Preliminary Water Quality Management Plan

For:

19708/19768 Kendall Drive - KENDALL DEVELOPMENT

APN 0261-161-20, 21, 22, 23, 24 & 25 AND 0261-171-05 & 07

Prepared for:

Xebec Pursuits, LLC

Attn: Danny Ricks

3010 Old Ranch Parkway, Suite 470

Seal Beach, California 90740

714-650-7111

Prepared by:

Blue Peak Engineering

Thomas Hawksworth, P.E., QSD

18543 Yorba Linda Blvd., #235

Yorba Linda, CA 92886

714-844-2720

Submittal Date: _____

Revision Date: _____

Approval Date: _____

Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for **Xebec Pursuits, LLC** by **Blue Peak Engineering**. The WQMP is intended to comply with the requirements of the San Bernardino and the NPDES Areawide Stormwater Program requiring the preparation of a WQMP. 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 San Bernardino County's Municipal Storm Water Management Program and the intent of the NPDES Permit for San Bernardino County and the incorporated cities of San Bernardino County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors in interest and the city/county 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."

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Project Data			
Permit/Application Number(s):	TBD	Grading Permit Number(s):	TBD
Tract/Parcel Map Number(s):	PTR 17230, PTR 172517	Building Permit Number(s):	TBD
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN 0261-161-20, 21, 22, 23, 24 & 25 AND 0261-171-05 & 07

Owner's Signature			
Owner Name: Xebec Pursuits, LLC (Attn: Sam Salim)			
Title	N/A		
Company	Xebec Pursuits, LLC		
Address	3010 Old Ranch Parkway, Suite 470 Seal Beach, California 90740		
Email	DanielR@xebecrealty.com		
Telephone #	714-650-7111		
Signature		Date	

Preparer's Certification

Project Data			
Permit/Application Number(s):	TBD	Grading Permit Number(s):	TBD
Tract/Parcel Map Number(s):	PTR 17230, PTR 172517	Building Permit Number(s):	TBD
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN 0261-161-20, 21, 22, 23, 24 & 25 AND 0261-171-05 & 07

"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 Regional Water Quality Control Board Order No. R8-2010-0036."

Engineer: Thomas Hawksworth, P.E., QSD		PE Stamp Below
Title	Project Manager	
Company	Blue Peak Engineering	
Address	18543 Yorba Linda Blvd. #235, Yorba Linda CA 92886	
Email	thomash@bluepeakeng.com	
Telephone #	714-844-2720	
Signature		
Date		

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Forms

Section 1 Discretionary Permit(s)

Form 1-1 Project Information					
Project Name	19708/19768 Kendall Drive – Kendall Development				
Project Owner Contact Name:	Xebec Pursuits, LLC (Attn: Sam Salim)				
Mailing Address:	3010 Old Ranch Parkway, Suite 470 Seal Beach, California 90740	E-mail Address:	DanielR@xebecrealty.com	Telephone:	714-650-7111
Permit/Application Number(s):	TBD		Tract/Parcel Map Number(s):	PTR 17230, PTR 172517	
Additional Information/ Comments:	N/A				
Description of Project:	This project purpose is to redevelop 9.7 acres to construct a 20,0000 SF Class A warehouse. All runoff from proposed improvements is directed to an underground infiltration basins for water quality treatment. The proposed underground infiltration basin BMPs will promote infiltration for that first flush runoff. The high-flow will overflow out a pipe into Kendall Drive's storm drain system then take it's natural course to the Santa Ana River. The owner is responsible for maintenance of all proposed BMPs.				
Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.	RESOLUTION NO. 2020-041-PC PUBLIC WORKS DEPARTMENT CONDITIONS d. An approved preliminary Full-Categorical Water Quality Management Plan (WQMP) shall be required for the project entitlement. Please submit at the time of Planning submittal. The applicant is directed to the County of San Bernardino's Flood Control web page for the template and Technical Guidance Document. e. A final full-categorical Water Quality management Plan (WQMP) is required for this project. The applicant is directed to the County of San Bernardino's Flood Control web page for the template and Technical Guidance Document. The Land Development Division, prior to issuance of any permit, shall approve the WQMP. A CD copy of the approved WQMP and Hydrology Study shall be required prior to grading permit issuance.				

Section 2 Project Description

2.1 Project Information

This section of the WQMP should 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.

Form 2.1-1 Description of Proposed Project

1 Development Category (Select all that apply):

☐ Significant re-development involving the addition or replacement of 5,000 ft² or more of impervious surface on an already developed site	☒ New development involving the creation of 10,000 ft² or more of impervious surface collectively over entire site	☐ Automotive repair shops with standard industrial classification (SIC) codes 5013, 5014, 5541, 7532- 7534, 7536-7539	☐ Restaurants (with SIC code 5812) where the land area of development is 5,000 ft² or more
☐ Hillside developments of 5,000 ft² or more which are located on areas with known erosive soil conditions or where the natural slope is 25 percent or more	☐ Developments of 2,500 ft² of impervious surface or more adjacent to (within 200 ft) or discharging directly into environmentally sensitive areas or waterbodies listed on the CWA Section 303(d) list of impaired waters.	☒ Parking lots of 5,000 ft² or more exposed to storm water	☐ Retail gasoline outlets that are either 5,000 ft² or more, or have a projected average daily traffic of 100 or more vehicles per day

☐ Non-Priority / Non-Category Project *May require source control LID BMPs and other LIP requirements. Please consult with local jurisdiction on specific requirements*.

2 Project Area (ft2):	422148	**3** Number of Dwelling Units:	n/a	**4** SIC Code:	4225

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.*

6 Does Project include roads? Yes ☐ No ☒ *If yes, ensure that applicable requirements for transportation projects are addressed (see Appendix A of TGD for WQMP)*

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:

The owner is responsible to insure that BMPs are maintained by the tenant.
Owner:
Xebec Pursuits, LLC
Attn: Sam Salim
3010 Old Ranch Parkway, Suite 470
Seal Beach, California 90740

2.3 Potential Stormwater Pollutants

Determine and describe expected stormwater pollutants of concern based on land uses and site activities (refer to Table 3-3 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 ☐	
Nutrients - Phosphorous	E ☒	N ☐	
Nutrients - Nitrogen	E ☒	N ☐	
Noxious Aquatic Plants	E ☒	N ☐	
Sediment	E ☒	N ☐	
Metals	E ☒	N ☐	
Oil and Grease	E ☒	N ☐	
Trash/Debris	E ☒	N ☐	
Pesticides / Herbicides	E ☒	N ☐	
Organic Compounds	E ☒	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	

2.4 Water Quality Credits

A water quality credit program is applicable for certain types of development projects if it is not feasible to meet the requirements for on-site LID. Proponents for eligible projects, as described below, can apply for water quality credits that would reduce project obligations for selecting and sizing other treatment BMP or participating in other alternative compliance programs. Refer to Section 6.2 in the TGD for WQMP to determine if water quality credits are applicable for the project.

Form 2.4-1 Water Quality Credits

1 Project Types that Qualify for Water Quality Credits: *Select all that apply*			
☐ Redevelopment projects that reduce the overall impervious footprint of the project site. [Credit = % impervious reduced]	Higher density development projects ☐ Vertical density [20%] ☐ 7 units/ acre [5%]	☐ Mixed use development, (combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that demonstrate environmental benefits not realized through single use projects) [20%]	☐ Brownfield redevelopment (redevelop real property complicated by presence or potential of hazardous contaminants) [25%]
☐ Redevelopment projects in established historic district, historic preservation area, or similar significant core city center areas [10%]	☐ Transit-oriented developments (mixed use residential or commercial area designed to maximize access to public transportation) [20%]	☐ In-fill projects (conversion of empty lots & other underused spaces < 5 acres, substantially surrounded by urban land uses, into more beneficially used spaces, such as residential or commercial areas) [10%]	☐ Live-Work developments (variety of developments designed to support residential and vocational needs) [20%]
2 Total Credit % 0 *(Total all credit percentages up to a maximum allowable credit of 50 percent)*			
Description of Water Quality Credit Eligibility (if applicable)	Not applicable		

Section 3 Site and Watershed Description

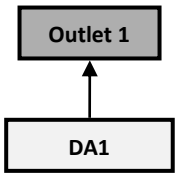
Describe the project site conditions that will facilitate the selection of BMP through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and sub-watershed 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.***

Form 3-1 Site Location and Hydrologic Features

Site coordinates *take GPS measurement at approximate center of site*	Latitude 34.222	Longitude -117.4067	Thomas Bros Map page Pg. 545-F1

1 San Bernardino County climatic region: ☒ Valley ☐ Mountain

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 to Outlet 1	Uninfiltrated flows from DA 1 will discharge out the parkway drain on Kendall Drive.

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)	410,343			
2 Existing site impervious area (ft^2)	168,125			
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 Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	B			
5 Longest flowpath length (ft)	1000			
6 Longest flowpath slope (ft/ft)	1.0%			
7 Current land cover type(s) *Select from Fig C-3 of Hydrology Manual*	Barren/Asphalt			
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*	Poor			

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 *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*				
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 Watershed Mapping Tool - http://permitrack.sbcounty.gov/wap/ See 'Drainage Facilities" link at this website*	Cajon Creek, Lytle Creek, Warm Creek, Santa Ana River Reach 4, 3, 2, 1 and the Pacific Ocean
Applicable TMDLs *Refer to Local Implementation Plan*	Santa Ana River Reach 3: Pathogens, Nitrates Warm Creek: Indicator Bacteria Lytle Creek: Chloride, Sulfates, Toxiciity, Indicator Bacteria Cajon Creek: Benthic Community Effects, Chloride, Nitrates, Sulfates, Toxicity
303(d) listed impairments *Refer to Local Implementation Plan and Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/ and State Water Resources Control Board website – http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml*	Warm Creek: Indicator Bacteria Santa Ana River Reach 4: Indicator Bacteria Santa Ana Reach 3: Copper, Lead, Indicator Bacteria Santa Ana River Reach 2: None Santa Ana River Reach 1: None
Environmentally Sensitive Areas (ESA) *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	N/A
Unlined Downstream Water Bodies *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	Santa Ana River Reaches 4-1
Hydrologic Conditions of Concern	☐ Yes *Complete Hydrologic Conditions of Concern (HCOC) Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-10 in submittal* ☒ No
Watershed–based BMP included in a RWQCB approved WAP	☐ Yes *Attach verification of regional BMP evaluation criteria in WAP* • *More Effective than On-site LID* • *Remaining Capacity for Project DCV* • *Upstream of any Water of the US* • *Operational at Project Completion* • *Long-Term Maintenance Plan* ☒ No

Section 4 Best Management Practices (BMP)

4.1 Source Control BMP

4.1.1 Pollution Prevention

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.

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	☒	☐	Property owner(s) are to familiarize themselves with the BMP's included in this document, and are to notify tenants of their responsibilities and requirements of this document.
N2	Activity Restrictions	☒	☐	Restrictions include: outdoor food preparation, vehicle maintenance, washing, and pesticide application by any other person than an applicator certified by the California Department of Pesticide Regulation.
N3	Landscape Management BMPs	☒	☐	A landscape maintenance company will be retained by the property owner(s) to service all site landscaping and irrigation. Site trees and shrubs are to be trimmed as necessary and all wastes disposed of offsite. Mulch that has been disturbed is to be replaced. Ongoing maintenance shall be consistent with local guidelines, and fertilizer and pesticide usage shall be consistent with the instructions contained on product labels and with the regulations administered by the State Department of Pesticide Regulation. Any breaks or leaks in piping must be repaired within 5 business days of report to the landscaper. Scrap pipe and extra materials shall be recycled if possible. All non-recycleable wastes shall be landfilled. The property owner(s) are responsible for the maintenance of the underground basins.
N4	BMP Maintenance	☒	☐	The isolator row of the underground basin shall be inspected at the beginning of the wet and dry seasons or more frequently as needed and shall be cleaned out when the average depth of sediment exceeds 3" throughout the length of the isolator row using the Jetvac process per manufacturer's recommendations. If inspection indicates the need for maintenance access is necessary, OSHA rules for contained space entries shall be followed.
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	Not Required
N6	Local Water Quality Ordinances	☒	☐	The property owner(s) and tenants are reponsible to comply with all City of San Bernardino Water Quality Ordinances.

Form 4.1-1 Non-Structural Source Control BMPs				
N7	Spill Contingency Plan	☐	☒	Not Required
N8	Underground Storage Tank Compliance	☐	☒	Not Required
N9	Hazardous Materials Disclosure Compliance	☐	☒	Not Required

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	☐	☒	Not required.
N11	Litter/Debris Control Program	☒	☐	A landscape maintenance company will be retained by the property owner(s) to provide litter control services, and will ensure that the site is trash free, including the inside of the trash enclosure. This will occur on a monthly basis or more frequently as directed by volume of trash. They are to report to the owner(s) if lids to the trash bins are broken.
N12	Employee Training	☒	☐	The tenants are to schedule an annual seminar and refresher course to review Source Control BMPs based on this document which can be conducted by a designated representative.
N13	Housekeeping of Loading Docks	☒	☐	The property owner(s) will ensure area is clean of debris.
N14	Catch Basin Inspection Program	☒	☐	The property owner(s) will ensure that the drop inlets are inspected after the first storm event of the rainy season and two times per month thereafter until the end of the rainy season. They are to be cleaned out as necessary or when filled to 25% capacity
N15	Vacuum Sweeping of Private Streets and Parking Lots	☒	☐	The property owner(s) will contract with a sweeping company to to complete this BMP. Sweeping will occur annually, prior to the rainy season.
N16	Other Non-structural Measures for Public Agency Projects	☐	☒	This is not a Public Agency Project.
N17	Comply with all other applicable NPDES permits	☒	☐	The project will comply with the Construction General Permit during construction.

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)	☒	☐	The pavement adjacent to the drop inlets will be painted with a "No Dumping, Drains to River" sign or equivalent.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	☐	☒	No outdoor material storage areas are included as part of the project.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	☒	☐	The trash enclosures are per City standards.
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)	☒	☐	Project plan designs maximize natural water storage and infiltration opportunities, and protect slopes and channels. Plants have been grouped with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Landscaping correlates to the climate, soil, related natural resources and existing vegetation of the site, as well as the type of development proposed. Irrigation methods have been utilized to minimize runoff of excess irrigation water across impervious surfaces and into the underground basin. Mulch has been used to minimize sediment run-off and maintain soil infiltration capacity. A programmable controller will be used that includes a weather sensor and flow sensor to eliminate irrigation during and immediately after rain events and in the event of a broken line. Scrap pipe and extra materials shall be recycled if possible. All non-recyclable wastes shall be landfilled. Hazardous wastes shall be disposed of per County hazardous material disposal regulations.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	☒	☐	The finished grade of landscape areas will be 1-2" below adjacent grades.
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	☐	☒	No significant slopes or channels are proposed. All areas that are not paved will be planted and irrigated.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	☐	☒	No covered dock areas.

S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	☐	☒	No maintenance bays are included in the project.
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	No wash areas are proposed.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	☐	☒	No outdoor processing areas are included in the project.

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 equipment wash areas are included in the project.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	☐	☒	No fueling areas.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	☐	☒	Hillside areas shall be landscaped with deep-rooted, drought tolerant plant species.
S14	Wash water control for food preparation areas	☐	☒	No food preparation areas
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	☐	☒	No community car wash racks are included in the project.

4.1.2 Preventative LID Site Design Practices

Site design practices associated with new LID requirements in the MS4 Permit should be considered in the earliest phases of a project. Preventative site design practices can result in smaller DCV for LID BMP and hydromodification control BMP by reducing runoff generation. 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 Preventative LID 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: 80% of the site is impervious. All impervious surfaces drain to the underground infiltration basin for treatment.
Maximize natural infiltration capacity: Yes ☒ No ☐ Explanation: The underground infiltration basins will promote infiltration of runoff.
Preserve existing drainage patterns and time of concentration: Yes ☒ No ☐ Explanation: Though time of concentration has been shortened due to the development, existing drainage patterns have been preserved to the maximum extent possible.
Disconnect impervious areas: Yes ☒ No ☐ Explanation: The runoff will first be directed to the underground infiltration system that is a disconnect to impervious areas before discharging runoff offsite.
Protect existing vegetation and sensitive areas: Yes ☐ No ☒ Explanation: The entire project area will be disturbed and graded to accommodate the development. Protecting vegetation is not feasible.
Re-vegetate disturbed areas: Yes ☒ No ☐ Explanation: Pervious areas will be landscaped.
Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes ☒ No ☐ Explanation: The underground basins are proposed under proposed pavement. The contractor shall avoid unecessary compaction of the basin bottom during construction.
Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes ☐ No ☒ Explanation: Due to the nature of the site, all runoff is directed to the underground infiltration basins as sheet flow and via a curb and gutter system.
Stake off areas that will be used for landscaping to minimize compaction during construction : Yes ☒ No ☐ Explanation: Unnecessary compaction will be minimized in landscaped areas around the perimeter of the project.

4.2 Project Performance Criteria

The purpose of this section of the Project WQMP is to establish targets for post-development hydrology based on performance criteria specified in the 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 of any downstream waterbody segments with a HCOC. ***If the project has more than one outlet for stormwater runoff, then complete additional versions of these forms for each DA / outlet.***

Methods applied in the following forms include:

- For LID BMP Design Capture Volume (DCV), the San Bernardino County Stormwater Program requires use of the P_6 method (MS4 Permit Section XI.D.6a.ii) – Form 4.2-1
- For HCOC pre- and post-development hydrologic calculation, the San Bernardino County Stormwater Program 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 HCOC 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): 422148	**2** Imperviousness after applying preventative site design practices (Imp%): 91.8	**3** Runoff Coefficient (Rc): .698 *$R_c = 0.858(Imp\%)^{\wedge 3} - 0.78(Imp\%)^{\wedge 2} + 0.774(Imp\%) + 0.04$*
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): .977 *http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*		
5 Compute P_6, Mean 6-hr Precipitation (inches): 1.45 *P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; 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): 69,892 CF *DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 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 HCOC Assessment (DA 1)

Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes ☐ No ☒

Go to: *http://permitrack.sbcounty.gov/wap/*

If "Yes", then complete HCOC assessment of site hydrology for 2yr 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)

If "No," then proceed to Section 4.3 Project Conformance Analysis

Condition	Runoff Volume (ft^3)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	**1** 136471 *Form 4.2-3 Item 12*	**2** 13 *Form 4.2-4 Item 13*	**3** 2.76 *Form 4.2-5 Item 10*
Post-developed	**4** 151839 *Form 4.2-3 Item 13*	**5** 11 *Form 4.2-4 Item 14*	**6** 21.89 *Form 4.2-5 Item 14*
Difference	**7** *15368* *Item 4 – Item 1*	**8** *2* *Item 2 – Item 5*	**9** *19.13* *Item 6 – Item 3*
Difference (as % of pre-developed)	**10** *.11%* *Item 7 / Item 1*	**11** *.15%* *Item 8 / Item 2*	**12** *6.93%* *Item 9 / Item 3*

Form 4.2-3 HCOC 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	Barren	Pavement						
2a Hydrologic Soil Group (HSG)	B	n/a						
3a DMA Area, ft^2 *sum of areas of DMA should equal area of DA*	242218	168125						
4a Curve Number (CN) *use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	86	98						
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	Pavement	Urban:Lan						
2b Hydrologic Soil Group (HSG)	n/a	B						
3b DMA Area, ft^2 *sum of areas of DMA should equal area of DA*	386034	36114						
4b Curve Number (CN) *use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	98	56						

5 Pre-Developed area-weighted CN: 91	**7** Pre-developed soil storage capacity, S (in): .99 *S = (1000 / Item 5) - 10*	**9** Initial abstraction, I_a (in): .198 *I_a = 0.2 * Item 7*
6 Post-Developed area-weighted CN: 94	**8** Post-developed soil storage capacity, S (in): .64 *S = (1000 / Item 6) - 10*	**10** Initial abstraction, I_a (in): .128 *I_a = 0.2 * Item 8*

11 Precipitation for 2 yr, 24 hr storm (in): 5.01
Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

12 Pre-developed Volume (ft^3): 136471
*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): 151839
*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 HCOC Requirement, (ft^3): 7776
*V_{HCOC} = (Item 13 * 0.95) – Item 12*

Form 4.2-4 HCOC Assessment for Time of Concentration (DA 1)

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 DA1 *Use additional forms if there are more than 4 DMA*				Post-developed DA1 *Use additional forms if there are more than 4 DMA*			
	DMA A	DMA B	DMA C	DMA D	DMA A	DMA B	DMA C	DMA D
1 Length of flowpath (ft) *Use Form 3-2 Item 5 for pre-developed condition*	1000				1000			
2 Change in elevation (ft)	21				13			
3 Slope (ft/ft), *S_o = Item 2 / Item 1*	.021				.013			
4 Land cover	barren				asphalt			
5 Initial DMA Time of Concentration (min) *Appendix C-1 of the TGD for WQMP*	13				11			
6 Length of conveyance from DMA outlet to project site outlet (ft) *May be zero if DMA outlet is at project site outlet*	0				0			
7 Cross-sectional area of channel (ft^2)	n/a				n/a			
8 Wetted perimeter of channel (ft)	n/a				n/a			
9 Manning's roughness of channel (n)	n/a				n/a			
10 Channel flow velocity (ft/sec) *V_{fps} = (1.49 / Item 9) * (Item 7/Item 8)^0.67 * (Item 3)^0.5*	n/a				n/a			
11 Travel time to outlet (min) *T_t = Item 6 / (Item 10 * 60)*	n/a				n/a			
12 Total time of concentration (min) *T_c = Item 5 + Item 11*	13				11			

13 Pre-developed time of concentration (min): 13 *Minimum of Item 12 pre-developed DMA*

14 Post-developed time of concentration (min): 11 *Minimum of Item 12 post-developed DMA*

15 Additional time of concentration needed to meet HCOC requirement (min): 1.35 *$T_{C\text{-}HCOC}$ = (Item 13 * 0.95) – Item 14*

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

Compute peak runoff for pre- and post-developed conditions

Variables		Pre-developed DA to Project Outlet (*Use additional forms if more than 3 DMA)*			Post-developed DA to Project Outlet (*Use additional forms if more than 3 DMA)*		
		DMA A	DMA B	DMA C	DMA A	DMA B	DMA C
1 Rainfall Intensity for storm duration equal to time of concentration *I_{peak} = 10^(LOG Form 4.2-1 Item 4 - 0.6 LOG Form 4.2-4 Item 5 /60)*		2.45			2.70		
2 Drainage Area of each DMA (Acres) *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)*		9.42			10.15		
3 Ratio of pervious area to total area *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)*		.59			.08		
4 Pervious area infiltration rate (in/hr) *Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP*		3.6			3.8		
5 Maximum loss rate (in/hr) *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)*		2.124			.304		
6 Peak Flow from DMA (cfs) *Q_p =Item 2 * 0.9 * (Item 1 - Item 5)*		2.76			21.89		
7 Time of concentration adjustment factor for other DMA to site discharge point *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)*	DMA A	*n/a*			*n/a*		
	DMA B		*n/a*			*n/a*	
	DMA C			*n/a*			*n/a*

8 Pre-developed Q_p at T_c for DMA A: *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 $7_{DMAA/3}$]*	**9** Pre-developed Q_p at T_c for DMA B: *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 $7_{DMAB/3}$]*	**10** Pre-developed Q_p at T_c for DMA C: *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 $7_{DMAC/2}$]*

10 Peak runoff from pre-developed condition confluence analysis (cfs): 2.76 *Maximum of Item 8, 9, and 10 (including additional forms as needed)*

11 Post-developed Q_p at T_c for DMA A: *Same as Item 8 for post-developed values*	**12** Post-developed Q_p at T_c for DMA B: *Same as Item 9 for post-developed values*	**13** Post-developed Q_p at T_c for DMA C: *Same as Item 10 for post-developed values*

14 Peak runoff from post-developed condition confluence analysis (cfs): 21.89 *Maximum of Item 11, 12, and 13 (including additional forms as needed)*

15 Peak runoff reduction needed to meet HCOC Requirement (cfs): 18.04 *$Q_{p\text{-}HCOC}$ = (Item 14 * 0.95) – Item 10*

4.3 Project Conformance Analysis

Complete the following forms for each project site DA to document that the proposed LID BMPs conform to the project DCV developed to meet performance criteria specified in the 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 MS4 Permit (see Section 5.3.1 in the TGD for WQMP). The forms compute the following for on-site LID BMP:

- Site Design and Hydrologic Source Controls (Form 4.3-2)
- Retention and Infiltration (Form 4.3-3)
- Harvested and Use (Form 4.3-4) or
- Biotreatment (Form 4.3-5).

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 5.3.2.1 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 Forms 4.3-2 and 4.3-4 to determine the feasibility of applicable HSC and harvest and use 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 HSC 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 LID HSC, retention and infiltration, and harvest and use BMPs are unable to mitigate the entire DCV, then biotreatment BMPs may be implemented by the project proponent. If biotreatment BMPs are used, then they must be sized to provide sufficient capacity for effective treatment of the remainder of the volume-based performance criteria that cannot be achieved with LID BMPs (TGD for WQMP Section 5.4.4.2). **Under no circumstances shall any portion of the DCV be released from the site without effective mitigation and/or treatment**.

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? Yes ☐ No ☒
Refer to Section 5.3.2.1 of the TGD for WQMP

If Yes, Provide basis: (attach)

[2] Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? Yes ☐ No ☒
(Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert):

- 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 stormwater infiltration would result in significantly increased risks of geotechnical hazards.

If Yes, Provide basis: (attach)

[3] Would infiltration of runoff on a Project site violate downstream water rights? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[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? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[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)? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[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? Yes ☐ No ☒
See Section 3.5 of the TGD for WQMP and WAP

If Yes, Provide basis: (attach)

[7] Any answer from Item 1 through Item 3 is "Yes": Yes ☐ No ☒
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.

[8] Any answer from Item 4 through Item 6 is "Yes": Yes ☐ No ☒
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.

[9] All answers to Item 1 through Item 6 are "No":
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.

4.3.1 Site Design Hydrologic Source Control BMP

Section XI.E. of the Permit emphasizes the use of LID preventative measures; and the use of LID HSC BMPs reduces the portion of the DCV that must be addressed in downstream BMPs. Therefore, all applicable HSC shall be provided except where they are mutually exclusive with each 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 HSC, if a project cannot feasibly meet BMP sizing requirements or cannot fully address HCOCs, feasibility of all applicable HSC 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 HSC BMP. Refer to Section 5.4.1 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: Yes ☐ No ☒ *If yes, complete Items 2-5; If no, proceed to Item 6*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Total impervious area draining to pervious area (ft^2)			
3 Ratio of pervious area receiving runoff to impervious area			
4 Retention volume achieved from impervious area dispersion (ft^3) *V = Item2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff*			
5 Sum of retention volume achieved from impervious area dispersion (ft^3):	$V_{retention}$ *=Sum of Item 4 for all BMPs*		
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes ☐ No ☒ *If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
7 Ponding surface area (ft^2)			
8 Ponding depth (ft)			
9 Surface area of amended soil/gravel (ft^2)			
10 Average depth of amended soil/gravel (ft)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft^3) $V_{retention}$ *= (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)*			
13 Runoff volume retention from on-lot infiltration (ft^3):	$V_{retention}$ *=Sum of Item 12 for all BMPs*		

Form 4.3-2 Site Design Hydrologic Source Control BMPs (DA 1)

Form 4.3-2 cont. Site Design Hydrologic Source Control BMPs (DA 1)

14 Implementation of evapotranspiration BMP (green, brown, or blue roofs): Yes ☐ No ☒ *If yes, complete Items 15-20. If no, proceed to Item 21*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
15 Rooftop area planned for ET BMP (ft^2)			
16 Average wet season ET demand (in/day) *Use local values, typical ~ 0.1*			
17 Daily ET demand (ft^3/day) *Item 15 * (Item 16 / 12)*			
18 Drawdown time (hrs) *Copy Item 6 in Form 4.2-1*			
19 Retention Volume (ft^3) $V_{retention}$ *= Item 17 * (Item 18 / 24)*			
20 Runoff volume retention from evapotranspiration BMPs (ft^3): $V_{retention}$ *=Sum of Item 19 for all BMPs*			
21 Implementation of Street Trees: Yes ☐ No ☒ *If yes, complete Items 22-25. If no, proceed to Item 26*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
22 Number of Street Trees			
23 Average canopy cover over impervious area (ft^2)			
24 Runoff volume retention from street trees (ft^3) $V_{retention}$ *= Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches*			
25 Runoff volume retention from street tree BMPs (ft^3): $V_{retention}$ *= Sum of Item 24 for all BMPs*			
26 Implementation of residential rain barrel/cisterns: Yes ☐ No ☒ *If yes, complete Items 27-29; If no, proceed to Item 30*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
27 Number of rain barrels/cisterns			
28 Runoff volume retention from rain barrels/cisterns (ft^3) $V_{retention}$ *= Item 27 * 3*			
29 Runoff volume retention from residential rain barrels/Cisterns (ft3): $V_{retention}$ *=Sum of Item 28 for all BMPs*			
30 Total Retention Volume from Site Design Hydrologic Source Control BMPs: *Sum of Items 5, 13, 20, 25 and 29*			

4.3.2 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 D 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 5.5.1 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).

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Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA 1)

1 Remaining LID DCV not met by site design HSC BMP (ft^3): *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30*			
BMP Type *Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs*	DA 1 BMP Type Underground Basin 1		
2 Infiltration rate of underlying soils (in/hr) *See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods*	121.5		
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*	1.25		
4 Design percolation rate (in/hr) *P_{design} = Item 2 / Item 3*	97.2		
5 Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1*	48		
6 Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details*	N/A		
7 Ponding Depth (ft) *d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6*	N/A		
8 Infiltrating surface area, SA_{BMP} (ft^2) *the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP*	N/A		
9 Amended soil depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*	N/A		
10 Amended soil porosity	N/A		
11 Gravel depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details*	N/A		
12 Gravel porosity	N/A		
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*	N/A		
14 Above Ground Retention Volume (ft^3) *$V_{retention}$ = Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*	0		
15 Underground Retention Volume (ft^3) *Volume determined using manufacturer's specifications and calculations*	17138		
16 Total Retention Volume from LID Infiltration BMPs: 17138 *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*			
17 Fraction of DCV achieved with infiltration BMP: 100% *Retention% = Item 16 / Form 4.2-1 Item 7*			
18 Is full LID DCV retained onsite with combination of hydrologic source control and LID retention/infiltration BMPs? Yes ☒ No ☐ *If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.*			

4.3.3 Harvest and Use BMP

Harvest and use BMP may be considered if the full LID DCV cannot be met by maximizing infiltration BMPs. Use Form 4.3-4 to compute on-site retention of runoff from proposed harvest and use BMPs.

Volume retention estimates for harvest and use BMPs are sensitive to the on-site demand for captured stormwater. Since irrigation water demand is low in the wet season, when most rainfall events occur in San Bernardino County, the volume of water that can be used within a specified drawdown period is relatively low. The bottom portion of Form 4.3-4 facilitates the necessary computations to show infeasibility if a minimum incremental benefit of 40 percent of the LID DCV would not be achievable with MEP implementation of on-site harvest and use of stormwater (Section 5.5.4 of the TGD for WQMP).

Form 4.3-4 Harvest and Use BMPs (DA 1)

1 Remaining LID DCV not met by site design HSC or infiltration BMP (ft^3): *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16*			
BMP Type(s) *Compute runoff volume retention from proposed harvest and use BMP (Select BMPs from Table 5-4 of the TGD for WQMP) - Use additional forms for more BMPs*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Describe cistern or runoff detention facility			
3 Storage volume for proposed detention type (ft^3) *Volume of cistern*			
4 Landscaped area planned for use of harvested stormwater (ft^2)			
5 Average wet season daily irrigation demand (in/day) Use local values, typical ~ 0.1 in/day			
6 Daily water demand (ft^3/day) *Item 4 * (Item 5 / 12)*			
7 Drawdown time (hrs) *Copy Item 6 from Form 4.2-1*			
8 Retention Volume (ft^3) *$V_{retention}$ = Minimum of (Item 3) or (Item 6 * (Item 7 / 24))*			
9 Total Retention Volume (ft^3) from Harvest and Use BMP0 *Sum of Item 8 for all harvest and use BMP included in plan*			
10 Is the full DCV retained with a combination of LID HSC, retention and infiltration, and harvest & use BMPs? Yes ☒ No ☐ *If yes, demonstrate conformance using Form 4.3-10. If no, then re-evaluate combinations of all LID BMP and optimize their implementation such that the maximum portion of the DCV is retained on-site (using a single BMP type or combination of BMP types). If the full DCV cannot be mitigated after this optimization process, proceed to Section 4.3.4.*			

4.3.4 Biotreatment BMP

Biotreatment BMPs may be considered if the full LID DCV cannot be met by maximizing retention and infiltration, and harvest and use BMPs. 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 4.3-5 to summarize the potential for volume based and/or flow based biotreatment options to biotreat the remaining unmet LID DCV w. Biotreatment computations are included as follows:

- Use Form 4.3-6 to compute biotreatment in small volume based biotreatment BMP (e.g. bioretention w/underdrains);
- Use Form 4.3-7 to compute biotreatment in large volume based biotreatment BMP (e.g. constructed wetlands);
- Use Form 4.3-8 to compute sizing criteria for flow-based biotreatment BMP (e.g. bioswales)

Form 4.3-5 Selection and Evaluation of Biotreatment BMP (DA 1)

1 Remaining LID DCV not met by site design HSC, infiltration, or harvest and use BMP for potential biotreatment (ft^3): 0 *Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16- Form 4.3-4 Item 9*	List pollutants of concern *Copy from Form 2.3-1.*	
2 Biotreatment BMP Selected *(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)*	Volume-based biotreatment *Use Forms 4.3-6 and 4.3-7 to compute treated volume*	Flow-based biotreatment *Use Form 4.3-8 to compute treated volume*
	☐ Bioretention with underdrain ☐ Planter box with underdrain ☐ Constructed wetlands ☐ Wet extended detention ☐ Dry extended detention	☐ Vegetated swale ☐ Vegetated filter strip ☐ Proprietary biotreatment
3 Volume biotreated in volume based biotreatment BMP (ft^3): *Form 4.3-6 Item 15 + Form 4.3-7 Item 13*	**4** Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft^3): *Item 1 – Item 3*	**5** Remaining fraction of LID DCV for sizing flow based biotreatment BMP: % *Item 4 / Item 1*
6 Flow-based biotreatment BMP capacity provided (cfs): *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)*		
7 Metrics for MEP determination: • 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: ☐ *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.*		

Form 4.3-6 Volume Based Biotreatment (DA 1) – Bioretention and Planter Boxes with Underdrains

Biotreatment BMP Type *(Bioretention w/underdrain, planter box w/underdrain, other comparable BMP)*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
1 Pollutants addressed with BMP *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*			
2 Amended soil infiltration rate *Typical ~ 5.0*			
3 Amended soil infiltration safety factor *Typical ~ 2.0*			
4 Amended soil design percolation rate (in/hr) P_{design} *= Item 2 / Item 3*			
5 Ponded water drawdown time (hr) *Copy Item 6 from Form 4.2-1*			
6 Maximum ponding depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
7 Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 4 * Item 5) or Item 6*			
8 Amended soil surface area (ft^2)			
9 Amended soil depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
10 Amended soil porosity, *n*			
11 Gravel depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
12 Gravel porosity, *n*			
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*			
14 Biotreated Volume (ft^3) $V_{biotreated}$ *= Item 8 * [(Item 7/2) + (Item 9 * Item 10) +(Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*			
15 Total biotreated volume from bioretention and/or planter box with underdrains BMP: 0 *Sum of Item 14 for all volume-based BMPs included in this form*			

Form 4.3-7 Volume Based Biotreatment (DA 1) – Constructed Wetlands and Extended Detention

Biotreatment BMP Type *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.*	DA DMA BMP Type		DA DMA BMP Type *(Use additional forms for more BMPs)*	
	Forebay	Basin	Forebay	Basin
1 Pollutants addressed with BMP forebay and basin *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*				
2 Bottom width (ft)				
3 Bottom length (ft)				
4 Bottom area (ft^2) A_{bottom} = *Item 2 * Item 3*				
5 Side slope (ft/ft)				
6 Depth of storage (ft)				
7 Water surface area (ft^2) $A_{surface}$ =*(Item 2 + (2 * Item 5 * Item 6)) * (Item 3 + (2 * Item 5 * Item 6))*				
8 Storage volume (ft^3) *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* V =*Item 6 / 3 * [Item 4 + Item 7 + (Item 4 * Item 7)^0.5]*				
9 Drawdown Time (hrs) *Copy Item 6 from Form 2.1*				
10 Outflow rate (cfs) Q_{BMP} = *(Item* $8_{forebay}$ *+ Item* 8_{basin}*) / (Item 9 * 3600)*				
11 Duration of design storm event (hrs)				
12 Biotreated Volume (ft^3) $V_{biotreated}$ = *(Item* $8_{forebay}$ *+ Item* 8_{basin}*) +(Item 10 * Item 11 * 3600)*				
13 Total biotreated volume from constructed wetlands, extended dry detention, or extended wet detention : 0 *(Sum of Item 12 for all BMP included in plan)*				

Form 4.3-8 Flow Based Biotreatment (DA 1)

Biotreatment BMP Type *Vegetated swale, vegetated filter strip, or other comparable proprietary BMP* **N/A**	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
1 Pollutants addressed with BMP *List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in TGD Table 5-5*			
2 Flow depth for water quality treatment (ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
3 Bed slope (ft/ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
4 Manning's roughness coefficient			
5 Bottom width (ft) b_w *= (Form 4.3-5 Item 6 * Item 4) / (1.49 * Item 2^1.67 * Item 3^0.5)*			
6 Side Slope (ft/ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
7 Cross sectional area (ft^2) *A = (Item 5 * Item 2) + (Item 6 * Item 2^2)*			
8 Water quality flow velocity (ft/sec) *V = Form 4.3-5 Item 6 / Item 7*			
9 Hydraulic residence time (min) *Pollutant specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
10 Length of flow based BMP (ft) *L = Item 8 * Item 9 * 60*			
11 Water surface area at water quality flow depth (ft^2) SA_{top} *= (Item 5 + (2 * Item 2 * Item 6)) * Item 10*			

4.3.5 Conformance Summary

Complete Form 4.3-9 to demonstrate how on-site LID DCV is met with proposed site design hydrologic source control, infiltration, harvest and use, 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 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate (DA 1)

1 Total LID DCV for the Project DA-1 (ft^3): 17138 *Copy Item 7 in Form 4.2-1*

2 On-site retention with site design hydrologic source control LID BMP (ft^3): 17138 *Copy Item 30 in Form 4.3-2*

3 On-site retention with LID infiltration BMP (ft^3): 100% *Copy Item 16 in Form 4.3-3*

4 On-site retention with LID harvest and use BMP (ft^3): 0 *Copy Item 9 in Form 4.3-4*

5 On-site biotreatment with volume based biotreatment BMP (ft^3): 0 *Copy Item 3 in Form 4.3-5*

6 Flow capacity provided by flow based biotreatment BMP (cfs): 0 *Copy Item 6 in Form 4.3-5*

7 LID BMP performance criteria are achieved if answer to any of the following is "Yes":

- Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes ☒ No ☐
  If yes, sum of Items 2, 3, and 4 is greater than Item 1
- 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: Yes ☐ No ☒
  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
- On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes ☐ No ☒
  If yes, Form 4.3-1 Items 7 and 8 were both checked yes

8 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:

- Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: ☐
  Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, V_{alt} *= (Item 1 – Item 2 – Item 3 – Item 4 – Item 5) * (100 - Form 2.4-1 Item 2)%*
- An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: ☐
  Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed

4.3.6 Hydromodification Control BMP

Use Form 4.3-10 to compute the remaining runoff volume retention, after LID BMP are implemented, needed to address HCOC, and the increase in time of concentration and decrease in peak runoff necessary to meet targets for protection of waterbodies with a potential HCOC. Describe hydromodification control BMP that address HCOC, which may include off-site BMP and/or in-stream controls. Section 5.6 of the TGD for WQMP provides additional details on selection and evaluation of hydromodification control BMP.

Form 4.3-10 Hydromodification Control BMPs (DA 1)

1 Volume reduction needed for HCOC performance criteria (ft^3): *(Form 4.2-2 Item 4 * 0.95) – Form 4.2-2 Item 1*	**2** On-site retention with site design hydrologic source control, infiltration, and harvest and use LID BMP (ft^3): *Sum of Form 4.3-9 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*
3 Remaining volume for HCOC volume capture (ft^3): *Item 1 – Item 2*	**4** Volume capture provided by incorporating additional on-site or off-site retention BMPs (ft^3): *Existing downstream BMP may be used to demonstrate additional volume capture (if so, attach to this WQMP a hydrologic analysis showing how the additional volume would be retained during a 2-yr storm event for the regional watershed)*

5 If Item 4 is less than Item 3, incorporate in-stream controls on downstream waterbody segment to prevent impacts due to hydromodification ☐ *Attach in-stream control BMP selection and evaluation to this WQMP*

6 Is Form 4.2-2 Item 11 less than or equal to 5%: Yes ☐ No ☐

If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:

- Demonstrate increase in time of concentration achieved by proposed LID site design, LID BMP, and additional on-site or off-site retention BMP ☐
  BMP upstream of a waterbody segment with a potential HCOC may be used to demonstrate increased time of concentration through hydrograph attenuation (if so, show that the hydraulic residence time provided in BMP for a 2-year storm event is equal or greater than the addition time of concentration requirement in Form 4.2-4 Item 15)
- 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 ☐
- Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California ☐

7 Form 4.2-2 Item 12 less than or equal to 5%: Yes ☐ No ☐

If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:

- Demonstrate reduction in peak runoff achieved by proposed LID site design, LID BMPs, and additional on-site or off-site retention BMPs ☐
  BMPs upstream of a waterbody segment with a potential HCOC may be used to demonstrate additional peak runoff reduction through hydrograph attenuation (if so, attach to this WQMP, a hydrograph analysis showing how the peak runoff would be reduced during a 2-yr storm event)
- Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California ☐

4.4 Alternative Compliance Plan (if applicable)

Describe an alternative compliance plan (if applicable) for projects not fully able to infiltrate, harvest and use, 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 compliance plans may include one or more of the following elements:

- On-site structural treatment control BMP - All treatment control BMP should be located as close to possible to the pollutant sources and should not be located within receiving waters;
- Off-site structural treatment control BMP - Pollutant removal should occur prior to discharge of runoff to receiving waters;
- Urban runoff fund or In-lieu program, if available

Depending upon the proposed alternative compliance plan, approval by the executive officer may or may not be required (see Section 6 of the TGD for WQMP).

Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

All BMP 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 may require a Maintenance Agreement (consult the jurisdiction's LIP). If a Maintenance Agreement is required, it must also be attached to the WQMP.

Form 5-1 BMP Inspection and Maintenance (use additional forms as necessary)

BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
Education of Property Owners, Tenants and occupants on storm-water BMPs	Property Owner(s) / Tenants	This BMP will begin at building occupancy. Practical informational materials are provided in this document in Section 6. These include BMPs that eliminate or reduce pollution during property improvements. The property owners and tenants are encouraged to implement the use of alternative building materials, drought resistant and native plant species in landscaping and pervious pavement in all additions and modifications to the property. Reference educational material can be found at http://sbcountystormwater.org/government/outreach-materials/	Ongoing
Activity Restrictions	Property Owner(s) / Tenants	Restrictions include vehicle washing and maintenance, outdoor materials storage, outdoor work or processing areas, and pesticide application by any other person than an applicator certified by the California Department of Pesticide Regulation. The Owner is to notify tenants of violation and cite if violation persists (within 1 week of violation).	Ongoing
Sweeping of Parking Lots	Property Owner(s) / Tenants	This BMP will begin within 1 year of project completion and sweeping will occur annually thereafter, prior to the rainy season. The tenant will contract with a sweeping company to	Annually

		complete this BMP. All wastes shall be landfilled. The parking lots shall be swept. There will be no parking lot cleaning with water.	
Infiltration Basin Maintenance	Property Owner(s)	The isolator row of the underground basins shall be inspected at the beginning of the wet and dry seasons or more frequently as needed and shall be cleaned out when the average depth of sediment exceeds 3" throughout the length of the isolator row using the Jetvac process per manufacturer's recommendations. If inspection indicates the need for maintenance access is necessary, OSHA rules for contained space entries shall be followed.	At the Beginning of the Wet and Dry Seasons
Litter Control	Property Owner(s)	This BMP will will occur on a monthly basis (or more frequently if dictated by volume of trash). A landscape maintenance company will be retained to provide litter control services. They are to ensure that overall site is trash free, including catch basin trash guards and the inside of the trash enclosure. Trash in these areas is to be removed and placed inside the trash bins. They are also to report to the Owner if the trash bins or lids have become damaged so that they can be replaced.	Monthly
Landscape Management BMPs	Property Owner(s)	This BMP will begin within 30 days of building occupancy and will occur on a monthly basis (or more frequently if desired). The property owner(s) will retain a landscape maintenance company or will have staff designated to service all site landscaping. Site trees and shrubs are to be trimmed as necessary and all wastes disposed of offsite. Mulch fiber that has been disturbed is to be replaced. They are also to ensure that all areas are trash free. Trash is to be disposed of offsite. Ongoing maintenance shall be consistent with local guidelines, and fertilizer and pesticide usage shall be consistent with the instructions contained on product labels and with the regulations administered by the State Department of Pesticide Regulation. Clippings and yard waste shall be composted. A landscape	Monthly

		maintenance company will be retained to service all site irrigation. Any breaks or leaks in piping must be repaired within 2 business days of report to the landscaper.	
Employee Training	Property Owner(s) / Tenants	This BMP will begin within 30 days of building occupancy and refresher course will occur annually thereafter. The tenants shall insure that all employees are familiar with the contents of this plan and appendix.	Annually
Catch Basin Inspection Program	Property Owner(s)	This BMP will begin within 30 days of project completion. Inspections will be done by a landscape maintenance company or other staff after the first storm of the rainy season and two times per month thereafter for the duration of the rainy season. The inspector is also required to clean the facilities as needed or when filled to 25% capacity. Cleaning can be by pump or shopvac or by hand. Debris and trash shall be landfilled.	After first storm and 2x/month in rainy season

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 connections

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 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

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

6.4 Other Supporting Documentation

- BMP Educational Materials
- Activity Restriction – C, C&R's & Lease Agreements

NOAA Atlas 14, Volume 6, Version 2 DEVORE
C.D.F.
Station ID: 79-2118
Location name: San Bernardino, California, USA*
Latitude: 34.222°, Longitude: -117.4067°
Elevation:
Elevation (station metadata): 2080 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	**0.160** (0.133-0.195)	**0.241** (0.200-0.293)	**0.338** (0.280-0.413)	**0.413** (0.339-0.508)	**0.507** (0.402-0.646)	**0.575** (0.446-0.748)	**0.640** (0.485-0.854)	**0.703** (0.518-0.966)	**0.784** (0.553-1.12)	**0.843** (0.574-1.25)
10-min	**0.230** (0.191-0.279)	**0.345** (0.286-0.420)	**0.485** (0.401-0.592)	**0.592** (0.485-0.728)	**0.727** (0.576-0.926)	**0.824** (0.640-1.07)	**0.917** (0.694-1.22)	**1.01** (0.742-1.38)	**1.12** (0.793-1.61)	**1.21** (0.823-1.79)
15-min	**0.278** (0.231-0.338)	**0.417** (0.346-0.508)	**0.586** (0.485-0.716)	**0.715** (0.587-0.881)	**0.879** (0.697-1.12)	**0.997** (0.774-1.30)	**1.11** (0.840-1.48)	**1.22** (0.897-1.67)	**1.36** (0.959-1.95)	**1.46** (0.995-2.17)
30-min	**0.420** (0.349-0.511)	**0.631** (0.524-0.768)	**0.887** (0.734-1.08)	**1.08** (0.889-1.33)	**1.33** (1.06-1.70)	**1.51** (1.17-1.96)	**1.68** (1.27-2.24)	**1.85** (1.36-2.53)	**2.06** (1.45-2.95)	**2.21** (1.51-3.28)
60-min	**0.651** (0.541-0.791)	**0.977** (0.811-1.19)	**1.37** (1.14-1.68)	**1.68** (1.38-2.06)	**2.06** (1.63-2.62)	**2.34** (1.81-3.04)	**2.60** (1.97-3.47)	**2.86** (2.10-3.92)	**3.19** (2.25-4.56)	**3.42** (2.33-5.08)
2-hr	**1.05** (0.868-1.27)	**1.44** (1.19-1.75)	**1.92** (1.59-2.35)	**2.29** (1.88-2.82)	**2.76** (2.19-3.52)	**3.10** (2.41-4.04)	**3.43** (2.59-4.57)	**3.74** (2.75-5.14)	**4.14** (2.92-5.94)	**4.44** (3.02-6.58)
3-hr	**1.38** (1.14-1.67)	**1.84** (1.52-2.23)	**2.40** (1.99-2.93)	**2.83** (2.32-3.49)	**3.38** (2.68-4.31)	**3.78** (2.94-4.92)	**4.16** (3.15-5.55)	**4.54** (3.34-6.23)	**5.01** (3.53-7.17)	**5.35** (3.64-7.94)
6-hr	**2.10** (1.74-2.55)	**2.71** (2.25-3.30)	**3.47** (2.87-4.24)	**4.06** (3.33-4.99)	**4.80** (3.81-6.12)	**5.34** (4.15-6.95)	**5.86** (4.44-7.82)	**6.37** (4.69-8.74)	**7.01** (4.95-10.0)	**7.48** (5.09-11.1)
12-hr	**2.85** (2.37-3.47)	**3.69** (3.06-4.49)	**4.72** (3.90-5.76)	**5.51** (4.52-6.78)	**6.53** (5.18-8.32)	**7.27** (5.64-9.46)	**7.98** (6.04-10.6)	**8.68** (6.39-11.9)	**9.57** (6.75-13.7)	**10.2** (6.96-15.2)
24-hr	**3.80** (3.37-4.38)	**5.01** (4.43-5.77)	**6.51** (5.74-7.52)	**7.67** (6.71-8.94)	**9.17** (7.77-11.0)	**10.3** (8.51-12.6)	**11.3** (9.17-14.3)	**12.4** (9.74-16.0)	**13.7** (10.4-18.5)	**14.7** (10.7-20.5)
2-day	**4.50** (3.98-5.18)	**6.10** (5.39-7.03)	**8.10** (7.15-9.37)	**9.67** (8.47-11.3)	**11.7** (9.93-14.1)	**13.2** (11.0-16.3)	**14.7** (11.9-18.5)	**16.2** (12.8-21.0)	**18.1** (13.7-24.4)	**19.5** (14.3-27.2)
3-day	**4.81** (4.26-5.54)	**6.65** (5.88-7.67)	**8.98** (7.93-10.4)	**10.8** (9.48-12.6)	**13.3** (11.2-16.0)	**15.1** (12.5-18.5)	**16.9** (13.7-21.2)	**18.6** (14.7-24.1)	**21.0** (15.9-28.3)	**22.7** (16.6-31.7)
4-day	**5.14** (4.55-5.92)	**7.23** (6.40-8.34)	**9.89** (8.73-11.4)	**12.0** (10.5-14.0)	**14.8** (12.6-17.9)	**16.9** (14.0-20.8)	**19.0** (15.4-24.0)	**21.1** (16.6-27.3)	**23.9** (18.1-32.2)	**26.0** (19.0-36.3)
7-day	**5.74** (5.08-6.61)	**8.34** (7.38-9.62)	**11.7** (10.3-13.5)	**14.4** (12.6-16.8)	**18.1** (15.3-21.8)	**20.8** (17.3-25.6)	**23.6** (19.1-29.8)	**26.5** (20.8-34.3)	**30.3** (22.9-40.8)	**33.2** (24.3-46.3)
10-day	**6.04** (5.35-6.96)	**8.94** (7.91-10.3)	**12.7** (11.2-14.7)	**15.8** (13.8-18.4)	**20.0** (17.0-24.1)	**23.2** (19.3-28.6)	**26.5** (21.5-33.4)	**29.9** (23.6-38.7)	**34.5** (26.1-46.5)	**38.0** (27.8-53.1)
20-day	**7.42** (6.57-8.55)	**11.2** (9.91-12.9)	**16.3** (14.4-18.8)	**20.5** (17.9-23.9)	**26.4** (22.3-31.8)	**31.0** (25.7-38.1)	**35.8** (29.0-45.2)	**41.0** (32.3-53.0)	**48.1** (36.4-64.9)	**53.8** (39.3-75.0)
30-day	**8.74** (7.74-10.1)	**13.1** (11.6-15.1)	**19.1** (16.9-22.1)	**24.2** (21.2-28.2)	**31.4** (26.6-37.8)	**37.2** (30.9-45.8)	**43.4** (35.1-54.6)	**49.9** (39.4-64.7)	**59.3** (44.8-80.0)	**66.9** (48.9-93.4)
45-day	**10.8** (9.56-12.4)	**15.8** (14.0-18.3)	**22.9** (20.2-26.5)	**29.0** (25.4-33.9)	**37.9** (32.1-45.7)	**45.2** (37.5-55.6)	**53.0** (43.0-66.8)	**61.6** (48.5-79.8)	**74.1** (56.0-99.9)	**84.4** (61.7-118)
60-day	**12.9** (11.4-14.9)	**18.4** (16.3-21.2)	**26.2** (23.2-30.3)	**33.1** (29.0-38.6)	**43.3** (36.7-52.2)	**51.9** (43.0-63.8)	**61.2** (49.5-77.1)	**71.5** (56.3-92.6)	**86.7** (65.6-117)	**99.6** (72.8-139)

[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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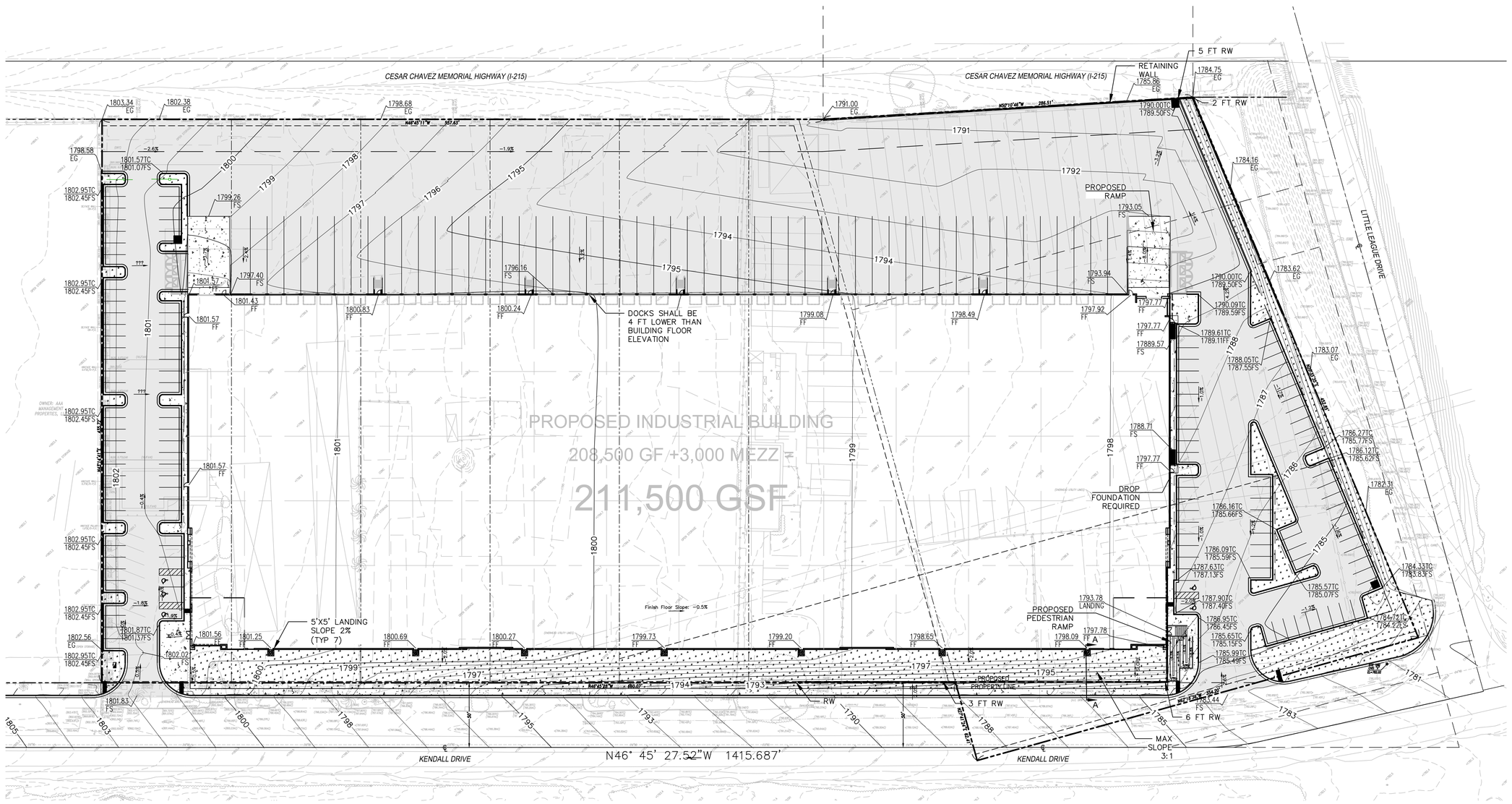
PF graphical

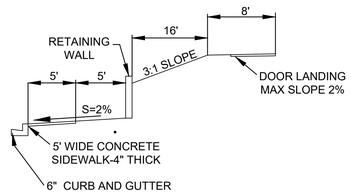


LOCATION MAP
SCALE: 1"=30'

SITE INFORMATION
ZONING = CI (CORRIDOR INDUSTRIAL)
PROP AREA = 10.15 ac
BLDG AREA = 208572 ft²
FF ELEV = 1801 TO 1797 .5% SLOPE
PROP BLDG = 1
(SEE ARCHITECTURAL PLANS FOR DETAILS)

STORM WATER REQUIREMENTS
TOTAL STORAGE REQUIRED = 30414 cu. ft.
ALL STORMWATER WILL BE RETAINED UNDERGROUND ON SITE.

WET UTILITIES
ALL SEWAGE WILL MAINTAINED BE ON PROPERTY THROUGH UNDERGROUND SEEPAGE TANKS.
A PRIVATE POTABLE WATER/FIRE LINE, INCLUDING FIRE HYDRANTS, WILL BE INSTALLED ON SITE AND CONNECTED TO THE WATER MAIN CURRENTLY IN KENDALL DRIVE.



DETAIL A-A
N.T.S.

ABBREVIATIONS & SYMBOLS

AB	AGGREGATE BASE
AC	ASPHALT CONCRETE
ACP	ASBESTOS-CEMENT PIPE
BCR	BEGINNING OF CURB RETURN
BM	BENCHMARK
BW	BACK OF WALK
CB	CATCH BASIN
CF	CURB FACE
℄	CENTERLINE
CI	CAST IRON
CO	CLEANOUT
DT	DIRT
ECR	END OF CURB RETURN
ELEC	ELECTRIC
EMH	ELECTRIC MANHOLE
EPB	ELECTRIC PULLBOX
EP	EDGE OF PAVEMENT
EX	EXISTING
FF	FINISHED FLOOR
FG	FINISHED GRADE
FL	FLOW LINE
FS	FINISHED SURFACE
G	GAS
GB	GRADE BREAK
GM	GAS METER
INV	INVERT ELEVATION
LIP	LIP OF GUTTER
MW	MONITOR WELL
PA	PLANTING AREA
PB	PULLBOX
PI	PRESSURIZED IRRIGATION
ℙ	PROPERTY LINE
PROP	PROPOSED
PVC	POLYVINYL CHLORIDE
R	RIDGE LINE
R/W	RIGHT OF WAY
SD	STORM DRAIN
SDMH	DRAIN MANHOLE
SL	STREET LIGHT
SS	SANITARY SEWER
SSMH	SEWER MANHOLE
S/W	SIDEWALK
T	TELEPHONE
TC	TOP OF CURB
TF	TOP OF FOOTING
TMH	TELEPHONE MANHOLE
TS	TRAFFIC SIGNAL
TSPB	TRAFFIC SIGNAL PULL BOX
TW	TOP OF WALL
W	WATER
WM	WATER METER
WV	WATER VALVE
VCP	VITRIFIED CLAY PIPE
	TRAFFIC SIGNAL
	POWER POLE
	FIRE HYDRANT
BF	BACKFLOW
	WATER VALVE
	WATER METER
	POST INDICATOR VALVE
	FIRE DEPT. CONNECTION
	STREET LIGHT
	DETECTOR CHECK (DCDA OR RPDA)
(XX)	EXISTING CONTOUR
XX	PROPOSED CONTOUR
(XX.XX)	EXISTING ELEVATION
XX.XX	PROPOSED ELEVATION
Ⓔ	ELECTRIC MANHOLE
Ⓓ	STORM DRAIN MANHOLE
Ⓢ	SEWER MANHOLE
Ⓣ	TELEPHONE MANHOLE
OHE	ELECTRIC LINES OVERHEAD
E	ELECTRIC LINE
G	GAS LINE
T	TELEPHONE LINE
S	SEWER LINE
SD	STORM DRAIN LINE
W	WATER LINE
X	EX. FENCE
	PROP. FENCE
	EX. WALL
	PROP. WALL

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DRAWING ISSUE RECORD
DATE DESCRIPTION

REVISION RECORD
NO. DATE DESCRIPTION

PROJECT INFORMATION

KENDALL DEVELOPMENT
KENDALL DRIVE
SAN BERNARDINO COUNTY, CA

PROFESSIONAL SEAL

SHEET TITLE
PRELIMINARY GRADING PLAN

SHEET NUMBER
1- of -2

BLUE PEAK JOB #: 0962
DATE: 09/26/2022

LOCATION MAP
SCALE: 1"=30'

CESAR CHAVEZ MEMORIAL HIGHWAY (I-215)

CESAR CHAVEZ MEMORIAL HIGHWAY (I-215)

RETAINING WALL

FIRE HYDRANT WITH BOLLARDS

FIRE HYDRANT WITH BOLLARDS

STORM CATCHBASIN

STORM CATCHBASIN

INSTALL FIRE HYDRANT

LITTLE LEAGUE DRIVE

OWNER: AAA MANAGEMENT PROPERTIES, LLC

SEWER CONNECTION TO BLDG KEEP 18" MIN VERTICAL SEPARATION FROM WATER

PROPOSED INDUSTRIAL BUILDING

208,500 GF +3,000 MEZZ =

211,500 GSF

FIRELINE WITH PIV AND FDC

STORMTECH STORAGE

FIRELINE WITH PIV AND FDC

SEWER CONNECTION TO BLDG KEEP 18" MIN VERTICAL SEPARATION FROM WATER

STORM CATCHBASIN

OVERFLOW TO KENDALL DRIVE

1" IRRIGATION SERVICE

1" WATER SERVICE

PROPOSED FIRE HYDRANT

PROPOSED PROPERTY LINE

RELOCATE HYDRANT BEHIND CURB

EXISTING FIRE HYDRANT PROTECT IN PLACE

EXISTING BLOW OUT RELOCATED BEHIND CURB

POWER POLE TO BE CONVERTED TO UNDERGROUND

KENDALL DRIVE

KENDALL DRIVE

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NO.	DATE	DESCRIPTION

PROJECT INFORMATION

KENDALL DEVELOPMENT

KENDALL DRIVE
SAN BERNARDINO COUNTY, CA

PROFESSIONAL SEAL

SHEET TITLE

PRELIMINARY UTILITY PLAN

SHEET NUMBER

2- of -2

BLUE PEAK JOB #: 0962
DATE: 09/26/2022