# APPENDIX 6

# WQMP

Ventura Engineering Inland INC
VEI

# *WATER QUALITY MANAGEMENT PLAN*

## *TITAN RECYCLING CENTER*
## *AGENCY NO.:_____*

*10011 LIVE OAK AVENUE & 14930 VALLEY BLVD*
*FONTANA, CALIFORNIA 92335*
*APN: 0235-041-14, 20, 21, 23 & 24*

***PREPARED FOR:***

*TITAN INDUSTRIAL METAL CORPORATION*
*10312 ALMOND AVENUE*
*FONTANA, CALIFORNIA 92335*
*(909) 772-4543*

***PREPARED BY:***

*VENTURA ENGINEERING INLAND*
*27393 YNEZ ROAD, SUITE 159*
*TEMECULA, CALIFORNIA 92591*
*(951) 252-7632*

***ORIGINAL DATE:*** *March 21, 2022*

*I hereby declare that I am the engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions code, and that the design is consistent with current standards.*


*WILFREDO VENTURA*
*R.C.E. NO. 66532*
*EXPIRES 6/30/22*

*3/21/22*
*DATE*

# Preliminary Water Quality Management Plan

**For:**

## Titan Recycling Center

AGENCY NUMBER: _____

APNS: 0235-041-14, 0235-041-20, 0235-041-21, 0235-041-23 AND 0235-041-24

## Prepared for:

Titan Industrial Metal Corporation
10312 Almond Avenue
Fontana, California 92335
(909) 772-4543

## Prepared by:

Ventura Engineering Inland, Inc.
27393 Ynez Road, Suite 159
Temecula, California 92591
(951) 252-7632

**Submittal Date:** March 21, 2022

**Revision Date:** _____

**Approval Date:** _____

# Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for Titan Industrial Metal Corporation by Ventura Engineering, Inc. The WQMP is intended to comply with the requirements of the San Bernardino County 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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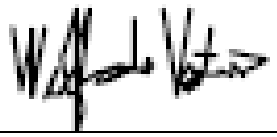
| Project Data | | | |
|---|---|---|---|
| Permit/Application Number(s): | CUP_____ | Grading Permit Number(s): | TBD |
| Tract/Parcel Map Number(s): | TBD | Building Permit Number(s): | TBD |
| CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract): | | | APNs 0235-041-14, 0235-041-20, 0235-041-21, 0235-041-23 and 0235-041-24 |

| Owner's Signature | | | |
|---|---|---|---|
| **Owner Name:** Titan Industrial Metal Corporation | | | |
| Title | | | |
| Company | Titan Industrial Metal Corporation | | |
| Address | 1032 Almond Avenue, Fontana, California 92335 | | |
| Email | | | |
| Telephone # | (909) 772-4543 | | |
| Signature | | Date | |

# Preparer's Certification

| Project Data | | | |
|---|---|---|---|
| Permit/Application Number(s): | CUP_____ | Grading Permit Number(s): | TBD |
| Tract/Parcel Map Number(s): | TBD | Building Permit Number(s): | TBD |
| CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract): | | | APNs 0235-041-14, 0235-041-20, 0235-041-21, 0235-041-23 and 0235-041-24 |

"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:** Wilfredo Ventura | | PE Stamp Below |
|---|---|---|
| Title | Principal | |
| Company | Ventura Engineering Inland, Inc. | |
| Address | 27393 Ynez Road, Suite 159<br>Temecula, California 92591 | |
| Email | wilfredo@venturaengineeringinland.com | |
| Telephone # | (951) 252-7632 | |
| Signature |  | |
| Date | March 21, 2022 | |

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# Forms

# Section 1 Discretionary Permit(s)

| Form 1-1 Project Information | | | | | |
|---|---|---|---|---|---|
| Project Name | Titan Recycling Center | | | | |
| Project Owner Contact Name: | Titan Industrial Metal Corporation | | | | |
| Mailing Address: | 10312 Almond Avenue<br>Fontana, California 92335 | E-mail Address: | | Telephone: | (909) 772-4543 |
| Permit/Application Number(s): | TBD | | Tract/Parcel Map Number(s): | APNs 0235-041-14, 0235-041-20, 0235-041-21, 0235-041-23 and 0235-041-24 | |
| Additional Information/ Comments: | Initial Application | | | | |
| Description of Project: | Conversion of the existing features into a recycling center | | | | |
| Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy. | No previous Conceptual WQMP | | | | |

# 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 $ft^2$ or more of impervious surface on an already developed site | ☐ New development involving the creation of 10,000 $ft^2$ 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 $ft^2$ or more |
| ☐ Hillside developments of 5,000 $ft^2$ 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 $ft^2$ 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 $ft^2$ or more exposed to storm water | ☐ Retail gasoline outlets that are either 5,000 $ft^2$ 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): | 184,003 | **3** Number of Dwelling Units: | 0 | **4** SIC Code: | 5093 |

**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 property owner is the responsible entity for implementation of WQMP requirements as follows:

BMP Inspection and Monitoring shall be the responsibility of:

Property Ownership
Titan Industrial Metal Corporation
10312 Almond Avenue
Fontana, California 92335
(909) 772-4543

BMP Operations and Maintenance shall be the responsibility of:

Property Ownership
Titan Industrial Metal Corporation
10312 Almond Avenue
Fontana, California 92335
(909) 772-4543

Financial responsibility shall be:

Property Ownership
Titan Industrial Metal Corporation
10312 Almond Avenue
Fontana, California 92335
(909) 772-4543

# 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 ☐ | |

# 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<br>☐ Vertical density [20%]<br>☐ 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) | None Apply |

# Section 3 Site and Watershed Description

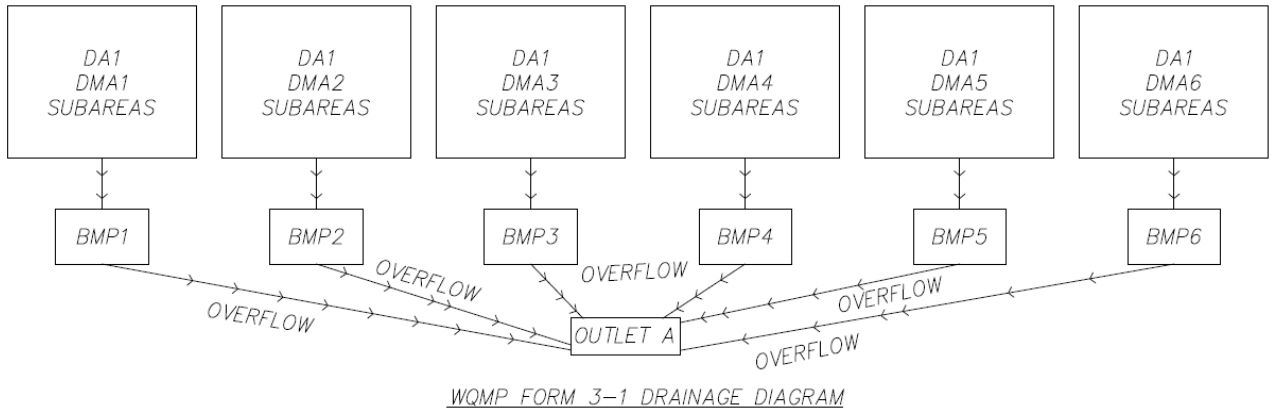
Describe the project site conditions that will facilitate the selection of BMP through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and 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$^{O}$ 4' 17.61" N | Longitude: 34$^{O}$ 4' 17.61" N | Thomas Bros Map page 604 |
|---|---|---|---|

**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*




WQMP FORM 3-1 DRAINAGE DIAGRAM

| Conveyance | Briefly describe on-site drainage features to convey runoff that is not retained within a DMA |
|---|---|
| DA1 to Outlet 1 | All project site is divided into sub drainage areas that all drain to individual BMPs that are all tied to a storm drain system that discharges to the same off-site public storm drain system. The entire area acts as one Drainage Area. |

## Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1

| For Drainage Area 1's sub-watershed DMA, provide the following characteristics | DA1 | | | |
|---|---|---|---|---|
| **1** DMA drainage area ($ft^2$) | 184,003 | | | |
| **2** Existing site impervious area ($ft^2$) | 174,802 | | | |
| **3** Antecedent moisture condition *For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf* | I | | | |
| **4** Hydrologic soil group *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/* | A | | | |
| **5** Longest flowpath length (ft) | 2975 | | | |
| **6** Longest flowpath slope (ft/ft) | 0.5 | | | |
| **7** Current land cover type(s) *Select from Fig C-3 of Hydrology Manual* | Industrial | | | |
| **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* | Site Is a Remodel<br>5% Landscaping | | | |

| **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 | | | | |
| **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 1

## (See County Stormwater Facility Mapping Tool Data in Attachment 3)

| | |
|---|---|
| Receiving waters<br>*Refer to Watershed Mapping Tool -*<br>*http://permitrack.sbcounty.gov/wap/*<br>*See 'Drainage Facilities" link at this website* | SBCFCD<br>West Fontana Channel<br>System 809 |
| Applicable TMDLs<br>*Refer to Local Implementation Plan* | None |
| 303(d) listed impairments<br>*Refer to Local Implementation Plan and Watershed Mapping Tool –*<br>*http://permitrack.sbcounty.gov/wap/ and State Water Resources Control Board website – http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml* | Not Listed At This Time |
| Environmentally Sensitive Areas (ESA)<br>*Refer to Watershed Mapping Tool –*<br>*http://permitrack.sbcounty.gov/wap/* | None within 200' |
| Unlined Downstream Water Bodies<br>*Refer to Watershed Mapping Tool –*<br>*http://permitrack.sbcounty.gov/wap/* | None |
| 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*<br>☒ No |
| Watershed–based BMP included in a RWQCB approved WAP | ☐ Yes *Attach verification of regional BMP evaluation criteria in WAP*<br>• *More Effective than On-site LID*<br>• *Remaining Capacity for Project DCV*<br>• *Upstream of any Water of the US*<br>• *Operational at Project Completion*<br>• *Long-Term Maintenance Plan*<br>☒ 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 | ☒ | ☐ | O&M Plan will be created during Final Engineering |
| N2 | Activity Restrictions | ☐ | ☒ | Not Applicable |
| N3 | Landscape Management BMPs | ☒ | ☐ | Landscape will be maintained per City requirements |
| N4 | BMP Maintenance | ☒ | ☐ | O&M Plan will be created during Final Engineering |
| N5 | Title 22 CCR Compliance (How development will comply) | ☒ | ☐ | Through Building Department review and approvals |
| N6 | Local Water Quality Ordinances | ☒ | ☐ | Landscape will be maintained per City requirements |
| N7 | Spill Contingency Plan | ☒ | ☐ | Per Applicable Recycling Center Operations Regulations and will be provided during Final Engineering |
| N8 | Underground Storage Tank Compliance | ☐ | ☒ | Not Applicable |
| N9 | Hazardous Materials Disclosure Compliance | ☒ | ☐ | Per Applicable Recycling Center Operations Regulations and will be provided during Final Engineering |

## 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 | ☒ | ☐ | Through Building Department review and approvals |
| N11 | Litter/Debris Control Program | ☒ | ☐ | Trash enclosure proposed per City requirements and will be provided during final engineering |
| N12 | Employee Training | ☒ | ☐ | Per Applicable Recycling Center Operations Regulations and will be provided during Final Engineering |
| N13 | Housekeeping of Loading Docks | ☒ | ☐ | Per Applicable Recycling Center Operations Regulations and will be provided during Final Engineering |
| N14 | Catch Basin Inspection Program | ☒ | ☐ | O&M Plan will be created and will be provided during final engineering |
| N15 | Vacuum Sweeping of Private Streets and Parking Lots | ☒ | ☐ | O&M Plan will be created (parking areas) and will be provided during final engineering |
| N16 | Other Non-structural Measures for Public Agency Projects | ☐ | ☒ | None proposed |
| N17 | Comply with all other applicable NPDES permits | ☒ | ☐ | WDID# will be obtained for Construction Disturbance over 1 acre and will be provided during final engineering |

## 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) | ☒ | ☐ | O&M Plan will be created with use of CASQA SD-13 and will be provided during final engineering |
| S2 | Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34) | ☒ | ☐ | O&M Plan will be created with use of CASQA SD-34 and will be provided during final engineering |
| S3 | Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32) | ☒ | ☐ | O&M Plan will be created with use of CASQA SD-32 and will be provided during final engineering |
| 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) | ☒ | ☐ | Landscape will be maintained per City requirements and CASQA SD-12 and will be provided during final engineering |
| S5 | Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement | ☒ | ☐ | Per proposed grading plan |
| S6 | Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10) | ☐ | ☒ | None Proposed |
| S7 | Covered dock areas (CASQA New Development BMP Handbook SD-31) | ☒ | ☐ | O&M Plan will be created with use of CASQA SD-31 and will be provided during final engineering |
| S8 | Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31) | ☒ | ☐ | O&M Plan will be created with use of CASQA SD-31 and will be provided during final engineering |
| S9 | Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33) | ☐ | ☒ | None proposed |
| S10 | Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36) | ☒ | ☐ | O&M Plan will be created with use of CASQA SD-36 and will be provided during final engineering |

## 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) | ☒ | ☐ | O&M Plan will be created with use of CASQA SD-33 and will be provided during final engineering |
| S12 | Fueling areas (CASQA New Development BMP Handbook SD-30) | ☐ | ☒ | None proposed |
| S13 | Hillside landscaping (CASQA New Development BMP Handbook SD-10) | ☐ | ☒ | None proposed |
| S14 | Wash water control for food preparation areas | ☐ | ☒ | None proposed |
| S15 | Community car wash racks (CASQA New Development BMP Handbook SD-33) | ☐ | ☒ | None proposed |

### 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<br>*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 ☐<br>Explanation: Additional landscaped areas have been added or expanded on the project site to incorporate infiltration areas and minimize the impervious surfaces required by the project. |
| Maximize natural infiltration capacity: Yes ☒ No ☐<br>Explanation: Infiltration areas are being proposed for low impact design and to add more vegetated areas where feasible |
| Preserve existing drainage patterns and time of concentration: Yes ☒ No ☐<br>Explanation: Project site is an operations recycling facility that is being upgraded, expanded, and modified; however, the same downstream connections to the existing storm drain inlets in the public storm drain system will be utilized at the north east corners of the intersection of Live Oak Ave and Valley Blvd. |
| Disconnect impervious areas: Yes ☒ No ☐<br>Explanation: Roofs and impervious paving areas are discharged to landscape and or low impact design elements prior to being discharged from the site. |
| Protect existing vegetation and sensitive areas: Yes ☐ No ☒<br>Explanation: None present to preserve. Site was 100% developed and is currently an operational recycling facility. |
| Re-vegetate disturbed areas: Yes ☐ No ☒<br>Explanation: Site currently fully disturbed and the project area is only disturbing what is needed to construct the new buildings and other site improvements. More vegetated areas are being added, but there is no areas to revegetate. |
| Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes ☒ No ☐<br>Explanation: Per geotechnical findings, the most suitable spots for infiltration will be used for the infiltration areas. |
| Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes ☒ No ☐<br>Explanation: Vegetated swales are being used where feasible. Storm drain pipping is only for overflow elements. |
| Stake off areas that will be used for landscaping to minimize compaction during construction : Yes ☒ No ☐<br>Explanation: Future landscaped areas will be staked out where not being disturbed |

# 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 ($ft^2$): 184,003 | **2** Imperviousness after applying preventative site design practices (Imp%): 84.3% | **3** Runoff Coefficient (Rc): 0.65<br>*$R_c = 0.858(Imp\%)^{\wedge 3}-0.78(Imp\%)^{\wedge 2}+0.774(Imp\%)+0.04$* |
| **4** Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.522 *http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html* | | |
| **5** Compute $P_6$, Mean 6-hr Precipitation (inches): 0.773<br>*$P_6$ = 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<br>*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 ☐<br>48-hrs ☒ |
| **7** Compute design capture volume, DCV ($ft^3$): 15,167<br>*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)*<br>*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** *Form 4.2-3 Item 12* | **2** *Form 4.2-4 Item 13* | **3** *Form 4.2-5 Item 10* |
| Post-developed | **4** *Form 4.2-3 Item 13* | **5** *Form 4.2-4 Item 14* | **6** *Form 4.2-5 Item 14* |
| Difference | **7** *Item 4 – Item 1* | **8** *Item 2 – Item 5* | **9** *Item 6 – Item 3* |
| Difference (as % of pre-developed) | **10** % *Item 7 / Item 1* | **11** % *Item 8 / Item 2* | **12** % *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 | | | | | | | | |
| **2a** Hydrologic Soil Group (HSG) | | | | | | | | |
| **3a** DMA Area, $ft^2$ *sum of areas of DMA should equal area of DA* | | | | | | | | |
| **4a** Curve Number (CN) *use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP* | | | | | | | | |
| **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 | | | | | | | | |
| **2b** Hydrologic Soil Group (HSG) | | | | | | | | |
| **3b** DMA Area, $ft^2$ *sum of areas of DMA should equal area of DA* | | | | | | | | |
| **4b** Curve Number (CN) *use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP* | | | | | | | | |

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

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

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

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

**14** Volume Reduction needed to meet HCOC Requirement, ($ft^3$):
*$V_{HCOC}$ = (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* | | | | | | | | |
| **2** Change in elevation (ft) | | | | | | | | |
| **3** Slope (ft/ft), $S_o$ = *Item 2 / Item 1* | | | | | | | | |
| **4** Land cover | | | | | | | | |
| **5** Initial DMA Time of Concentration (min) *Appendix C-1 of the TGD for WQMP* | | | | | | | | |
| **6** Length of conveyance from DMA outlet to project site outlet (ft) *May be zero if DMA outlet is at project site outlet* | | | | | | | | |
| **7** Cross-sectional area of channel ($ft^2$) | | | | | | | | |
| **8** Wetted perimeter of channel (ft) | | | | | | | | |
| **9** Manning's roughness of channel (n) | | | | | | | | |
| **10** Channel flow velocity (ft/sec) $V_{fps}$ = *(1.49 / Item 9) * (Item 7/Item 8)^0.67 * (Item 3)^0.5* | | | | | | | | |
| **11** Travel time to outlet (min) $T_t$ = *Item 6 / (Item 10 * 60)* | | | | | | | | |
| **12** Total time of concentration (min) $T_c$ = *Item 5 + Item 11* | | | | | | | | |
| **13** Pre-developed time of concentration (min): *Minimum of Item 12 pre-developed DMA* | | | | | | | | |
| **14** Post-developed time of concentration (min): *Minimum of Item 12 post-developed DMA* | | | | | | | | |
| **15** Additional time of concentration needed to meet HCOC requirement (min): $T_{C\text{-}HCOC}$ = *(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<br>*$I_{peak}$ = 10^(LOG Form 4.2-1 Item 4 - 0.6 LOG Form 4.2-4 Item 5 /60)* | | | | | | | |
| **2** Drainage Area of each DMA (Acres)<br>*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)* | | | | | | | |
| **3** Ratio of pervious area to total area<br>*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)* | | | | | | | |
| **4** Pervious area infiltration rate (in/hr)<br>*Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP* | | | | | | | |
| **5** Maximum loss rate (in/hr)<br>*$F_m$ = Item 3 * Item 4*<br>*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)* | | | | | | | |
| **6** Peak Flow from DMA (cfs)<br>*$Q_p$ =Item 2 * 0.9 * (Item 1 - Item 5)* | | | | | | | |
| **7** Time of concentration adjustment factor for other DMA to site discharge point<br>*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:<br>*$Q_p$ = 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:<br>*$Q_p$ = 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:<br>*$Q_p$ = 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): | *Maximum of Item 8, 9, and 10 (including additional forms as needed)* | |
| **11** Post-developed $Q_p$ at $T_c$ for DMA A:<br>*Same as Item 8 for post-developed values* | **12** Post-developed $Q_p$ at $T_c$ for DMA B:<br>*Same as Item 9 for post-developed values* | **13** Post-developed $Q_p$ at $T_c$ for DMA C:<br>*Same as Item 10 for post-developed values* |
| **14** Peak runoff from post-developed condition confluence analysis (cfs): | *Maximum of Item 11, 12, and 13 (including additional forms as needed)* | |
| **15** Peak runoff reduction needed to meet HCOC Requirement (cfs): | *$Q_{p\text{-}HCOC}$ = (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* | DA1 DMA1 BMP Type None | DA1 DMA2 BMP Type None | DA1 DMA3 BMP Type None |
| **2** Total impervious area draining to pervious area ($ft^2$) | 18,654 | 12,104 | 70,635 |
| **3** Ratio of pervious area receiving runoff to impervious area | 0 | 0 | 0 |
| **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* | 0 | 0 | 0 |
| **5** Sum of retention volume achieved from impervious area dispersion ($ft^3$): See Summary After DMA5 *$V_{retention}$ =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* | DA1 DMA1 BMP Type Landscaping | DA1 DMA2 BMP Type None | DA1 DMA3 BMP Type Landscaping |
| **7** Ponding surface area ($ft^2$) | 1,415 | 0 | 3,340 |
| **8** Ponding depth (ft) | 0.5 | 0.5 | 0.5 |
| **9** Surface area of amended soil/gravel ($ft^2$) | 1,415 | 0 | 3,340 |
| **10** Average depth of amended soil/gravel (ft) | 1 | 0.75 | 0.75 |
| **11** Average porosity of amended soil/gravel | 0.3 | 0.3 | 0.3 |
| **12** Retention volume achieved from on-lot infiltration ($ft^3$) *$V_{retention}$ = (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)* | 1,026 | 0 | 2,421 |
| **13** Runoff volume retention from on-lot infiltration ($ft^3$): See Summary After DMA6 *$V_{retention}$ =Sum of Item 12 for all BMPs* | | | |

## Form 4.3-2 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* | DA1 DMA1 BMP Type None | DA1 DMA2 BMP Type None | DA1 DMA3 BMP Type None |
| **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 ($ft^3$): See Summary After DMA6 $V_{retention}$ *=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* | DA1 DMA1 BMP Type None | DA1 DMA2 BMP Type None | DA1 DMA3 BMP Type None |
| **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 ($ft^3$): See Summary After DA5 $V_{retention}$ *= 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* | DA1 DMA1 BMP Type None | DA1 DMA2 BMP Type None | DA1 DMA3 BMP Type None |
| **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): See Summary After DMA6 $V_{retention}$ *=Sum of Item 28 for all BMPs* | | | |
| **30** Total Retention Volume from Site Design Hydrologic Source Control BMPs: See Summary After DMA6 *Sum of Items 5, 13, 20, 25 and 29* | | | |

## 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 1 DMA 4 BMP Type None | DA 1 DMA 5 BMP Type None | DA 1 DMA 6 BMP Type None |
| **2** Total impervious area draining to pervious area ($ft^2$) | 9,638 | 40,864 | 3,183 |
| **3** Ratio of pervious area receiving runoff to impervious area | 0 | 0 | 0 |
| **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* | 0 | 0 | 0 |
| **5** Sum of retention volume achieved from impervious area dispersion ($ft^3$): 0 *$V_{retention}$ =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 1 DMA 4 BMP Type Landscaping | DA 1 DMA 5 BMP Type Landscaping | DA 1 DMA 6 BMP Type Landscaping |
| **7** Ponding surface area ($ft^2$) | 2,796 | 1,678 | 0 |
| **8** Ponding depth (ft) | 0.5 | 0.5 | 0.5 |
| **9** Surface area of amended soil/gravel ($ft^2$) | 2796 | 1,678 | 0 |
| **10** Average depth of amended soil/gravel (ft) | 0.75 | 0.75 | 0.75 |
| **11** Average porosity of amended soil/gravel | 0.3 | 0.3 | 0.3 |
| **12** Retention volume achieved from on-lot infiltration ($ft^3$) *$V_{retention}$ = (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)* | 2,027 | 1,216 | 0 |
| **13** Runoff volume retention from on-lot infiltration ($ft^3$): 6,691 *$V_{retention}$ =Sum of Item 12 for all BMPs* | | | |

## 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 1 DMA 4 BMP Type None | DA 1 DMA 5 BMP Type None | DA 1 DMA 6 BMP Type None |
| **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 ($ft^3$): 0 *$V_{retention}$ =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 1 DMA 4 BMP Type Landscaping | DA 1 DMA 5 BMP Type Landscaping | DA 1 DMA 6 BMP Type Landscaping |
| **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 ($ft^3$): 0 *$V_{retention}$ = 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 1 DMA 4 BMP Type Landscaping | DA 1 DMA 5 BMP Type Landscaping | DA 1 DMA 6 BMP Type Landscaping |
| **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): 0 *$V_{retention}$ =Sum of Item 28 for all BMPs* | | | |
| **30** Total Retention Volume from Site Design Hydrologic Source Control BMPs: 6,691 *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).

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

**1** Remaining LID DCV not met by site design HSC BMP ($ft^3$): 4,618 *$V_{unmet}$ = 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* | DA1 DMA1 BMP Type Infiltration | DA1 DMA2 BMP Type Infiltration | DA1 DMA3 BMP Type Infiltration |
|---|---|---|---|
| **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* | 14.03 | 14.03 | 14.03 |
| **3** Infiltration safety factor *See TGD Section 5.4.2 and Appendix D* | 3 | 3 | 3 |
| **4** Design percolation rate (in/hr) *$P_{design}$ = Item 2 / Item 3* | 4.68 (2.4 Max) | 4.68 (2.4 Max) | 4.68 (2.4 Max) |
| **5** Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1* | 48 | 48 | 48 |
| **6** Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details* | 0.5 | 0.5 | 0.5 |
| **7** Ponding Depth (ft) *$d_{BMP}$ = Minimum of (1/12*Item 4*Item 5) or Item 6* | 0.5 | 0.5 | 0.5 |
| **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* | 3,853 | 3,935 | 4,564 |
| **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* | 1.0 | 1.0 | 1.0 |
| **10** Amended soil porosity | 0.3 | 0.3 | 0.3 |
| **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* | 0 | 0 | 0 |
| **12** Gravel porosity | 0 | 0 | 0 |
| **13** Duration of storm as basin is filling (hrs) *Typical ~ 3hrs* | 3 | 3 | 3 |
| **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))]* | 5,394 | 5,508 | 6,390 |
| **15** Underground Retention Volume ($ft^3$) *Volume determined using manufacturer's specifications and calculations* | 0 | 0 | 0 |

**16** Total Retention Volume from LID Infiltration BMPs: See Summary After DMA5 *(Sum of Items 14 and 15 for all infiltration BMP*

**17** Fraction of DCV achieved with infiltration BMP: See Summary After DMA5 % *Retention% = Item 16 / Form 4.2-1 Item 7*

**18** See Summary After DMA6: 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.*

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

**1** Remaining LID DCV not met by site design HSC BMP ($ft^3$): 4,492 *$V_{unmet}$ = 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* | DA1 DMA4 BMP Type Infiltration | DA1 DMA5 BMP Type Infiltration | DA1 DMA6 BMP Type Infiltration |
|---|---|---|---|
| **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* | 14.03 | 14.03 | |
| **3** Infiltration safety factor *See TGD Section 5.4.2 and Appendix D* | 3 | 3 | |
| **4** Design percolation rate (in/hr) *$P_{design}$ = Item 2 / Item 3* | 4.68 (2.4 Max) | 4.68 (2.4 Max) | |
| **5** Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1* | 48 | 48 | |
| **6** Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details* | 0.5 | 0.5 | |
| **7** Ponding Depth (ft) *$d_{BMP}$ = Minimum of (1/12*Item 4*Item 5) or Item 6* | 0.5 | 0.5 | |
| **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* | 3,070 | 1,324 | |
| **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* | 1.0 | 1.0 | |
| **10** Amended soil porosity | 0.3 | 0.3 | |
| **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* | 0 | 0 | |
| **12** Gravel porosity | 0 | 0 | |
| **13** Duration of storm as basin is filling (hrs) *Typical ~ 3hrs* | 3 | 3 | |
| **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))]* | 4,302 | 1,854 | |
| **15** Underground Retention Volume ($ft^3$) *Volume determined using manufacturer's specifications and calculations* | 0 | 0 | |

**16** Total Retention Volume from LID Infiltration BMPs: 23,449 *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*

**17** Fraction of DCV achieved with infiltration BMP: 155 % *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 |
| **2** Describe cistern or runoff detention facility | N/A | | |
| **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 BMP *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 ($ft^3$): *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<br>☐ Planter box with underdrain<br>☐ Constructed wetlands<br>☐ Wet extended detention<br>☐ Dry extended detention | ☐ Vegetated swale<br>☐ Vegetated filter strip<br>☐ 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:<br>• 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 |
|---|---|---|---|
| **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: *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<br>*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 | |
|---|---|---|---|---|
| | Forebay | Basin | Forebay | Basin |
| **1** Pollutants addressed with BMP forebay and basin<br>*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 ($ft^2$)<br>$A_{surface}$ =*(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*<br>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 ($ft^3$)<br>$V_{biotreated}$ = *(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 :<br>*(Sum of Item 12 for all BMP included in plan)* | | | | |

## Form 4.3-8 Flow Based Biotreatment (DA 1)

| Biotreatment BMP Type<br>*Vegetated swale, vegetated filter strip, or other comparable proprietary BMP* | DA DMA<br>BMP Type | DA DMA<br>BMP Type | DA DMA<br>BMP Type |
|---|---|---|---|
| **1** Pollutants addressed with BMP<br>*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)<br>*BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details* | | | |
| **3** Bed slope (ft/ft)<br>*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)<br>$b_w$ = *(Form 4.3-5 Item 6 * Item 4) / (1.49 * Item 2^1.67 * Item 3^0.5)* | | | |
| **6** Side Slope (ft/ft)<br>*BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details* | | | |
| **7** Cross sectional area ($ft^2$)<br>*A = (Item 5 * Item 2) + (Item 6 * Item 2^2)* | | | |
| **8** Water quality flow velocity (ft/sec)<br>*V = Form 4.3-5 Item 6 / Item 7* | | | |
| **9** Hydraulic residence time (min)<br>*Pollutant specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details* | | | |
| **10** Length of flow based BMP (ft)<br>*L = Item 8 * Item 9 * 60* | | | |
| **11** Water surface area at water quality flow depth ($ft^2$)<br>$SA_{top}$ = *(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 ($ft^3$): 15,167 *Copy Item 7 in Form 4.2-1*

**2** On-site retention with site design hydrologic source control LID BMP ($ft^3$): 10,549 *Copy Item 30 in Form 4.3-2*

**3** On-site retention with LID infiltration BMP ($ft^3$): 23,449 *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 ($ft^3$): n/a *(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 ($ft^3$): 32,537 *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 ($ft^3$): n/a *Item 1 – Item 2* | **4** Volume capture provided by incorporating additional on-site or off-site retention BMPs ($ft^3$): n/a *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 |
|---|---|---|---|
| DA1 -BMP1 | Property Owner | See O&M Plan In Attachment 6 (to be completed with Final Engineering) | See O&M Plan In Attachment 6 (to be completed with Final Engineering) |
| DA1 -BMP2 | Property Owner | See O&M Plan In Attachment 6 (to be completed with Final Engineering) | See O&M Plan In Attachment 6 (to be completed with Final Engineering) |
| DA1 -BMP3 | Property Owner | See O&M Plan In Attachment 6 (to be completed with Final Engineering) | See O&M Plan In Attachment 6 (to be completed with Final Engineering) |
| DA1 -BMP4 | Property Owner | See O&M Plan In Attachment 6 (to be completed with Final Engineering) | See O&M Plan In Attachment 6 (to be completed with Final Engineering) |
| DA1 -BMP5 | Property Owner | See O&M Plan In Attachment 6 (to be completed with Final Engineering) | See O&M Plan In Attachment 6 (to be completed with Final Engineering) |
| DA1 -BMP6 | Property Owner | See O&M Plan In Attachment 6 (to be completed with Final Engineering) | See O&M Plan In Attachment 6 (to be completed with Final Engineering) |

# 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

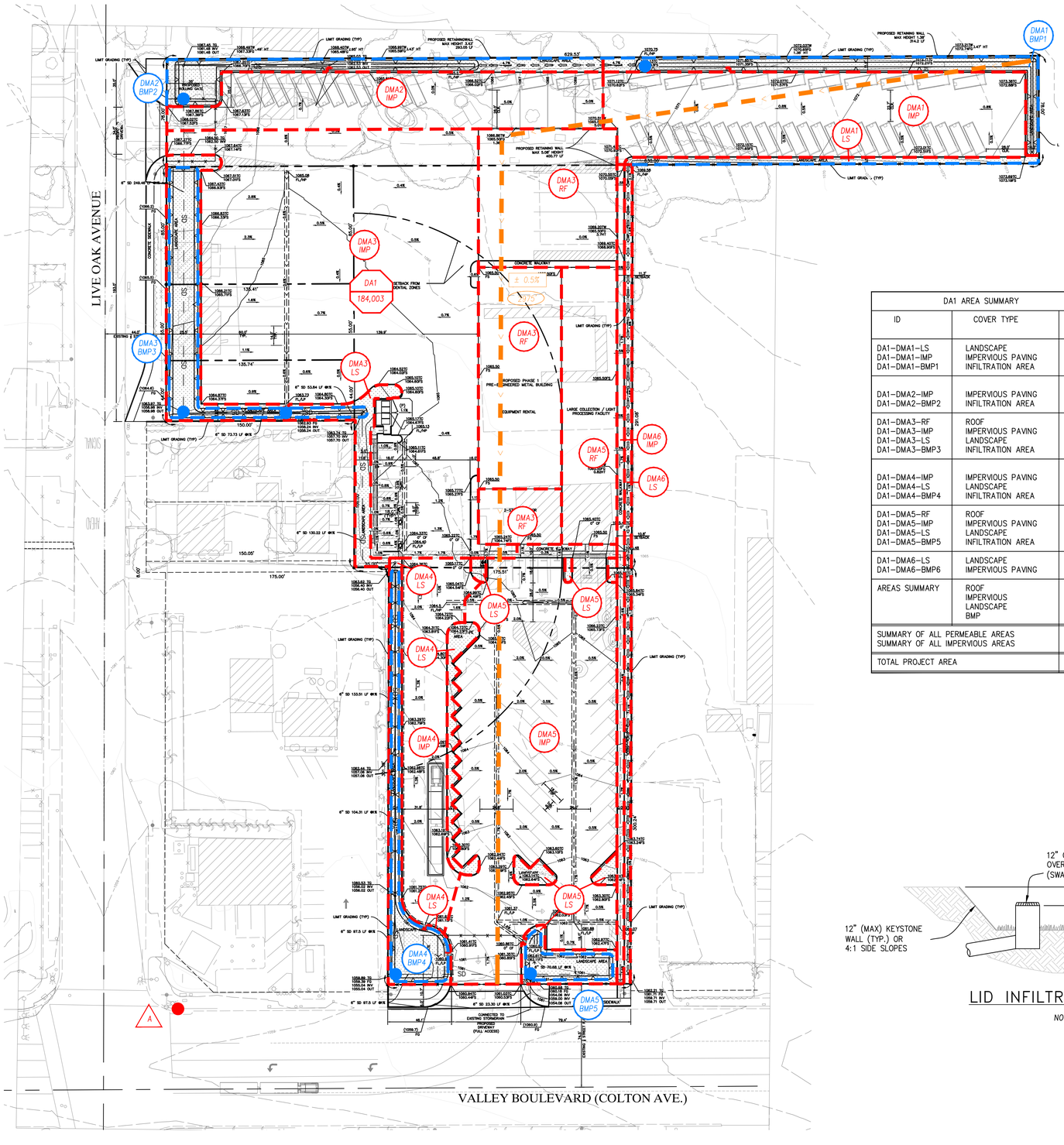
Attach all O&M Plans and Maintenance Agreements for BMP to the WQMP.

## 6.4 Other Supporting Documentation

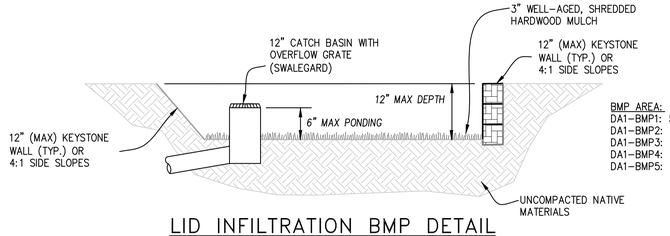
- BMP Educational Materials
- Activity Restriction – C, C&R's & Lease Agreements

# *Attachment 1: WQMP Exhibits*

*Please refer to the attached exhibits.*




| DA1 AREA SUMMARY | | |
|---|---|---|
| ID | COVER TYPE | SUB-AREA (SQ-FT) |
| DA1-DMA1-LS | LANDSCAPE | 1,415 |
| DA1-DMA1-IMP | IMPERVIOUS PAVING | 18,654 |
| DA1-DMA1-BMP1 | INFILTRATION AREA | 3,853 |
| DA1-DMA2-IMP | IMPERVIOUS PAVING | 12,104 |
| DA1-DMA2-BMP2 | INFILTRATION AREA | 3,935 |
| DA1-DMA3-RF | ROOF | 21,989 |
| DA1-DMA3-IMP | IMPERVIOUS PAVING | 48,646 |
| DA1-DMA3-LS | LANDSCAPE | 3,340 |
| DA1-DMA3-BMP3 | INFILTRATION AREA | 4,564 |
| DA1-DMA4-IMP | IMPERVIOUS PAVING | 9,638 |
| DA1-DMA4-LS | LANDSCAPE | 2,796 |
| DA1-DMA4-BMP4 | INFILTRATION AREA | 3,073 |
| DA1-DMA5-RF | ROOF | 8,003 |
| DA1-DMA5-IMP | IMPERVIOUS PAVING | 32,861 |
| DA1-DMA5-LS | LANDSCAPE | 1,678 |
| DA1-DMA5-BMP5 | INFILTRATION AREA | 1,324 |
| DA1-DMA6-LS | LANDSCAPE | 2,945 |
| DA1-DMA6-BMP6 | IMPERVIOUS PAVING | 3,183 |
| AREAS SUMMARY | ROOF | 29,992 |
| | IMPERVIOUS | 125,087 |
| | LANDSCAPE | 12,174 |
| | BMP | 16,749 |
| SUMMARY OF ALL PERMEABLE AREAS | | 29,923 |
| SUMMARY OF ALL IMPERVIOUS AREAS | | 155,079 |
| TOTAL PROJECT AREA | | 184,003 |




BMP AREA:
DA1-BMP1: 5,669 SQ-FT
DA1-BMP2: 5,629 SQ-FT
DA1-BMP3: 2,459 SQ-FT
DA1-BMP4: 853 SQ-FT
DA1-BMP5: 537 SQ-FT

LID INFILTRATION BMP DETAIL

*NOT TO SCALE*

40 0 40 80
( IN FEET )
APPROXIMATE SCALE: 1 inch = 40 ft.
(FULL SIZE EXHIBIT IS 24 X 36)

N

# DMA LEGEND

- DRAINAGE AREA BOUNDARY
- BMP AREA BOUNDARY
- DA# / SQ-FT — DRAINAGE AREA ID; AREA – SQUARE FOOTAGE
- ID — GENERAL COVER TYPER
- DMA# BMP# — BMP IDENTIFICATION
- # # — EXISTING LONGEST FLOW PATH, LENGTH, SLOPE
- # — COMPLIANCE POINT

## FORM 4.1-1 NON-STRUCTURAL SOURCE CONTROL BMP LEGEND

| | | |
|---|---|---|
| N1 | EDUCATIONAL MATERIALS | NO SYMBOL |
| N3 | LANDSCAPE MANAGEMENT BMPS | |
| N4 | BMP MAINTENANCE | NO SYMBOL |
| N5 | TITLE 22 CCR | NO SYMBOL |
| N6 | LOCAL WATER QUALITY ORDINANCE | |
| N7 | SPILL CONTINGENCY PLAN | COVERS ENTIRE SITE |
| N9 | HAZARDOUS MATERIAL DISCLOSURE COMPLIANCE | NO SYMBOL |
| N10 | UNIFORM FIRE CODE IMPLEMENTATION | NO SYMBOL |
| N11 | LITTER/DEBRIS CONTROL PROGRAM | COVERS ENTIRE SITE |
| N12 | EMPLOYEE TRAINING | NO SYMBOL |
| N13 | HOUSEKEEPING OF LOADING DOCKS | COVERS ENTIRE SITE |
| N14 | CATCH BASIN INSPECTION PROGRAM | |
| N15 | VACUUMING SWEEPING | COVERS ENTIRE SITE |
| N17 | COMPLY WITH OTHER NPDES PERMITS | NO SYMBOL |

## FORM 4.1-2 STRUCTURAL SOURCE CONTROL BMP LEGEND

| | | |
|---|---|---|
| S1 | STORM DRAIN STENCILING | |
| S2 | OUTDOOR MATERIAL STORAGE | COVERS ENTIRE SITE |
| S3 | TRASH ENCLOSURES | LOCATIONS TBD |
| S4 | USE EFFICIENT IRRIGATION | |
| S5 | LANDSCAPING | |
| S7 | DOCK AREAS | LOCATIONS TBD |
| S8 | SPILL PREVENTION | COVERS ENTIRE SITE |
| S10 | OUTDOOR PROCESSING | COVERS ENTIRE SITE |
| S11 | EQUIPMENT WASH AREAS | LOCATIONS TBD |


VENTURA ENGINEERING, LLC
27393 YNEZ ROAD, SUITE 159
TEMECULA, CALIFORNIA 92591
PHONE (951) 252-7632
FAX (951) 346-5726


SAN BERNARDINO COUNTY

TITAN RECYCLING
TRACT 5907 LOT 11
998 S. SIERRA AVENUE, SAN BERNARDINO, CALIFORNIA 92408
APN: 0141-282-05

# WQMP EXHIBIT

# *Attachment 2: Grading Plan Copy*

*Please refer to the attached copy of the project's grading plan.*

## CONSTRUCTION NOTES:

1. PROPOSED INFILTRATION AREA DETAIL 1 SEE SHEET 3.
2. PROPOSED SWALEGARD 12"X12" GRATE INLET CATCH BASIN.
3. PROPOSED 8" PVC CLEAN OUT.
4. PROPOSED 6" PVC (SDR 35) STORMDRAIN PIPE.
5. PROPOSED 6" CURB & GUTTER PER CITY OF SAN BERNARDINO STANDARD.
6. PROPOSED 6" CURB PER CITY OF SAN BERNARDINO STANDARD.
7. PROPOSED 3' RIBBON GUTTER PER DETAIL 3 SEE SHEET 3.
8. PROPOSED 3' CUT CURB AND APRON PER DETAIL 2 SEE SHEET 3.
9. PROPOSED CONCRETE WALKWAY PER CITY OF SAN BERNARDINO STANDARD.
10. PROPOSED 8" RETAINING WALL.
11. PROPOSED TRUNCATED DOMES PER ADA STANDARD.
12. PROPOSED LANDSCAPE.
13. PROPOSED TRUCK SCALES.
14. PROPOSED WROUGHT IRON FENCE AT PROPERTY LINE.
15. PROPOSED AC PAVING THROUGHOUT PROJECT SITE.
16. PROPOSED 5-BIKE RACK (INGROUND) BY: BARCO PRODUCTS #05CL1692 OR EQUAL.
17. PROPOSED ADA PATH OF TRAVEL THROUGHOUT SITE AND TO PUBLIC RIGHT OF WAY.
18. PROPOSED EV CHARGER SERVICES 2 EVCS.
19. PROPOSED 8' HIGH CMU WALL SURROUNDING PROPERTY BETWEEN RESIDENTIAL ZONES.
20. PROPOSED 3' CONDITIONS VEGETATED SWALE PER DETAIL 5 SEE SHEET 3.
21. PROPOSED MOVABLE STORAGE BINS, UNDER SEPARATE PERMIT.

## UTILITY NOTES:

1. EXISTING MAIN WATER.
2. EXISTING MAIN SEWER.
3. PROPOSED 8" SEWER MAIN.
4. PROPOSED 2" WATER LATERAL.

## EARTHWORK:

| | |
|---|---|
| CUT: | 3,306 CY |
| FILL: | 3,306 CY |
| IMPORT: | 0 CY |

## AREA OF DISTURBANCE:

188,538 S.F. (4.32 ACRES)

## SECTION NOTE:

SEE SHEET 4 FOR SECTIONS.

## OWNER:

TITAN INDUSTRIAL METAL CORPORATION
10312 ALMOND AVENUE 91761
FONTANA CALIFORNIA,92335-5284
909-772-4543 PH

## PROPERTY ADDRESS:

LIVE OAK AND VALLEY BOULEVARD.
FONTANA CALIFORNIA, 92335-0000

## UTILITIES:

VERIZON P.O. BOX 9688 MISSION HILLS, CALIFORNIA
WWW.VERIZON.COM 91346
(800) 555-4833

BURRTEC WASTE
WWW.BURRTEC.COM
(909) 822-9739 9820
CHERRY AVE. FONTANA, CALIFORNIA 92335

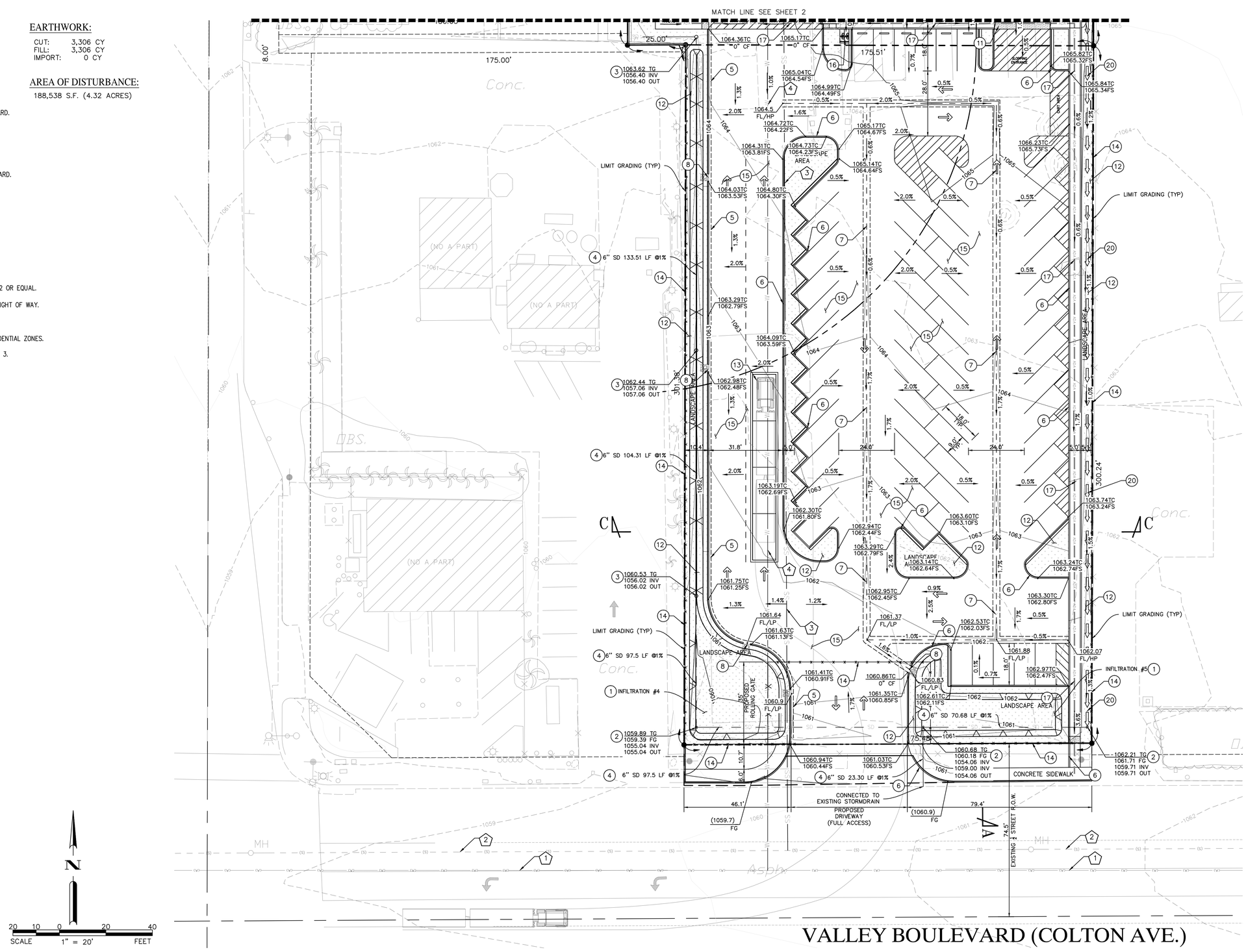
TIME WARNER CABLE
WWW.TIMEWARNERCABLE.COM
(888) 892-2253 9820
SIERRA AVENUE. #G FONTANA, CALIFORNIA 92335

SOUTHERN CA EDISON COMPANY P.O.
BOX 800 ROSEMEAD, CALIFORNIA 91770
(800) 655-4555
WWW.SCE.COM

SOUTHERN CALIFORNIA GAS COMPANY P.O.
BOX C MONTEREY PARK, CALIFORNIA 91756
WWW.SOCALGAS.COM
(800) 427-2000

SEWER SERVICE – CITY OF FONTANA
8353 SIERRA AVENUE.
(909) 350-7670

FONTANA WATER COMPANY 8440 NUEVO AVENUE
P.O. BOX 987 FONTANA, CALIFORNIA 92334
(909) 822-2201




N

20 10 0 20 40
SCALE 1" = 20' FEET

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WILFREDO@VENTURAENGINEERINGINLAND.COM

Wilfredo Ventura 3/5/22
DATE

WILFREDO S.D. VENTURA
RCE 66532 EXP. 06/30/22

Ventura Engineering Inland INC VEI

REGISTERED PROFESSIONAL ENGINEER
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No. 66532
Exp. 6-30-22
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STATE OF CALIFORNIA

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|---|---|---|---|---|

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R.C.E. NO. _____ EXP. _____

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CHECKED BY:
RECOMMENDED BY:

# CITY OF SAN BERNARDINO
DEVELOPMENT SERVICES ~ PUBLIC WORKS/ENGINEERING

14930 VALLEY BLVD
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FOR
CONCEPTUAL GRADING PLAN

DRAWING NO.

SHEET 1 OF 4 SHEETS

FOR CITY USE ONLY: FILE NO. W.O. NO.

## CONSTRUCTION NOTES:

1. PROPOSED INFILTRATION AREA DETAIL 1 SEE SHEET 3.
2. PROPOSED SWALEGARD 12"X12" GRATE INLET CATCH BASIN.
3. PROPOSED 8" PVC CLEAN OUT.
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## UTILITY NOTES:

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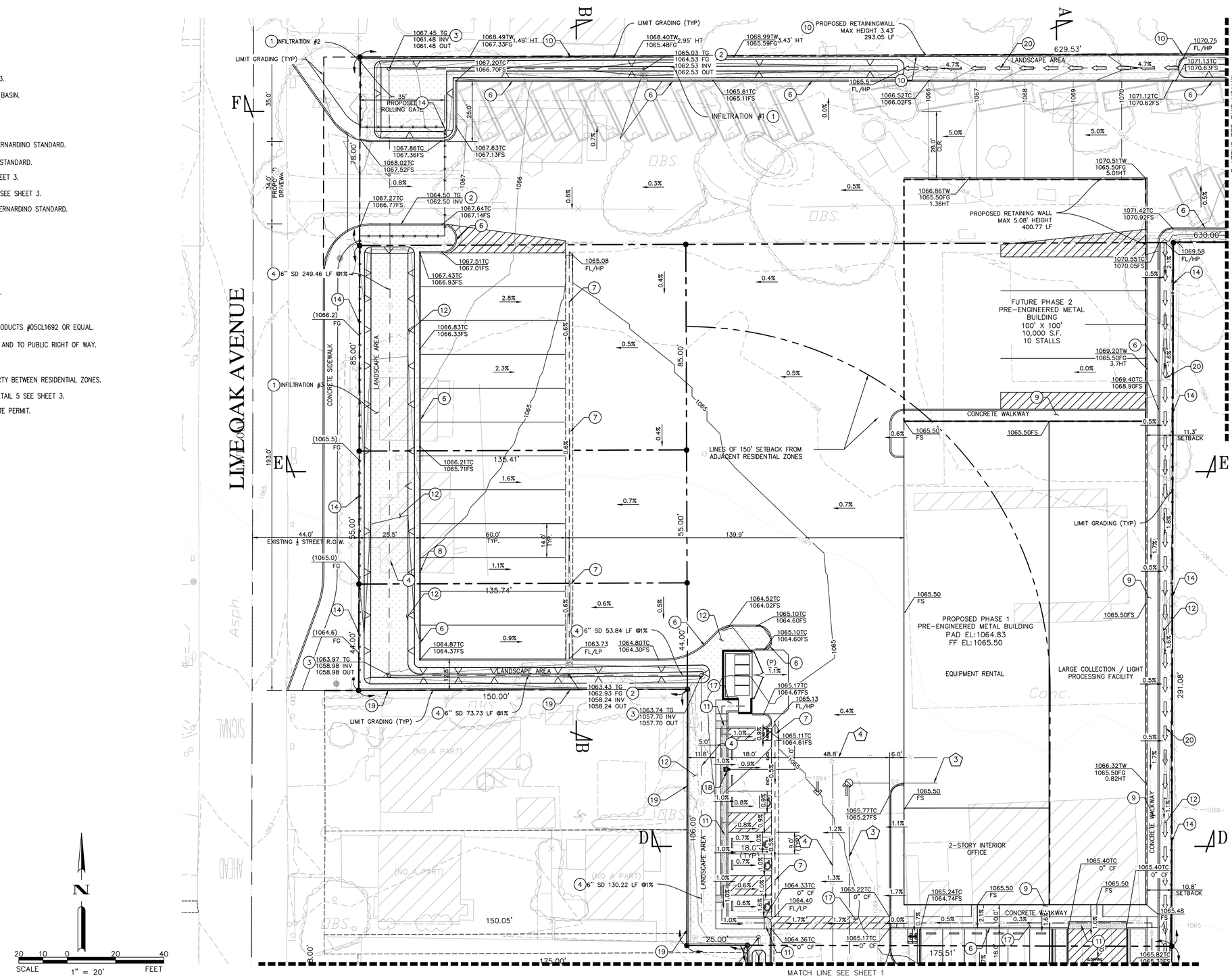




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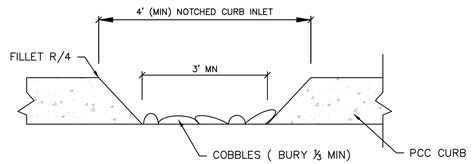
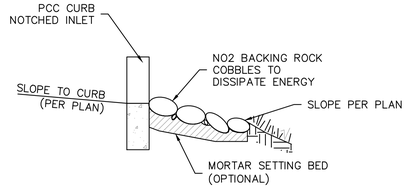
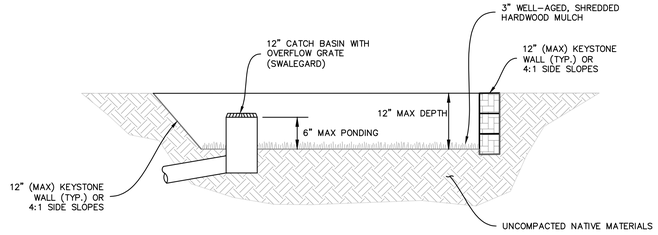
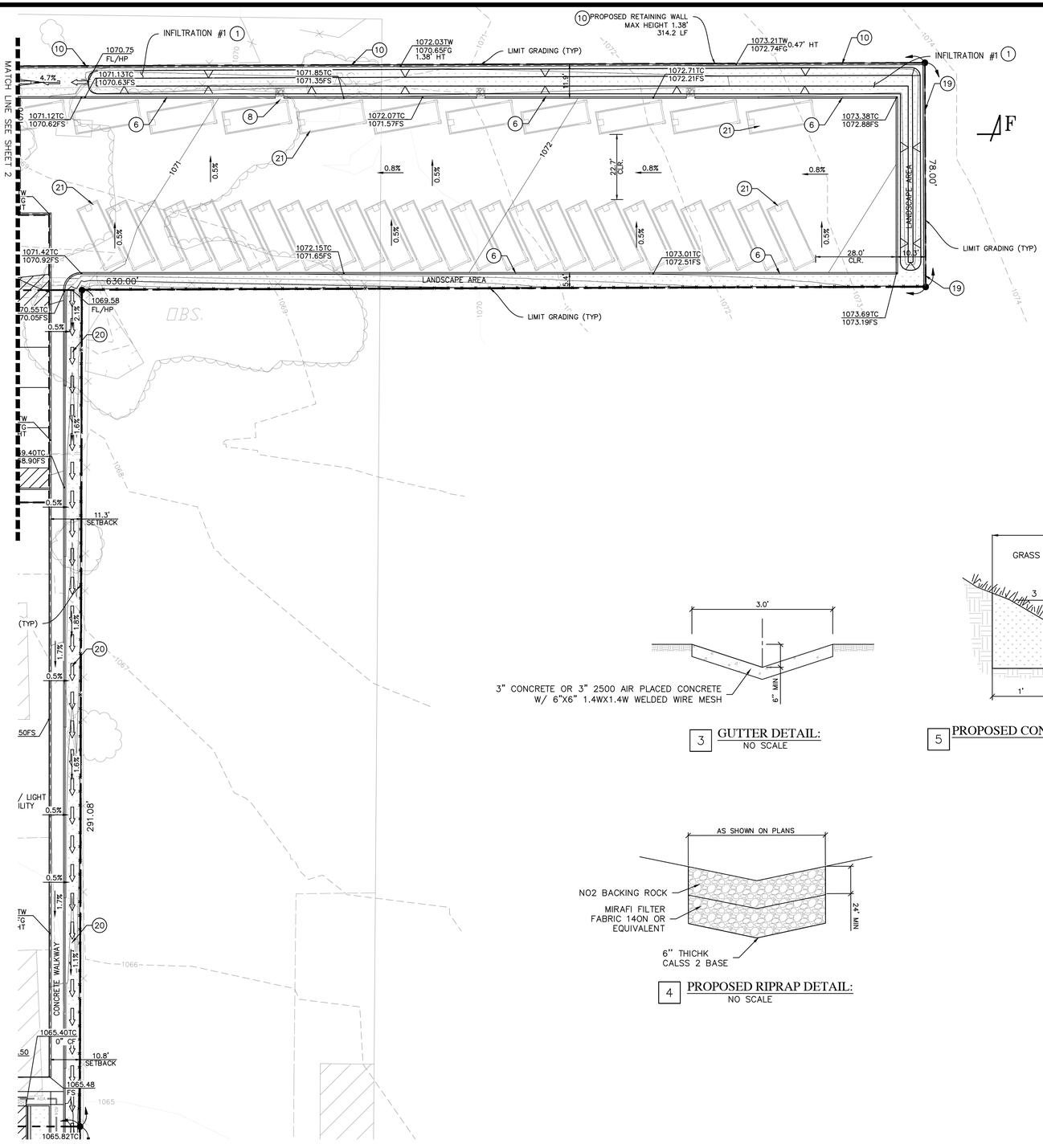


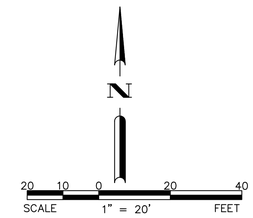




2 CURB CUT DETAIL:
NO SCALE




1 LID INFILTRATION BMP DETAIL:
NOT TO SCALE



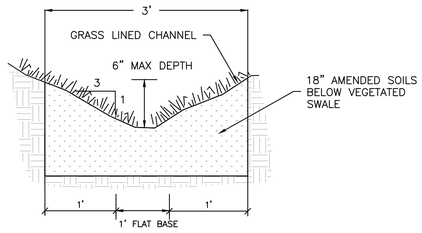




3 GUTTER DETAIL:
NO SCALE




4 PROPOSED RIPRAP DETAIL:
NO SCALE




5 PROPOSED CONDITIONS VEGETATED SWALE DETAIL:
NOT TO SCALE

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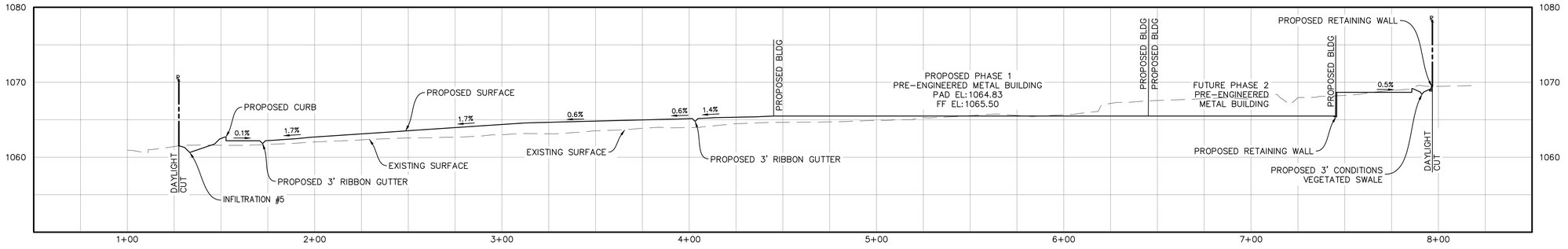
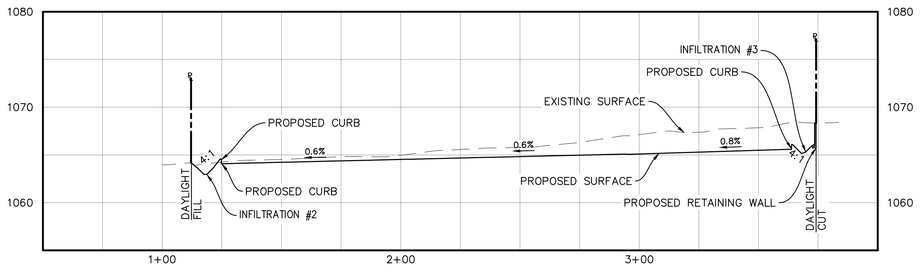


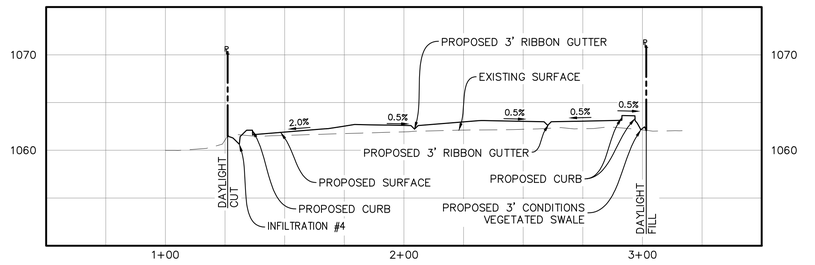

## SECTION A-A

HORIZONTAL SCALE: 1"=30'
VERTICAL SCALE: 1"=5'



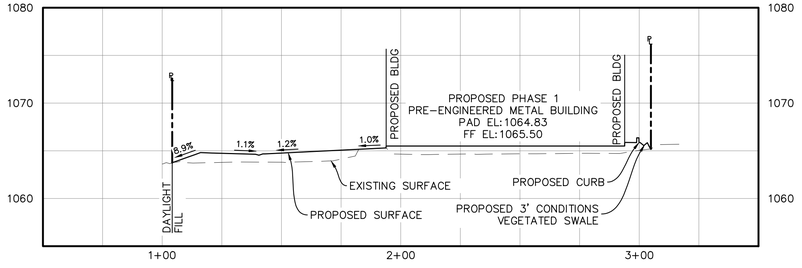

## SECTION B-B

HORIZONTAL SCALE: 1"=30'
VERTICAL SCALE: 1"=5'



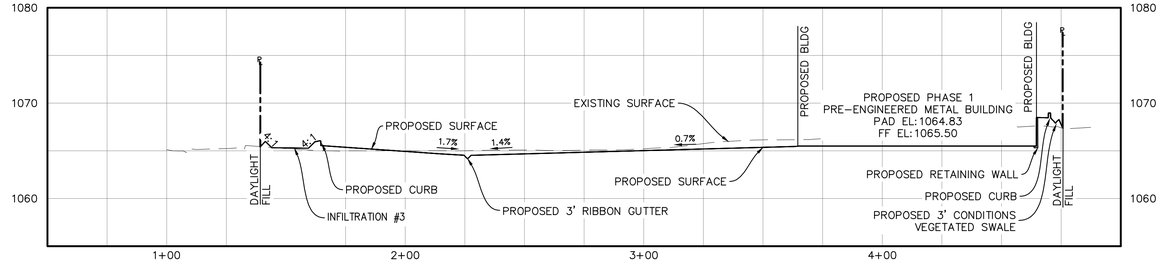

## SECTION C-C

HORIZONTAL SCALE: 1"=30'
VERTICAL SCALE: 1"=5'



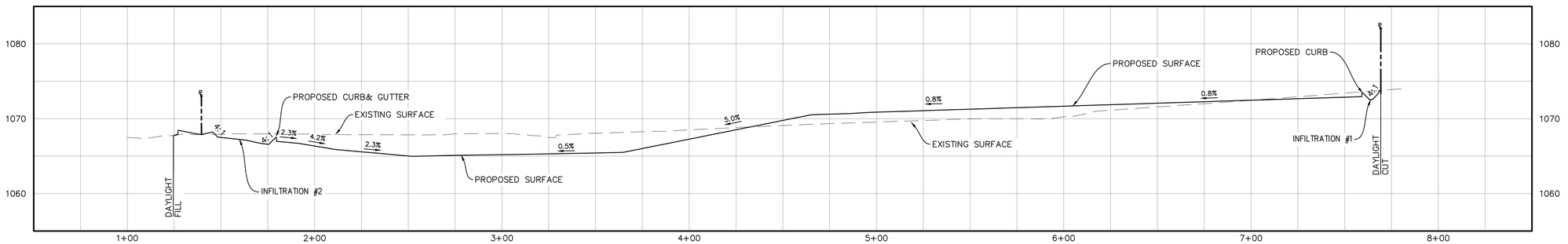

## SECTION D-D

HORIZONTAL SCALE: 1"=30'
VERTICAL SCALE: 1"=5'




## SECTION E-E

HORIZONTAL SCALE: 1"=30'
VERTICAL SCALE: 1"=5'




## SECTION F-F

HORIZONTAL SCALE: 1"=30'
VERTICAL SCALE: 1"=5'

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Wilfredo Ventura 3/5/22
WILFREDO S.D. VENTURA DATE
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SECTIONS

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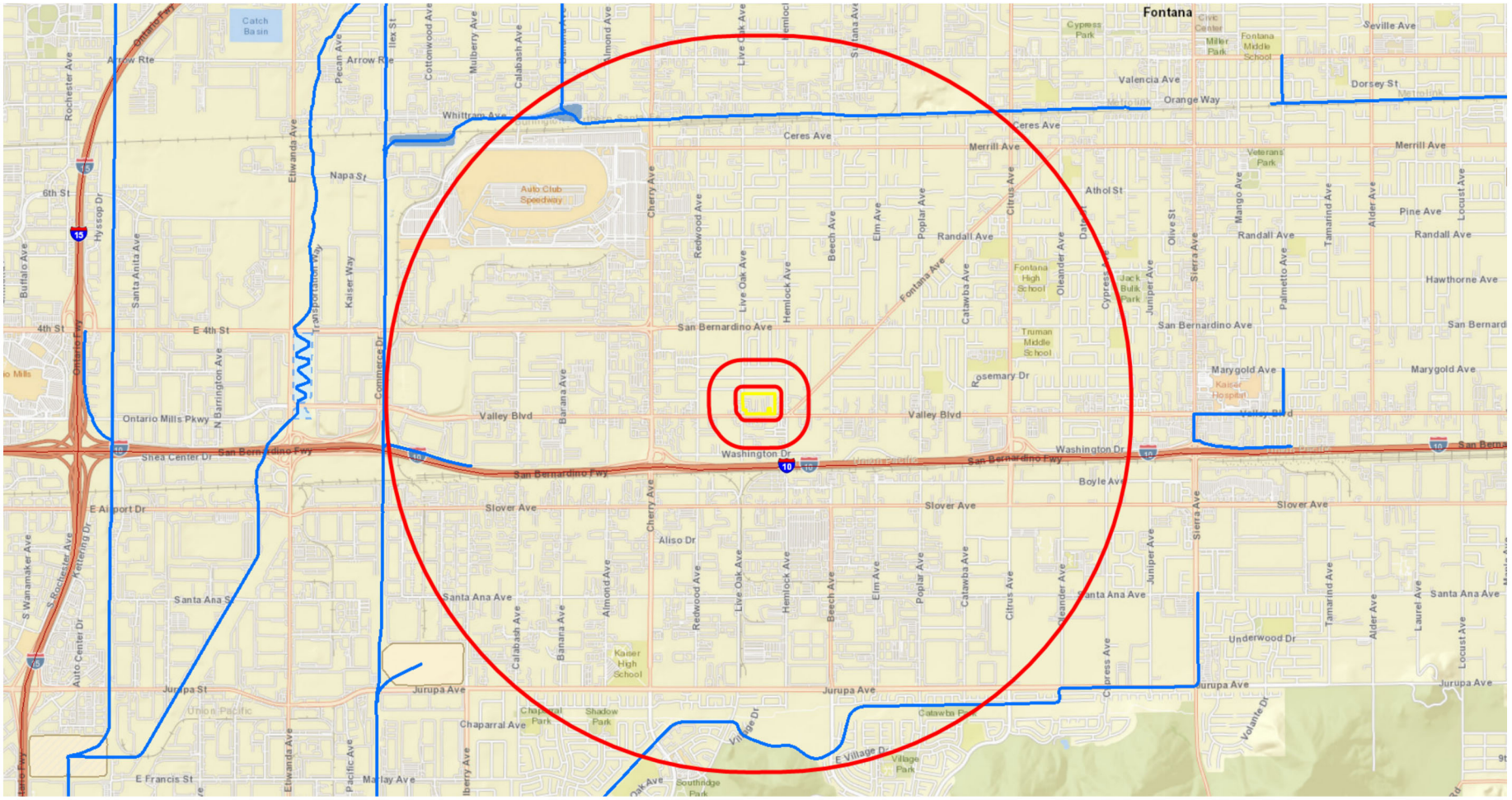
SHEET 4 OF 4 SHEETS

# *Attachment 3: Reference Plans*

*Please refer to the attached references.*




1 Miles

RBF CONSULTING GIS

Site Address: permitrack.sbcounty.gov/wap

County of San Bernardino
Stormwater Facility Mapping

# SWFMT Map


## WQMP Project Report

**County of San Bernardino Stormwater Program**

Santa Ana River Watershed Geodatabase

Monday, January 03, 2022

Note: The information provided in this report and on the Stormwater Geodatabase for the County of San Bernardino Stormwater Program is intended to provide basic guidance in the preparation of the applicant's Water Quality Management Plan (WQMP) and should not be relied upon without independent verification.

| | |
|---|---|
| **Project Site Parcel Number(s):** | 023504104, 023504120, 023504109, 023504114, 023504125, 023504113, 023504124, 023504107, 023504108, 023504105, 023504112, 023504121, 023504111, 023504123, 023504119 |
| **Project Site Acreage:** | 12.468 |
| **HCOC Exempt Area:** | Yes. Verify that the project is completely with the HCOC exemption area. |
| **Closest Receiving Waters:** (Applicant to verify based on local drainage facilities and topography.) | **System Number** - 809<br>**Facility Name** - West Fontana Channel<br>**Owner** - SBCFCD |
| **Closest channel segment's susceptibility to Hydromodification:** | EHM |
| **Highest downstream hydromodification susceptibility:** | EHM |
| **Is this drainage segment subject to TMDLs?** | No |
| **Are there downstream drainage segments subject to TMDLs?** | No |
| **Is this drainage segment a 303d listed stream?** | No |
| **Are there 303d listed streams downstream?** | No |
| **Are there unlined downstream waterbodies?** | No |
| **Project Site Onsite Soil Group(s):** | A |
| **Environmentally Sensitive Areas within 200':** | None |
| **Groundwater Depth (FT):** | -362 |
| **Parcels with potential septic tanks within 1000':** | Yes |
| **Known Groundwater Contamination Plumes within 1000':** | Yes |
| **Studies and Reports Related to Project Site:** | Chino Basin Recharge Master Plan<br>Chino Basin Water Master 32nd Annual Report<br>Summary Report Master Storm Drainage Plan Study<br>Summary Report Master Storm Drainage Plan Map<br>FONTANA MPD FEE STUDY<br>Master SD Hydrology Calcs for Fontana Vol III<br>Master SD Hydrology Calcs For Fontana Vol II<br>Master SD Hydrology Calcs for Fontana Vol V<br>Master SD Hydrology Calcs for Fontana Vol IV<br>San Sevaine - Boyle Map 0001<br>San Sevaine - Boyle Map 0002<br>San Sevaine - Boyle Map 0003<br>SBCounty CSDP Project No.2 Volume 1<br>SBCounty CSDP Project No.2 Volume 2<br>Volume 2 Map<br>SBCounty CSDP Project No.3 Volume I<br>SBCounty CSDP Project No.3 Volume II<br>West Fontana Channel Preliminary Basin Study |

# *Attachment 4: NRCS Soils Report*

*Please refer to the attached references.*

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

# Custom Soil Resource Report for San Bernardino County Southwestern Part, California

## Titian Recycling


December 4, 2021

# Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# Contents

# How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

# Custom Soil Resource Report
## Soil Map


Map Scale: 1:1,070 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**
- Aerial Photography

## MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: San Bernardino County Southwestern Part, California
Survey Area Data: Version 13, Sep 13, 2021

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

Date(s) aerial images were photographed: May 10, 2018—Jun 5, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

## MAP LEGEND

## MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| TvC | Tujunga gravelly loamy sand, 0 to 9 percent slopes | 3.2 | 100.0% |
| **Totals for Area of Interest** | | **3.2** | **100.0%** |

# Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

# San Bernardino County Southwestern Part, California

## TvC—Tujunga gravelly loamy sand, 0 to 9 percent slopes

### Map Unit Setting

*National map unit symbol:* hcl2
*Elevation:* 10 to 1,500 feet
*Mean annual precipitation:* 10 to 25 inches
*Mean annual air temperature:* 59 to 64 degrees F
*Frost-free period:* 250 to 350 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Tujunga and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Tujunga

#### Setting

*Landform:* Alluvial fans
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Alluvium derived from granite

#### Typical profile

*H1 - 0 to 36 inches:* gravelly loamy sand
*H2 - 36 to 60 inches:* gravelly sand

#### Properties and qualities

*Slope:* 0 to 9 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Somewhat excessively drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Low (about 3.8 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 4s
*Land capability classification (nonirrigated):* 4e
*Hydrologic Soil Group:* A
*Ecological site:* R019XG912CA - Sandy Fan
*Hydric soil rating:* No

### Minor Components

#### Unnamed

*Percent of map unit:* 5 percent
*Landform:* Drainageways
*Hydric soil rating:* Yes

**Soboba, gravelly loamy sand**

*Percent of map unit:* 5 percent
*Hydric soil rating:* No

**Delhi, fine sand**

*Percent of map unit:* 5 percent
*Hydric soil rating:* No

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United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

# *Attachment 5: Drainage Analysis References*

*Please refer to the attached references.*

**NOAA Atlas 14, Volume 6, Version 2**
**Location name: Fontana, California, USA***
**Latitude: 34.0718°, Longitude: -117.4797°**
**Elevation: 1067.71 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 | **0.105** (0.087-0.127) | **0.138** (0.115-0.167) | **0.183** (0.152-0.223) | **0.222** (0.182-0.272) | **0.277** (0.220-0.351) | **0.321** (0.250-0.417) | **0.368** (0.279-0.491) | **0.419** (0.309-0.575) | **0.492** (0.347-0.704) | **0.552** (0.376-0.818) |
| 10-min | **0.150** (0.125-0.182) | **0.197** (0.164-0.240) | **0.262** (0.218-0.319) | **0.318** (0.261-0.390) | **0.396** (0.315-0.504) | **0.460** (0.358-0.598) | **0.528** (0.400-0.703) | **0.601** (0.443-0.824) | **0.705** (0.498-1.01) | **0.791** (0.539-1.17) |
| 15-min | **0.182** (0.152-0.220) | **0.239** (0.199-0.290) | **0.317** (0.263-0.386) | **0.384** (0.316-0.471) | **0.479** (0.381-0.609) | **0.557** (0.433-0.723) | **0.639** (0.484-0.850) | **0.727** (0.536-0.997) | **0.853** (0.602-1.22) | **0.957** (0.651-1.42) |
| 30-min | **0.271** (0.226-0.329) | **0.356** (0.297-0.433) | **0.473** (0.393-0.576) | **0.573** (0.472-0.703) | **0.716** (0.569-0.909) | **0.831** (0.646-1.08) | **0.953** (0.723-1.27) | **1.09** (0.799-1.49) | **1.27** (0.899-1.82) | **1.43** (0.972-2.12) |
| 60-min | **0.397** (0.331-0.482) | **0.522** (0.434-0.633) | **0.693** (0.575-0.844) | **0.839** (0.691-1.03) | **1.05** (0.833-1.33) | **1.22** (0.946-1.58) | **1.40** (1.06-1.86) | **1.59** (1.17-2.18) | **1.86** (1.32-2.67) | **2.09** (1.42-3.10) |
| 2-hr | **0.600** (0.500-0.727) | **0.775** (0.645-0.941) | **1.01** (0.840-1.23) | **1.21** (0.995-1.48) | **1.48** (1.18-1.89) | **1.70** (1.32-2.21) | **1.93** (1.46-2.57) | **2.17** (1.60-2.97) | **2.50** (1.77-3.58) | **2.77** (1.89-4.11) |
| 3-hr | **0.767** (0.639-0.930) | **0.987** (0.822-1.20) | **1.28** (1.06-1.56) | **1.52** (1.25-1.87) | **1.85** (1.47-2.35) | **2.11** (1.64-2.74) | **2.38** (1.80-3.17) | **2.66** (1.96-3.64) | **3.04** (2.15-4.35) | **3.34** (2.28-4.96) |
| 6-hr | **1.10** (0.914-1.33) | **1.41** (1.17-1.71) | **1.82** (1.51-2.21) | **2.14** (1.77-2.63) | **2.59** (2.06-3.29) | **2.93** (2.28-3.80) | **3.27** (2.48-4.36) | **3.62** (2.67-4.97) | **4.10** (2.89-5.86) | **4.46** (3.04-6.62) |
| 12-hr | **1.45** (1.21-1.76) | **1.88** (1.57-2.28) | **2.43** (2.02-2.96) | **2.87** (2.36-3.52) | **3.44** (2.73-4.37) | **3.87** (3.01-5.02) | **4.29** (3.26-5.72) | **4.72** (3.48-6.47) | **5.28** (3.73-7.56) | **5.71** (3.89-8.46) |
| 24-hr | **1.95** (1.73-2.25) | **2.58** (2.28-2.98) | **3.37** (2.97-3.90) | **3.98** (3.48-4.64) | **4.78** (4.05-5.77) | **5.37** (4.46-6.61) | **5.95** (4.82-7.50) | **6.53** (5.14-8.45) | **7.27** (5.50-9.81) | **7.83** (5.73-10.9) |
| 2-day | **2.36** (2.09-2.72) | **3.19** (2.82-3.69) | **4.25** (3.75-4.92) | **5.09** (4.45-5.93) | **6.19** (5.24-7.45) | **7.00** (5.81-8.62) | **7.81** (6.33-9.84) | **8.62** (6.80-11.2) | **9.69** (7.33-13.1) | **10.5** (7.67-14.6) |
| 3-day | **2.57** (2.28-2.97) | **3.54** (3.13-4.08) | **4.78** (4.21-5.53) | **5.77** (5.05-6.73) | **7.09** (6.01-8.55) | **8.09** (6.71-9.96) | **9.09** (7.36-11.5) | **10.1** (7.96-13.1) | **11.5** (8.66-15.4) | **12.5** (9.13-17.4) |
| 4-day | **2.78** (2.46-3.20) | **3.86** (3.41-4.46) | **5.27** (4.64-6.10) | **6.40** (5.60-7.47) | **7.93** (6.71-9.55) | **9.09** (7.54-11.2) | **10.3** (8.30-12.9) | **11.4** (9.02-14.8) | **13.0** (9.87-17.6) | **14.3** (10.4-19.9) |
| 7-day | **3.17** (2.80-3.65) | **4.49** (3.97-5.18) | **6.22** (5.49-7.20) | **7.63** (6.68-8.90) | **9.55** (8.09-11.5) | **11.0** (9.15-13.6) | **12.5** (10.2-15.8) | **14.1** (11.1-18.2) | **16.2** (12.2-21.8) | **17.8** (13.0-24.8) |
| 10-day | **3.43** (3.03-3.95) | **4.91** (4.34-5.66) | **6.87** (6.05-7.94) | **8.47** (7.41-9.88) | **10.7** (9.04-12.9) | **12.4** (10.3-15.2) | **14.1** (11.5-17.8) | **16.0** (12.6-20.7) | **18.4** (14.0-24.9) | **20.4** (14.9-28.4) |
| 20-day | **4.05** (3.59-4.67) | **5.89** (5.21-6.80) | **8.37** (7.38-9.68) | **10.4** (9.13-12.2) | **13.3** (11.3-16.1) | **15.6** (13.0-19.2) | **18.0** (14.6-22.7) | **20.6** (16.2-26.6) | **24.1** (18.2-32.5) | **26.9** (19.7-37.5) |
| 30-day | **4.78** (4.23-5.51) | **6.94** (6.14-8.01) | **9.90** (8.73-11.5) | **12.4** (10.8-14.5) | **16.0** (13.5-19.2) | **18.8** (15.6-23.1) | **21.8** (17.7-27.5) | **25.0** (19.7-32.4) | **29.6** (22.4-39.9) | **33.2** (24.3-46.4) |
| 45-day | **5.65** (5.00-6.51) | **8.10** (7.16-9.34) | **11.5** (10.1-13.3) | **14.4** (12.6-16.8) | **18.7** (15.8-22.5) | **22.1** (18.3-27.2) | **25.8** (20.9-32.5) | **29.7** (23.4-38.5) | **35.4** (26.8-47.8) | **40.1** (29.3-56.0) |
| 60-day | **6.68** (5.92-7.70) | **9.41** (8.32-10.9) | **13.3** (11.7-15.3) | **16.6** (14.5-19.4) | **21.5** (18.2-25.9) | **25.5** (21.1-31.3) | **29.8** (24.2-37.6) | **34.6** (27.2-44.7) | **41.4** (31.3-55.9) | **47.2** (34.5-65.8) |

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

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

Please refer to NOAA Atlas 14 document for more information.

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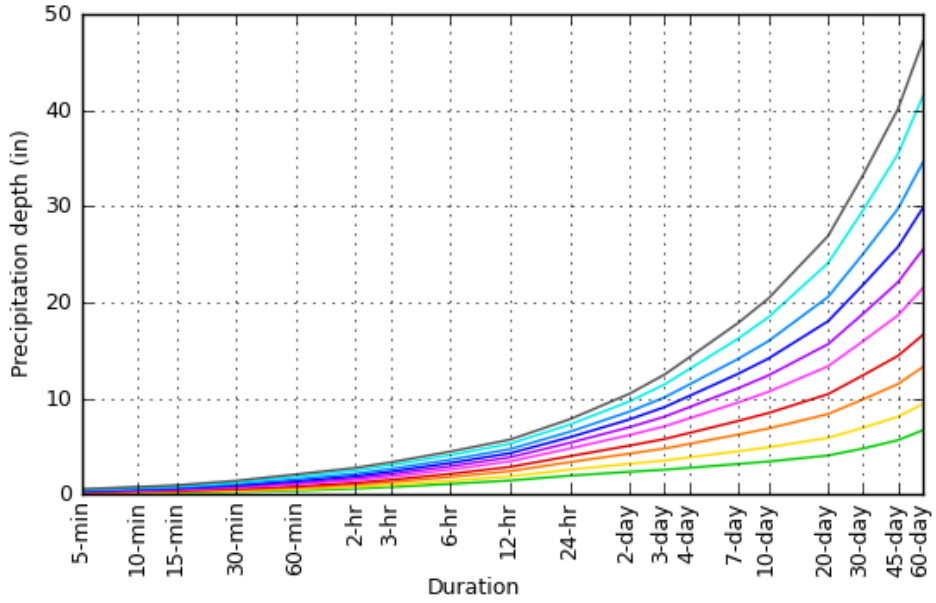
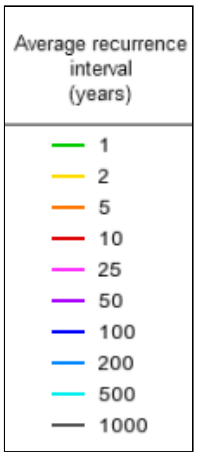
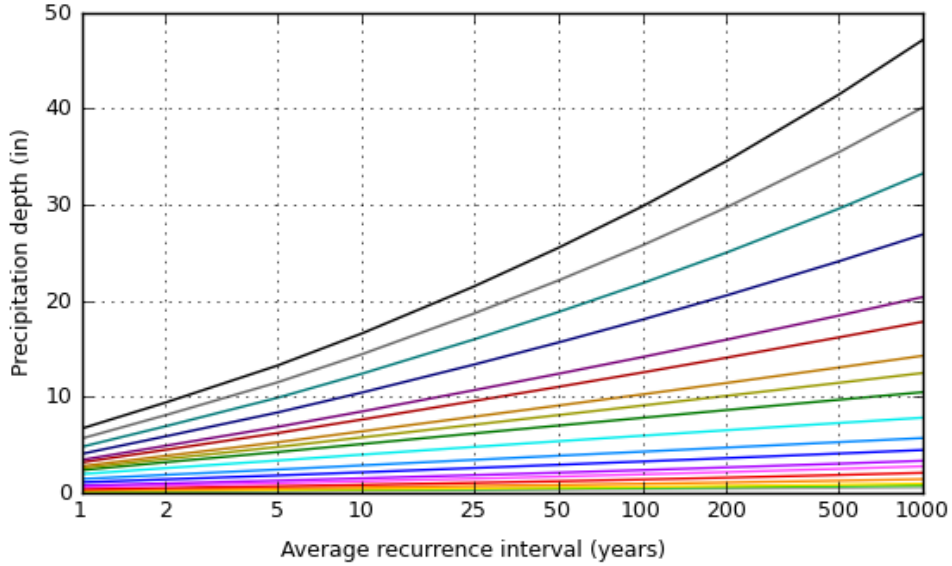
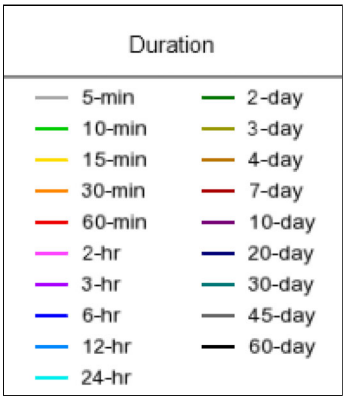
## PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.0718°, Longitude: -117.4797°

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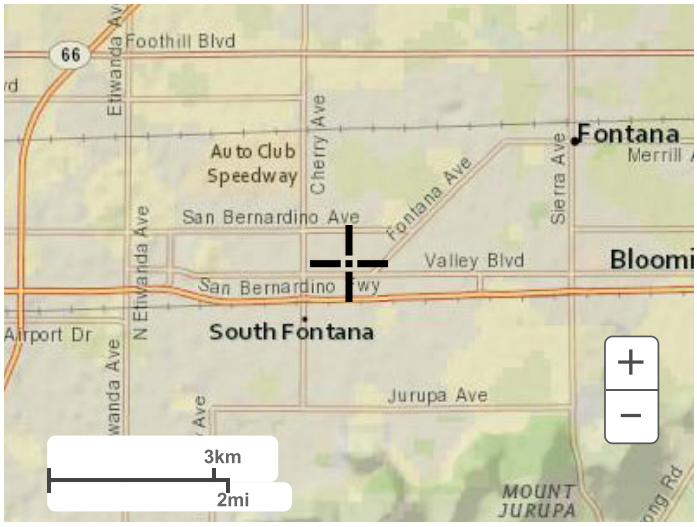
## Maps & aerials

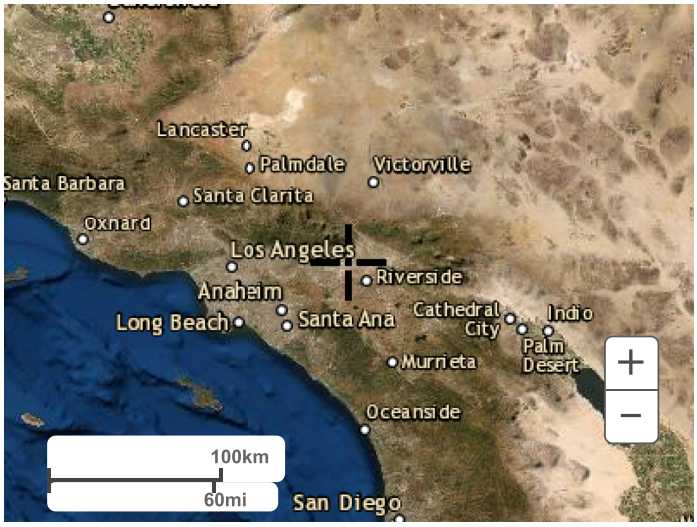
**Small scale terrain**




**Large scale terrain**


**Large scale map**


**Large scale aerial**

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

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

| Cover Type (3) | Quality of Cover (2) | Soil Group A | B | C | D |
|---|---|---|---|---|---|
| **NATURAL COVERS -** | | | | | |
| Barren (Rockland, eroded and graded land) | | 78 | 86 | 91 | 93 |
| Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak) | Poor | 53 | 70 | 80 | 85 |
| | Fair | 40 | 63 | 75 | 81 |
| | Good | 31 | 57 | 71 | 78 |
| Chaparral, Narrowleaf (Chamise and redshank) | Poor | 71 | 82 | 88 | 91 |
| | Fair | 55 | 72 | 81 | 86 |
| Grass, Annual or Perennial | Poor | 67 | 78 | 86 | 89 |
| | Fair | 50 | 69 | 79 | 84 |
| | Good | 38 | 61 | 74 | 80 |
| Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass) | Poor | 63 | 77 | 85 | 88 |
| | Fair | 51 | 70 | 80 | 84 |
| | Good | 30 | 58 | 71 | 78 |
| Open Brush (Soft wood shrubs - buckwheat, sage, etc.) | Poor | 62 | 76 | 84 | 88 |
| | Fair | 46 | 66 | 77 | 83 |
| | Good | 41 | 63 | 75 | 81 |
| Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent.) | Poor | 45 | 66 | 77 | 83 |
| | Fair | 36 | 60 | 73 | 79 |
| | Good | 25 | 55 | 70 | 77 |
| Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent) | Poor | 57 | 73 | 82 | 86 |
| | Fair | 44 | 65 | 77 | 82 |
| | Good | 33 | 58 | 72 | 79 |
| **URBAN COVERS -** | | | | | |
| Residential or Commercial Landscaping (Lawn, shrubs, etc.) | Good | 32 | 56 | 69 | 75 |
| Turf (Irrigated and mowed grass) | Poor | 58 | 74 | 83 | 87 |
| | Fair | 44 | 65 | 77 | 82 |
| | Good | 33 | 58 | 72 | 79 |
| **AGRICULTURAL COVERS -** | | | | | |
| Fallow (Land plowed but not tilled or seeded) | | 77 | 86 | 91 | 94 |

**SAN BERNARDINO COUNTY**

**HYDROLOGY MANUAL**

**CURVE NUMBERS FOR PERVIOUS AREAS**



Figure C-3 (1 of 2)

## Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

| Cover Type (3) | Quality of Cover (2) | Soil Group A | B | C | D |
|---|---|---|---|---|---|
| AGRICULTURAL COVERS (Continued) | | | | | |
| Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.) | Poor | 66 | 77 | 85 | 89 |
| | Good | 58 | 72 | 81 | 85 |
| Orchards, Evergreen (Citrus, avocados, etc.) | Poor | 57 | 73 | 82 | 86 |
| | Fair | 44 | 65 | 77 | 82 |
| | Good | 33 | 58 | 72 | 79 |
| Pasture, Dryland (Annual grasses) | Poor | 68 | 79 | 86 | 89 |
| | Fair | 49 | 69 | 79 | 84 |
| | Good | 39 | 61 | 74 | 80 |
| Pasture, Irrigated (Legumes and perennial grass) | Poor | 58 | 74 | 83 | 87 |
| | Fair | 44 | 65 | 77 | 82 |
| | Good | 33 | 58 | 72 | 79 |
| Row Crops (Field crops - tomatoes, sugar beets, etc.) | Poor | 72 | 81 | 88 | 91 |
| | Good | 67 | 78 | 85 | 89 |
| Small grain (Wheat, oats, barley, etc.) | Poor | 65 | 76 | 84 | 88 |
| | Good | 63 | 75 | 83 | 87 |

Notes:

1. All curve numbers are for Antecedent Moisture Condition (AMC) II.
2. Quality of cover definitions:

   Poor-Heavily grazed, regularly burned areas, or areas of high burn potential. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.

   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.

   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.
3. See Figure C-2 for definition of cover types.

**SAN BERNARDINO COUNTY**
**HYDROLOGY MANUAL**

**CURVE NUMBERS FOR PERVIOUS AREAS**



Figure C-3 (2 of 2)

## ACTUAL IMPERVIOUS COVER

| Land Use (1) | Range-Percent | Recommended Value For Average Conditions-Percent (2) |
|---|---|---|
| Natural or Agriculture | 0 - 0 | 0 |
| Public Park | 10 - 25 | 15 |
| School | 30 - 50 | 40 |
| Single Family Residential: (3) | | |
| 2.5 acre lots | 5 - 15 | 10 |
| 1 acre lots | 10 - 25 | 20 |
| 2 dwellings/acre | 20 - 40 | 30 |
| 3-4 dwellings/acre | 30 - 50 | 40 |
| 5-7 dwellings/acre | 35 - 55 | 50 |
| 8-10 dwellings/acre | 50 - 70 | 60 |
| More than 10 dwellings/acre | 65 - 90 | 80 |
| Multiple Family Residential: | | |
| Condominiums | 45 - 70 | 65 |
| Apartments | 65 - 90 | 80 |
| Mobile Home Park | 60 - 85 | 75 |
| Commercial, Downtown Business or Industrial | 80 - 100 | 90 |

Notes:

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

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

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

**SAN BERNARDINO COUNTY**

**HYDROLOGY MANUAL**

**ACTUAL IMPERVIOUS COVER FOR DEVELOPED AREAS**



Figure C-4

# *Attachment 6: Operations & Maintenance Plan*

*Please refer to the attached references.*

*The operations maintenance program and associated documents will be added during the next round of corrections, once BMPs approved tentatively for use.*