** Pre-developed soil storage capacity, S (in): 21.25 *S = (1000 / Item 5) - 10*	**9** Initial abstraction, I_a (in): 4.25 *I_a = 0.2 * Item 7*
6 Post-Developed area-weighted CN: 85.36	**8** Post-developed soil storage capacity, S (in): 1.71 *S = (1000 / Item 6) - 10*	**10** Initial abstraction, I_a (in): 0.34 *I_a = 0.2 * Item 8*

11 Precipitation for 10 yr, 24 hr storm (in): 2.32
Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

12 Pre-developed Volume (ft^3): 412
*V_{pre} =(1 / 12) * (Item sum of Item 3) * [(Item 11 – Item 9)^2 / ((Item 11 – Item 9 + Item 7)*

13 Post-developed Volume (ft^3): 2,265
*V_{pre} =(1 / 12) * (Item sum of Item 3) * [(Item 11 – Item 10)^2 / ((Item 11 – Item 10 + Item 8)*

14 Volume Reduction needed to meet hydromodification requirement, (ft^3): 1,739
*Vhydro = (Item 13 * 0.95) – Item 12*