Preliminary Water Quality Management Plan

For:

Canyon Ranch

TTM 20402

APN: 0293-141-38
0293-132-01

Prepared for:

Highpointe Canyon Ranch LLC

530 Technology, Suite 100

Irvine, CA 92618

949-472-0800

Prepared by:

Proactive Engineering Consultants, Inc.

200 S Main Street, Suite 300

Corona, CA 92882

951-280-3302

Submittal Date: 1/19/2023

Revision Date: _____

Approval Date:_____

Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for Highpointe Canyon Ranch LLC by Proactive Engineering Consultants, Inc. The WQMP is intended to comply with the requirements of the County of San Bernardino and the NPDES Areawide Stormwater Program requiring the preparation of a WQMP. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with San Bernardino County's Municipal Storm Water Management Program and the intent of the NPDES Permit for San Bernardino County and the incorporated cities of San Bernardino County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors in interest and the city/county shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

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

.

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):		Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN: 0293-141-38 0293-132-01

Owner's Signature		
Owner Name: Steve Vliss		
Title	President & CEO	
Company	Highpoint Canyon Ranch LLC	
Address	530 Technology, Suite 100 Irvine, CA 92618	
Email	Steve.vliss@highpointeinc.com	
Telephone #	949-472-0800	
Signature	Date	

Preparer's Certification

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):		Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN: 0293-141-38 0293-132-01

"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: Scott Gilbert		PE Stamp Below
Title	Project Manager	
Company	Proactive Engineering Consultants, Inc.	
Address	200 S Main Street, Suite 300 Corona, CA 92882	
Email	scottgilbert@proactiveengineering.net	
Telephone #	951-280-3300	
Signature		
Date		

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Section 1 Discretionary Permit(s)

Form 1-1 Project Information

Project Name	Canyon Ranch				
Project Owner Contact Name:	Steve Vliss				
Mailing Address:	530 Technology, Suite 100 Irvine, CA 92618	E-mail Address:	Steve.vliss@highpointeinc.com	Telephone:	949-472-0800
Permit/Application Number(s):		Tract/Parcel Map Number(s):			
Additional Information/ Comments:	Canyon Ranch -the proposed residential development is located within two different city jurisdictions (Loma Linda and Redlands). The 67-acre (Loma Linda) and 24.9-acre (Redlands) site will be developed into multiple single family homes. The entire Canyon Ranch development measures approximately 88-acres and is intended to be developed into a residential development. The project site is divided into three drainage area and each will utilize a separate basin as a collection point. This WQMP is limited to the units developed within TTM 20402. A separate report has been prepared for the City of Loma Linda regarding said portion of the proposed residential development.				
Description of Project:	Canyon Ranch- is a proposed 27-unit single family residential development located in the City of Redlands within the County of San Bernardino. The project site is bounded by San Timoteo Creek on the westerly and south sides, vacant land on the north, and vacant land on the easterly side of the project site. The project site consists of approximately 24.9 acres of disturbed vacant land. The existing site condition is undeveloped, vacant land with minimal grading and fair amount of dried brush. The land was previously used for agricultural purposes and slopes towards the northwest at an average slope gradient of 1-2 percent. Tract 20403 and 20404 of Canyon Ranch is on the westerly side of the site in the City of Loma Linda. Development of the site will compose of single-family homes varying in size, streets, and an onsite Water Quality Basin for treatment of runoff. The project proposes to 27 Dwelling Units using the following information: 1 DU/ Acre, and 2DU/ Acre. The project site will treat onsite flows via infiltration basin systems, including addressing the hydrologic conditions of concerns and mitigating peak flow rates being discharged into the San Mateo Creek located on the westerly side of the project site. Generally, onsite drainage generally flows from east to the north west where the onsite infiltration basin is located. Any runoff that is not collected within the site due to grading constraints will be captured via catch basin and routed to the basin to be treated and discharged. Runoff for the proposed project generally includes roof runoff, off-site runoff, streets runoff and any other relevant impervious areas. Water is captured using local gutters, storm water inlets and/ or catch basins and conveyed to the private main storm drain system. Streat flow is captured via inlets, where storm water confluences with drainage from landscaped areas as well as offsite areas. After runoff is collected, it is then routed to the onsite infiltration basin where the runoff produced by the 2-year storm is treated and discharged to the public storm drain system. The proposed basin has not only been sized to treat runoff but has also been accordingly sized as a collection point for a 100-Year Storm Event prior to being discharged. Discharged runoff from the proposed infiltration basin will be conveyed to the City of Loma Linda storm drain line. The City of Loma Linda storm drain line will be utilized to convey				

	runoff from the project area. The City of Loma Linda storm drain will be located within Tract No. 20404. An agreement with the City of Loma Linda will be prepared during final engineering to allow this project the use of the City of Loma Linda storm drain line. The City of Loma Linda storm drain line will be built as part of Tract No. 20404 improvements and prior to Tract No. 20402.
Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.	

Section 2 Project Description

2.1 Project Information

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

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

Form 2.1-1 Description of Proposed Project

[1] Development Category (Select all that apply):

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

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

[2] Project Area (ft2):	1,085,080	[3] Number of Dwelling Units:	27	[4] SIC Code:	1521

[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:

Maintenance of the WQMP facilities will be the sole responsibility of the property owner:

Highpointe Canyon Ranch LLC
Address: 530 Technology, Suite 100
Irvine, CA 92618
Contact: Steve Vliss
Phone: 949-472-0800

The proposed treatment facilities will be transferred to the HOA (homeowner's association). A homeowner's association will be formed and will succeed Highpointe Canyon Ranch, LLC as the entity responsible for long-term maintenance. Maintenance of the WQMP facilities will be the sole responsibility of Highpointe Canyon Ranch, LLC. These facilities include any treatment control BMPs, non-structural source BMPs, and structural source BMPs. Refer to Section 5 of the WQMP for activities required and the minimum frequency of the activities. Upon completion of the project, Highpointe Canyon Ranch, LLC will transfer the operation, maintenance inspection, and funding to the HOA. The owner may choose to contract out the maintenance of the storm water facilities to a contractor with the proper equipment.

All proposed storm drain infrastructure which includes catch basins and storm drain lines will be transferred to the City of Redlands. City of Redlands will own and maintain catch basins and storm drain lines within public streets.

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 ☐	Pollutant to be expected from animal waste (house pets) and/or pavement runoff. Negative effects to water runoff include human health risks.
Nutrients - Phosphorous	E ☒	N ☐	Pollutant to be expected from landscaped areas and pavement runoff. Negative effects to water runoff include the support growth of algae or unwanted microbial growth on the water surface in the storage unit.
Nutrients - Nitrogen	E ☒	N ☐	Pollutant to be expected from landscaped areas and pavement runoff. Negative effects to water runoff include the support growth of algae or unwanted microbial growth on the water surface in the storage unit.
Noxious Aquatic Plants	E ☐	N ☒	The proposed development does not include any areas where water will be standing long enough to allow the growth of aquatic plants.
Sediment	E ☒	N ☐	Potential pollutant from landscaped areas and/or open areas within project site. Negative effects to water runoff include clogging pump intake or distribution and increasing the maintenance of storage.
Metals	E ☒	N ☐	Cars, Trucks & Parking Areas. Negative effects to water runoff include plant toxicity.
Oil and Grease	E ☒	N ☐	Pollutant to be expected from vehicles and uncovered parking areas. Negative effects to water runoff include plant toxicity, human health risk, and animal health risk.
Trash/Debris	E ☒	N ☐	Pollutant to be expected from condominiums, tenants, and occupants. Negative effects to water runoff include plant toxicity, human health risk, and animal health risk.
Pesticides / Herbicides	E ☒	N ☐	Pollutant to be expected from landscaped areas. Negative effects to water runoff include plant toxicity, human health risk, and animal health risk.
Organic Compounds	E ☒	N ☐	Pollutant to be expected from landscape areas. Negative effects to water runoff include plant toxicity, human health risk, and animal health risk.
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	

POLLUTANTS LISTED HEREON WILL BE MITIGATED BY IMPLEMENTING AN INFILTRATION BASIN

2.4 Water Quality Credits

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

Form 2.4-1 Water Quality Credits

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

Section 3 Site and Watershed Description

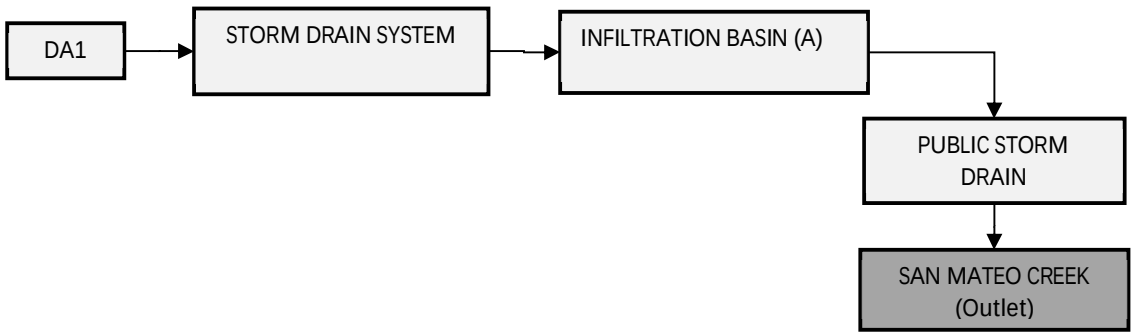
Describe the project site conditions that will facilitate the selection of BMP through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and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

Form 3-1 Site Location and Hydrologic Features

Site coordinates *take GPS measurement at approximate center of site*	Latitude 34° 2'36.80"N	Longitude 117°12'57.47"W	Thomas Bros Map page 647

[1] San Bernardino County climatic region: ☒ Valley ☐ Mountain

[2] Does the site have more than one drainage area (DA): Yes☐ No☒ *If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached*



Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA
DA1 to San Mateo Creek	Roof runoff and landscaping drains to pervious areas where it is treated and directed into the on-site storm drain system. The streets, driveways & other paved areas runoff were directed into on-site storm drain system through catch basins. Within the private on-site storm drain system, the runoff is routed to the proposed infiltration basin. Runoff will infiltrate and outlet into the downstream basin prior to discharging into the San Mateo Creek.

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA A			
1 DMA drainage area (ft^2)	1,085,080			
2 Existing site impervious area (ft^2)	0			
3 Antecedent moisture condition *For desert areas, use* *http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf*	II			
4 Hydrologic soil group *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	A			
5 Longest flowpath length (ft)	1,665			
6 Longest flowpath slope (ft/ft)	0.0583			
7 Current land cover type(s) *Select from Fig C-3 of Hydrology Manual*	Grass			
8 Pre-developed pervious area condition: *Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating*	Poor			

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1 (use only as needed for additional DMA w/in DA 1)				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	N/A	N/A	N/A	N/A
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*				


TTM 2u402
Existing Site Photos - 2021-10-07
Legend
Dove Ln
Morning Dove Ln
San Timoteo Canyon Rd
San Timoteo Canyon Rd
N
500 ft
Google Earth
© 2021 Google



Figure 4: Within the project site looking Northerly.



Figure 2: Within the project site looking towards North-Westerly edge of the project site.



Figure 3: Within the project site looking towards North-Westerly edge of the project site.



Figure 1: Within the project site looking towards North-Westerly edge of the project site.



Figure 6: Within the project site looking towards Westerly edge of the project site.



Figure 7: Within the project site looking toward Southerly -Westerly edge of the project site.



Figure 5: Within the project site looking toward the Southerly edge of the project site.

Form 3-3 Watershed Description for Drainage Area

Receiving waters *Refer to Watershed Mapping Tool - http://permitrack.sbcounty.gov/wap/ See 'Drainage Facilities" link at this website*	San Timoteo Creek Reach 1B- San Timoteo Creek Reach 1A- Santa Ana River, Reach 5- Santa Ana River, Reach 3- Prado Flood Control Basin
Applicable TMDLs *Refer to Local Implementation Plan*	SAR Reach 3
303(d) listed impairments *Refer to Local Implementation Plan and Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/ and State Water Resources Control Board website – http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml*	Santa Ana River, Reach 3 – Copper, fecal coliform, lead Santa Ana River, Reach 4- Pathogens
Environmentally Sensitive Areas (ESA) *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	According to the County of San Bernardino Watershed Mapping Tool, the project site is not located within a potentially sensitive area
Unlined Downstream Water Bodies *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	San Timoteo Creek Reach 1B
Hydrologic Conditions of Concern	☒ Yes *Complete Hydrologic Conditions of Concern (HCOC) Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-10 in submittal* ☐ No
Watershed–based BMP included in a RWQCB approved WAP	☐ Yes *Attach verification of regional BMP evaluation criteria in WAP* • *More Effective than On-site LID* • *Remaining Capacity for Project DCV* • *Upstream of any Water of the US* • *Operational at Project Completion* • *Long-Term Maintenance Plan* ☒ No

Section 4 Best Management Practices (BMP)

4.1 Source Control BMP

4.1.1 Pollution Prevention

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

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

Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N1	Education of Property Owners, Tenants and Occupants on Stormwater BMPs	☒	☐	The current owner/developer and future owners and their POA shall be familiar with the contents of this WQMP and County & City ordinances and brochures and furnish copies of these documents to all future property owners. The project owner will provide educational materials to property owners within the project. The materials will discuss water quality management issues relating to the project and property owners individual and corporate responsibilities. The materials will contain appropriate information from private and government resources. These materials will include information on general good housekeeping practices that contribute to protection of Storm water quality, and BMPs that eliminate or reduce pollution. The materials will describe the use of chemicals (including household type) that should be limited to the property, with no discharge of specified wastes via hosing or other direct discharge to gutters, catch basins, and storm drains. These materials will be made available by the owner and are attached to the WQMP template as Section 6.4. The owner will note the availability of stormwater information and educational materials available on the San Bernardino County Website http://www.sbcountystormwater.org/ A copy of these materials and a copy of the WQMP must be given to each property owner with the purchase of a lot within the subdivision at the close of purchase
N2	Activity Restrictions	☒	☐	Property owners and their tenants or occupants shall not be allowed to discharge chemicals, chemical residues, wastewater or other prohibited discharges listed in the City stormwater Ordinance, to the outside, paved areas of the site; or store chemicals or other pollutant sources in a non-spill contained or covered facilities as stipulated in the CC&Rs.
N3	Landscape Management BMPs	☒	☐	The POA and their landscape maintenance contractor shall inspect the irrigation system plant health and erosion problems after each landscape procedure and shall report all repairs and problems to the POA. All routine landscaping maintenance.
N4	BMP Maintenance	☒	☐	The POA shall inspect for standing water in the water retention/infiltration basins, 48 hours after storm events. BMP maintenance shall be performed per the schedule in Form 5-1, as needed to restore free drainage.
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	The POA will file appropriate hazardous material disclosures, if any storage is conducted, and must comply with all Title 22 CCR, Chapter 29 regulations. The City of Redlands through the Fire Department provides for household hazardous waste collection. The homeowners shall comply by using this facility to dispose of all leftover pesticides, fertilizers, herbicides, oil, paints, antifreeze, batteries, corrosives,

Form 4.1-1 Non-Structural Source Control BMPs				
				and flammables. Alternate approved sites for disposal are available. See the San Bernardino County stormwater website for additional disposal locations. Additionally, there are educational material covering hazardous waste covered under N1. The current educational materials are attached to this WQMP.
N6	Local Water Quality Ordinances	☒	☐	The POA shall ensure that all maintenance activities at the site comply with the County of San Bernardino's Stormwater Ordinance and MS4 Permit, through the implementation of BMPs.
N7	Spill Contingency Plan	☐	☒	Not required for single family residences.
N8	Underground Storage Tank Compliance	☐	☒	Storage tanks will not be implemented.
N9	Hazardous Materials Disclosure Compliance	☐	☒	Not required for single family residences.

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	☒	☐	This project will be developed and operated in accordance with Article 80 of the Uniform Fire Code. The current owners or the future POA shall require all fire code requirements to be implemented at this project site.
N11	Litter/Debris Control Program	☒	☐	The Homeowners will be responsible for litter and debris on their individual lots (Lots 1-28).
N12	Employee Training	☐	☒	Not applicable for single family residences
N13	Housekeeping of Loading Docks	☐	☒	The proposed project site will not implement loading docks
N14	Catch Basin Inspection Program	☒	☐	The building operator shall have the entire storm drain system inspected and cleaned a minimum of once annually prior to the start of the rainy season. Catch Basins should be checked quarterly for debris buildup and signs of illegal dumping.
N15	Vacuum Sweeping of Private Streets and Parking Lots	☐	☒	Project site does not contain private streets and/or parking lots
N16	Other Non-structural Measures for Public Agency Projects	☐	☒	This development is not part of a Public Agency Project.
N17	Comply with all other applicable NPDES permits	☒	☐	General construction permit coverage will be obtained and a SWPPP will be prepared and implemented during final engineering as part of the construction methods. All building occupants required to obtain coverage under the General Permit will do so by filing a Notice of Intent preparing a SWPPP and performing all required stormwater monitoring and reporting to the State Water Board.

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)	☒	☐	Signage notices regarding discharge prohibitions will be placed at storm drain inlets to eliminate or reduce dumping and littering. The stencil shall be blue on a white background with lettering 2-1/2" in height and reading "NO DOUMPING -DRAINS TO RIVER". A fish or similar water dependent creature silhouette may be included subject to City approval. In lieu of a stencil, a catch basin curb marker, circular or rectangular, at 4" in height or diameter may be used. The message will be the same and subject to City approval. A painted circular stencil shall not be bigger than 8" in diameter. Legibility will be checked and repainted annually.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	☐	☒	This development does not include the storage of materials outdoors.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	☐	☒	This development does not include the trash and waste storage.
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)	☒	☐	Irrigation methods will be utilized to minimize runoff of excess irrigation water across impervious surfaces and into the storm water conveyance system. Such measures shall include employing rain-triggered shutoff devices to eliminate or reduce irrigation during and immediately after precipitation, using mulches (such as wood chips) to minimize sediment in runoff and to maintain soil infiltration capacity, and coordinating design of the irrigation system and landscape to minimize overspray and runoff. Irrigation systems shall use flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or water supply lines. Water conservation devices such as programmable irrigation timers and soil moisture sensors shall be used. This project will be designed for efficient irrigation by implementation of BMP SD-12. Reference SD-12 attached under the BMP section 6.4B.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	☒	☐	All parkway strips shall be finish-graded at a minimum of 1-2 inches below top of curb or sidewalk for increased retention/infiltration of stormwater and irrigation water.
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	☒	☐	Project plans will include Source-Control BMPs to decrease the potential for erosion of slopes, channels, and storm drain outlets. Slope runoff will be conveyed safely from the tops of slopes. 1. All manufactured slopes within the project will be landscaped and protected.

				2. Prior to slope landscaping slopes shall be stabilized per the SWPPP. Install energy dissipaters per the Final project plans at the outlet locations shown on the attached BMP exhibit. 3. Onsite conveyance channels (drainage swales) will be lined, where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	☒	☒	No docks as part of this development
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	☐	☒	Maintenance bays are not proposed as part of this development.
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	Vehicle wash areas are not provided as part of this development.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	☐	☒	Outdoor processing is not associated with the proposed development.

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)	☐	☒	Outdoor equipment is not associated with the proposed development.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	☐	☒	Fueling areas are not included as part of this development.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	☐	☒	Not applicable
S14	Wash water control for food preparation areas	☐	☒	The proposed development does not include food preparation areas.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	☐	☒	The proposed development does not include community car wash areas.

4.1.2 Preventative LID Site Design Practices

Site design practices associated with new LID requirements in the MS4 Permit should be considered in the earliest phases of a project. Preventative site design practices can result in smaller DCV for LID BMP and hydromodification control BMP by reducing runoff generation. Describe site design and drainage plan including:

- A narrative of site design practices utilized or rationale for not using practices
- A narrative of how site plan incorporates preventive site design practices
- Include an attached Site Plan layout which shows how preventative site design practices are included in WQMP

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

Form 4.1-3 Preventative LID Site Design Practices Checklist

Site Design Practices *If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be selected to meet targets*
Minimize impervious areas: Yes ☒ No ☐ Explanation: Impervious areas will be minimized to the maximum extent practicable by providing pervious areas.
Maximize natural infiltration capacity: Yes ☒ No ☐ Explanation: All pervious areas will be below adjacent impervious areas to maximize natural infiltration, and the project site utilizes subsurface infiltration basins.
Preserve existing drainage patterns and time of concentration: Yes ☒ No ☐ Explanation: Drainage pattern will be maintained to the maximum extent feasible.
Disconnect impervious areas: Yes ☒ No ☐ Explanation: Impervious areas will be disconnected from pervious areas by grading design. The stormwater runoff will be routed through the storm drain system.
Protect existing vegetation and sensitive areas: Yes ☐ No ☒ Explanation: There isn't any existing sensitive vegetation on the proposed site.
Re-vegetate disturbed areas: Yes ☒ No ☐ Explanation: All disturbed areas without impervious construction will be revegetated.
Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes ☒ No ☐ Explanation: Unnecessary compaction will be avoided within the proposed infiltration basin areas.
Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes ☒ No ☐ Explanation: The project site will utilize vegetated swales where applicable.
Stake off areas that will be used for landscaping to minimize compaction during construction: Yes ☒ No ☐ Explanation: Landscaping areas will be staked off after rough grading has been completed to prevent excessive compaction.

The project site utilizes the minimum impervious area feasible for the site. It incorporates Infiltration Basins that will promote onsite infiltration. The proposed systems used are large in area in order to meet the 48-hour drawdown requirement. Flows will all be directed via sheet flow into nearby catch basins and concrete v-gutters. Once the runoff is collected via proposed catch basins, it will then be directed to the proposed infiltration basin. Runoff that exceeds the proposed basin design storm, it may be discharged into the San Mateo Creek not to exceed the existing peak flow rate. Flows on the roofs will first be directed into the landscape for pretreatment via downspouts before reaching the storm drain system. The area in which we will have infiltration will be compacted accordingly, to allow for natural infiltration for the system. Additionally, the landscaped areas shall be staked off during construction to minimize compaction within the specified areas which would promote micro-infiltration. The project site does not preserve existing vegetation. Pervious pavement was also not considered in this project design because all of the water is being directed towards nearby catch basins and concrete v-gutters in order to reach the storm drain system.

4.2 Project Performance Criteria

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): 1,085,080	2 Imperviousness after applying preventative site design practices (Imp%): 24	3 Runoff Coefficient (Rc): 0.19 *$R_c = 0.858(Imp\%)^{\wedge 3} - 0.78(Imp\%)^{\wedge 2} + 0.774(Imp\%) + 0.04$*
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.465 *http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*		
5 Compute P_6, Mean 6-hr Precipitation (inches): 0.689 *P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)*		
6 Drawdown Rate *Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.*		24-hrs ☐ 48-hrs ☒
7 Compute design capture volume, DCV (ft^3): 23,550 *DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)* *Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2*		

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

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

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

If "Yes", then complete HCOC assessment of site hydrology for 2yr storm event using Forms 4.2-3 through 4.2-5 and insert results below

(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual)

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

Condition	Runoff Volume (ft^3)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	[1] 46,577 *Form 4.2-3 Item 12*	[2] 57 *Form 4.2-4 Item 13*	[3] 0.9 *Form 4.2-5 Item 10*
Post-developed	[4] 6,352 *Form 4.2-3 Item 13*	[5] 53 *Form 4.2-4 Item 14*	[6] 0.2 *Form 4.2-5 Item 14*
Difference	[7] *40,225* *Item 4 – Item 1*	[8] 4 *Item 2 – Item 5*	[9] *0.7* *Item 6 – Item 3*
Difference (as % of pre-developed)	[10] 0% Increase *Item 7 / Item 1*	[11] 0% Increase *Item 8 / Item 2*	[12] 0% Increase *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 H
1a Land Cover type	Grass						
2a Hydrologic Soil Group (HSG)	B						
3a DMA Area, ft^2 *sum of areas of DMA should equal area of DA*	1,085,080						
4a Curve Number (CN) *use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	78						
Weighted Curve Number Determination for: Post-developed DA	**DMA A**	**DMA B**	**DMA C**	**DMA D**	**DMA E**	**DMA F**	**DMA H**
1b Land Cover type	Grass	Infiltration Basin	Residential				
2b Hydrologic Soil Group (HSG)	B	B	B				
3b DMA Area, ft^2 *sum of areas of DMA should equal area of DA*	212,021	18,718	854,341				
4b Curve Number (CN) *use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	78	56	56				

5 Pre-Developed area-weighted CN: 78	7 Pre-developed soil storage capacity, S (in): 2.82 *S = (1000 / Item 5) - 10*	9 Initial abstraction, I_a (in): 0.56 *I_a = 0.2 * Item 7*
6 Post-Developed area-weighted CN: 60	8 Post-developed soil storage capacity, S (in): 6.66 *S = (1000 / Item 6) - 10*	10 Initial abstraction, I_a (in): 1.33 *I_a = 0.2 * Item 8*

11 Precipitation for 2 yr, 24 hr storm (in): 2.05
Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

12 Pre-developed Volume (ft^3): 46,577
*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): 6,352
*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): 0
*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*	1,665				531	162	1,362	
2 Change in elevation (ft)	97.07				68.5	8	25	
3 Slope (ft/ft), S_o = *Item 2 / Item 1*	0.0583				0.1290	0.0494	0.0183	
4 Land cover	Grass				Grass	Infiltration Basin	Residential	
5 Initial DMA Time of Concentration (min) *Appendix C-1 of the TGD for WQMP*	57				33.5	14	53	
6 Length of conveyance from DMA outlet to project site outlet (ft) *May be zero if DMA outlet is at project site outlet*	0				1,301	0	0	
7 Cross-sectional area of channel (ft^2)	18				18	18	18	
8 Wetted perimeter of channel (ft)	13.4				13.4	13.4	13.4	
9 Manning's roughness of channel (n)	.020				.020	.020	.020	
10 Channel flow velocity (ft/sec) V_{fps} = *(1.49 / Item 9) * (Item 7/Item 8)^0.67 * (Item 3)^0.5*	32.5				32.5	32.5	32.5	
11 Travel time to outlet (min) T_t = *Item 6 / (Item 10 * 60)*	0				0.67	0	0	
12 Total time of concentration (min) T_c = *Item 5 + Item 11*	57				5.67	5	53	

13 Pre-developed time of concentration (min): 57 *Minimum of Item 12 pre-developed DMA*

14 Post-developed time of concentration (min): 53 *Minimum of Item 12 post-developed DMA*

15 Additional time of concentration needed to meet HCOC requirement (min): 1.1 $T_{C\text{-}HCOC}$ = *(Item 13 * 0.95) – Item 14*

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

Compute peak runoff for pre- and post-developed conditions

Variables		Pre-developed DA to Project Outlet (*Use additional forms if more than 3 DMA)*			Post-developed DA to Project Outlet (*Use additional forms if more than 3 DMA)*		
		DMA A	DMA B	DMA C	DMA A	DMA B	DMA C
1 Rainfall Intensity for storm duration equal to time of concentration *I_{peak} = 10^(LOG Form 4.2-1 Item 4 - 0.6 LOG Form 4.2-4 Item 5 /60)*		0.45			0.45	0.45	0.45
2 Drainage Area of each DMA (Acres) *For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)*		24.91			4.87	0.43	19.61
3 Ratio of pervious area to total area *For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)*		1			1	1	0.30
4 Pervious area infiltration rate (in/hr) *Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP*		0.41			0.41	0.72	0.72
5 Maximum loss rate (in/hr) *F_m = Item 3 * Item 4* *Use area-weighted F_m from DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)*		0.41			0.41	0.72	0.22
6 Peak Flow from DMA (cfs) *Q_p =Item 2 * 0.9 * (Item 1 - Item 5)*		0.9			0.2	0	0
7 Time of concentration adjustment factor for other DMA to site discharge point *Form 4.2-4 Item 12 DMA / Other DMA upstream of site discharge point (If ratio is greater than 1.0, then use maximum value of 1.0)*	DMA A	*n/a*			*n/a*	N/A	N/A
	DMA B	N/A	*n/a*		N/A	*n/a*	N/A
	DMA C	N/A		*n/a*	0.10	N/A	*n/a*

8 Pre-developed Q_p at T_c for DMA A: 0.9 CFS *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: N/A *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: N/A *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): 0.9 *Maximum of Item 8, 9, and 10 (including additional forms as needed)*		
11 Post-developed Q_p at T_c for DMA A: 0.2 *Same as Item 8 for post-developed values*	12 Post-developed Q_p at T_c for DMA B: 0 *Same as Item 9 for post-developed values*	13 Post-developed Q_p at T_c for DMA C: 0 *Same as Item 10 for post-developed values*
14 Peak runoff from post-developed condition confluence analysis (cfs): 0.2 *Maximum of Item 11, 12, and 13 (including additional forms as needed)*		
15 Peak runoff reduction needed to meet HCOC Requirement (cfs): 0 *$Q_{p\text{-}HCOC}$ = (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).

Due to the site constraints that exist on the project site, they would limit the type of BMP to be implemented in a DA. The project development utilized BMPS in multiple locations, to maximize on-site retention of the DCV. A combination of BMP's can mitigate the entire DCV, if a single BMP type, or combination of BMP types cannot successfully mitigate the entire DCV. The proposed BMP(s) would maximize on-site retention of the DCV within the minimum effective area. The storm drain system is designed to accommodate 2-year and 100-year storm events. All runoff that exceeds that of the basin requirements will be discharged into the San Mateo Creek to which will not exceed the existing flow rate of the project site.

Form 4.3-1 Infiltration BMP Feasibility (DA 1)

Feasibility Criterion – Complete evaluation for each DA on the Project Site

[1] Would infiltration BMP pose significant risk for groundwater related concerns? Yes ☐ No ☒
Refer to Section 5.3.2.1 of the TGD for WQMP

If Yes, Provide basis: (attach)

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

- The location is less than 50 feet away from slopes steeper than 15 percent
- The location is less than eight feet from building foundations or an alternative setback.
- A study certified by a geotechnical professional or an available watershed study determines that stormwater infiltration would result in significantly increased risks of geotechnical hazards.

If Yes, Provide basis: (attach)

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

If Yes, Provide basis: (attach)

[4] Is proposed infiltration facility located on hydrologic soil group (HSG) D soils or does the site geotechnical investigation indicate presence of soil characteristics, which support categorization as D soils? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[5] Is the design infiltration rate, after accounting for safety factor of 2.0, below proposed facility less than 0.3 in/hr (accounting for soil amendments)? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[6] Would on-site infiltration or reduction of runoff over pre-developed conditions be partially or fully inconsistent with watershed management strategies as defined in the WAP, or impair beneficial uses? Yes ☐ No ☒
See Section 3.5 of the TGD for WQMP and WAP

If Yes, Provide basis: (attach)

[7] Any answer from Item 1 through Item 3 is "Yes": Yes ☐ No ☒
If yes, infiltration of any volume is not feasible onsite. Proceed to Form 4.3-4, Harvest and Use BMP. If no, then proceed to Item 8 below.

[8] Any answer from Item 4 through Item 6 is "Yes": Yes ☐ No ☒
If yes, infiltration is permissible but is not required to be considered. Proceed to Form 4.3-2, Hydrologic Source Control BMP.
If no, then proceed to Item 9, below.

[9] All answers to Item 1 through Item 6 are "No":
Infiltration of the full DCV is potentially feasible, LID infiltration BMP must be designed to infiltrate the full DCV to the MEP.
Proceed to Form 4.3-2, Hydrologic Source Control BMP.

4.3.1 Site Design Hydrologic Source Control BMP

Section XI.E. of the Permit emphasizes the use of LID preventative measures; and the use of LID HSC BMPs reduces the portion of the DCV that must be addressed in downstream BMPs. Therefore, all applicable HSC shall be provided except where they are mutually exclusive with each other, or with other BMPs. Mutual exclusivity may result from overlapping BMP footprints such that either would be potentially feasible by itself, but both could not be implemented. Please note that while there are no numeric standards regarding the use of HSC, if a project cannot feasibly meet BMP sizing requirements or cannot fully address HCOCs, feasibility of all applicable HSC must be part of demonstrating that the BMP system has been designed to retain the maximum feasible portion of the DCV. Complete Form 4.3-2 to identify and calculate estimated retention volume from implementing site design HSC BMP. Refer to Section 5.4.1 in the TGD for more detailed guidance.

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

1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes ☐ No ☐ *If yes, complete Items 2-5; If no, proceed to Item 6*	DA 1 DMA A BMP Type N/A		
2 Total impervious area draining to pervious area (ft^2)			
3 Ratio of pervious area receiving runoff to impervious area			
4 Retention volume achieved from impervious area dispersion (ft^3) *V = Item2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff*			
5 Sum of retention volume achieved from impervious area dispersion (ft^3): 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 A BMP Type N/A		
7 Ponding surface area (ft^2)			
8 Ponding depth (ft)			
9 Surface area of amended soil/gravel (ft^2)			
10 Average depth of amended soil/gravel (ft)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft^3) *$V_{retention}$ = (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)*			
13 Runoff volume retention from on-lot infiltration (ft^3): 0 *$V_{retention}$ =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 A BMP Type N/A		
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 A BMP Type N/A		
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 A BMP Type N/A		
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: N/A *Sum of Items 5, 13, 20, 25 and 29*			

4.3.2 Infiltration BMPs

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

If site constraints limit the use of BMPs to a single type and implementation of retention and infiltration BMPs mitigate no more than 40% of the DCV, then they are considered infeasible and the Project Proponent may evaluate the effectiveness of BMPs lower in the LID hierarchy of use (Section 5.5.1 of the TGD for WQMP)

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

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

1 Remaining LID DCV not met by site design HSC BMP (ft^3): 23,550 *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30*			
BMP Type *Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs*	DA 1 BMP Type: Above Ground Basin	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
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*	5.08		
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*	3		
4 Design percolation rate (in/hr) *P_{design} = Item 2 / Item 3*	1.69		
5 Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1*	48		
6 Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details*	5		
7 Ponding Depth (ft) *d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6*	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*	5,050		
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*	0		
10 Amended soil porosity	0.4		
11 Gravel depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details*	N/A		
12 Gravel porosity	0.4		
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*	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))]*	34,995		
15 Underground Retention Volume (ft^3) *Volume determined using manufacturer's specifications and calculations*	N/A		
16 Total Retention Volume from LID Infiltration BMPs: 34,995 *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*			
17 Fraction of DCV achieved with infiltration BMP: 149% *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): N/A *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 1 DMA A BMP Type N/A		
2 Describe cistern or runoff detention facility			
3 Storage volume for proposed detention type (ft^3) *Volume of cistern*			
4 Landscaped area planned for use of harvested stormwater (ft^2)			
5 Average wet season daily irrigation demand (in/day) Use local values, typical ~ 0.1 in/day			
6 Daily water demand (ft^3/day) *Item 4 * (Item 5 / 12)*			
7 Drawdown time (hrs) *Copy Item 6 from Form 4.2-1*			
8Retention 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: N/A *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.*			

Harvest and Use is not utilized on the proposed project site.

4.3.4 Biotreatment BMP

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

Use Form 4.3-5 to summarize the potential for volume based and/or flow based biotreatment options to biotreat the remaining unmet LID DCV w. Biotreatment computations are included as follows:

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

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

1 Remaining LID DCV not met by site design HSC, infiltration, or harvest and use BMP for potential biotreatment (ft^3): 0 *Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16- Form 4.3-4 Item 9*	List pollutants of concern *Copy from Form 2.3-1.*	
2 Biotreatment BMP Selected *(Select biotreatment BMP(s) necessary to ensure all pollutants of concern are addressed through Unit Operations and Processes, described in Table 5-5 of the TGD for WQMP)*	Volume-based biotreatment *Use Forms 4.3-6 and 4.3-7 to compute treated volume*	Flow-based biotreatment *Use Form 4.3-8 to compute treated volume*
	☐ Bioretention with underdrain ☐ Planter box with underdrain ☐ Constructed wetlands ☐ Wet extended detention ☐ Dry extended detention	☐ Vegetated swale ☐ Vegetated filter strip ☐ Proprietary biotreatment
3 Volume biotreated in volume based biotreatment BMP (ft^3): *Form 4.3-6 Item 15 + Form 4.3-7 Item 13*	4 Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft^3): *Item 1 – Item 3*	5 Remaining fraction of LID DCV for sizing flow based biotreatment BMP: % *Item 4 / Item 1*
6 Flow-based biotreatment BMP capacity provided (cfs): *Use Figure 5-2 of the TGD for WQMP to determine flow capacity required to provide biotreatment of remaining percentage of unmet LID DCV (Item 5), for the project's precipitation zone (Form 3-1 Item 1)*		
7 Metrics for MEP determination: • Provided a WQMP with the portion of site area used for suite of LID BMP equal to minimum thresholds in Table 5-7 of the TGD for WQMP for the proposed category of development: ☐ *If maximized on-site retention BMPs is feasible for partial capture, then LID BMP implementation must be optimized to retain and infiltrate the maximum portion of the DCV possible within the prescribed minimum effective area. The remaining portion of the DCV shall then be mitigated using biotreatment BMP.*		

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

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

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

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

4.3.5 Conformance Summary

Complete Form 4.3-9 to demonstrate how on-site LID DCV is met with proposed site design hydrologic source control, infiltration, harvest and use, and/or biotreatment BMP. The bottom line of the form is used to describe the basis for infeasibility determination for on-site LID BMP to achieve full LID DCV, and provides methods for computing remaining volume to be addressed in an alternative compliance plan. If the project has more than one outlet, then complete additional versions of this form for each outlet.

Form 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate (DA 1)

1 Total LID DCV for the Project DA-1 (ft^3): 26,867 *Copy Item 7 in Form 4.2-1*

2 On-site retention with site design hydrologic source control LID BMP (ft^3): 0 *Copy Item 30 in Form 4.3-2*

3 On-site retention with LID infiltration BMP (ft^3): 34,995 *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): 0 *(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): 34,995 *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): 0 *Item 1 – Item 2*	4 Volume capture provided by incorporating additional on-site or off-site retention BMPs (ft^3): 0 *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
Catch Basin	City of Redlands	Inspect for illegal dumping and /or debris accumulation. Clean filters whenever 25% of filter capacity is exceeded by debris accumulation	At least 2 times a year and before and after any Storm Event.
Landscape Maintenance	Lot Owner	Landscapes shall be maintained to ensure water efficiency and healthy appearance. A regular maintenance schedule shall include, but not be limited to, checking, adjusting, and repairing the irrigation equipment; resetting the automatic controller; aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning, weeding, removing litter and replacement of plants as required. Verify fertilizer and pesticide usage requirements consistent with the instructions contained on product labels and with the regulations administered by the State Department of Pesticide Regulation Comply with product labels as new products are purchased and update new regulations by the State Department of Pesticide Regulation (http://www.cdpr.ca.gov/)	Weekly
Roof Runoff Controls	Lot Owner	Roof Inlets and Outlets - Inspect and clean as necessary all roof inlets, outlets and drains (CASQA New Development BMP Handbook SD-11	Yearly
Education of Property Owners, Tenants and Occupants	HOA	Self-regulated compliance. The project owner is responsible for the initial distribution of the WQMP and educational materials to the individual lot owners at the close of escrow on each lot. Individual lot owners are responsible for staying informed regarding current storm water quality requirements by downloading the latest educational material published	Yearly

		by the County of San Bernardino and available on the County's website at: http://www.sbcountystormwater.org/ agency.	
Signage and Stencil	City of Redlands	Clean the stencil/signage surface to remove any excess dirt and Re-paint if necessary.	Annually
Irrigation System	Lot Owner	Check and repair the irrigation system. Verify there are no leaks or runoff from landscape areas. Adjust irrigation heads and system run times as necessary to prevent overwatering of vegetation, overspray or run-off from landscape areas and to ensure the health and aesthetic quality of the landscape	Monthly
Water Quality Basin (Detention/ Infiltration Basin)	HOA	Monthly inspections should occur for debris and litter removal and signs of ponding issues such as odors, insects, and overgrowth. Prior to October 1, conduct annual inspections and maintenance for erosion, clogging of outlets, standing water issues, and adequacy of infiltration. Visually inspect infiltration basin on a monthly basis because of their importance for water quality management and post-construction storm water pollution prevention. One of these inspections should be before October 1 and one should be after May 1. Remove litter, debris, and dead vegetation. Revegetate as needed. Check for signs of ponding issues such as odors, clogging of outlets, standing water, erosion, and adequacy of infiltration. Remove accumulated sediment and re-grade when the accumulated sediment volume is greater than 10% of the basin volume.	Inspect twice annually, once before and after the rainy season and after extreme storm events. Maintenance as needed.
Trash Enclosures	Property Owner	Empty trash receptacles. Clean the areas around enclosures by sweeping and /or mopping to provent discharges of cleanup water.	Weekly

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.

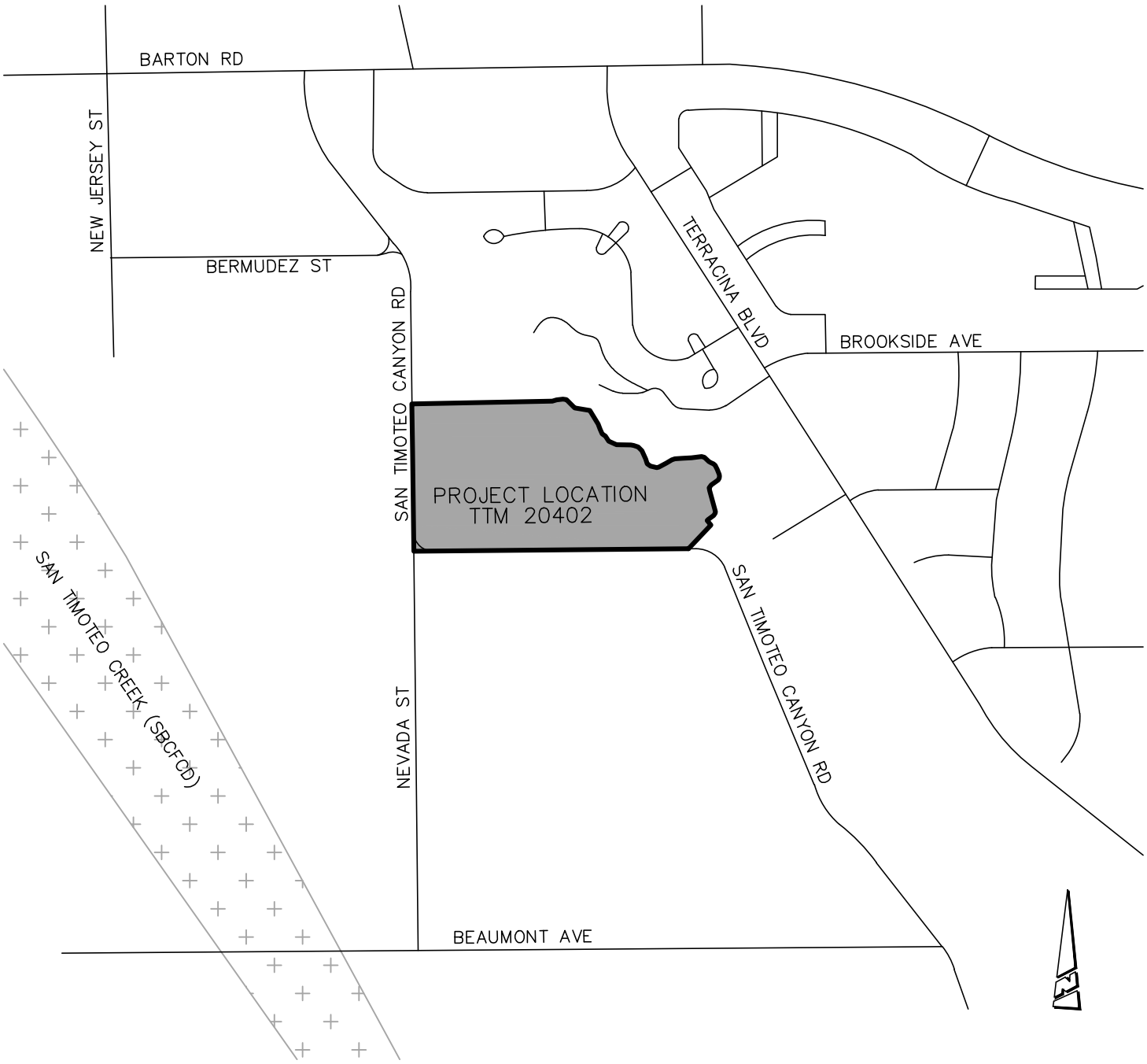
6.4 Other Supporting Documentation

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

6.1. Site Plan and Drainage Plan

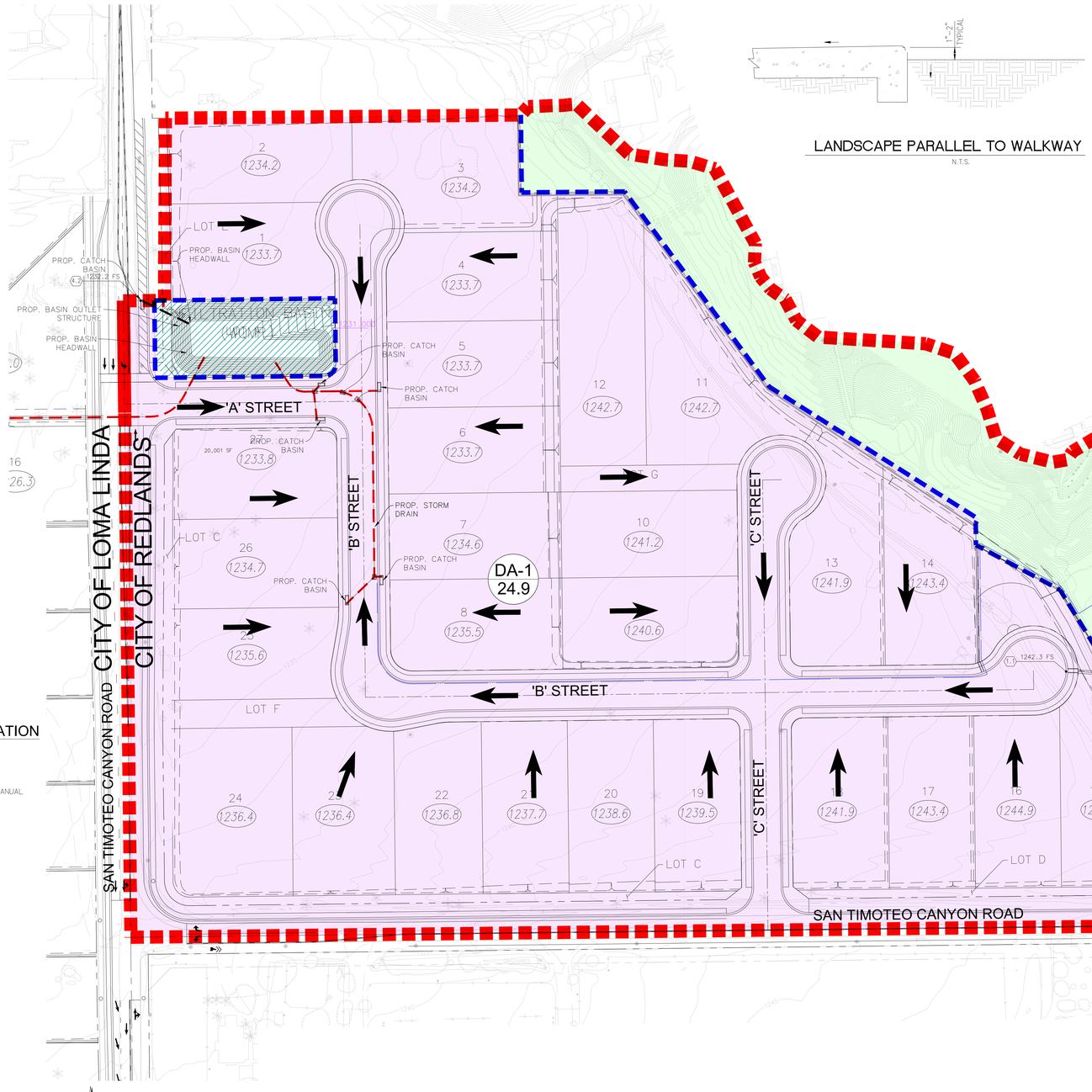
Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



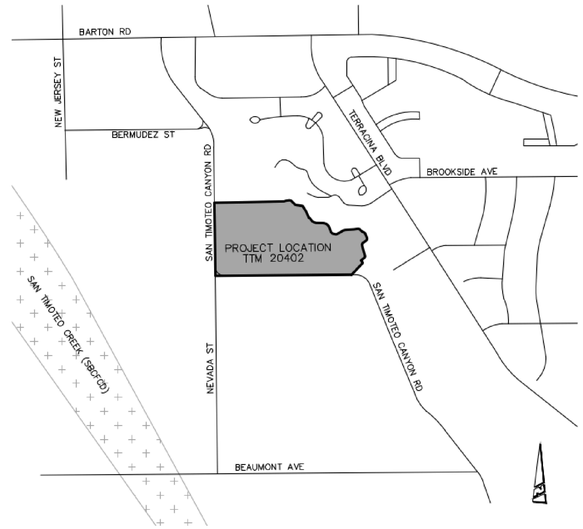
VICINITY MAP

N.T.S.



LANDSCAPE PARALLEL TO WALKWAY

N.T.S.



VICINITY MAP

NTS

HYDROLOGY INFORMATION

SITE AREA: 24.9 AC
SOIL GROUP: A/B
IMPERVIOUS: 24%
ISOHYETALS: 0.465
FREQUENCY: 2 YEAR
METHOD: SAN BERNARDINO HYDROLOGY MANUAL

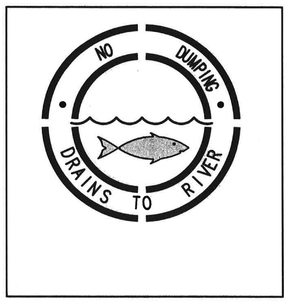
DA 1		
TOTAL =	1,085,080	
AREA ID	AREA (SF)	PERVIOUS AREA (SF)
DMA A - UNDEVELOPED LAND	212021	212,021
DMA B - INFILTRATION BASIN AREA	18,718	18,718
DMA C - RESIDENTIAL SF - 2 DWELLINGS/ACRE	854,341	598,039
	TOTAL	828,778
	IMPERVIOUS AREA =	256,302
	% IMP	24%

PERVIOUSNESS DATA	
AREA ID	% PERVIOUS
UNDEVELOPED LAND	100
INFILTRATION BASIN AREA	100
RESIDENTIAL SF - 2 DWELLINGS/ACRE *	70

NOTES:
*OBTAIN FROM SAN BERNARDINO HYDROLOGY MANUAL

LEGEND

- A-1 / 0.89 — SUBAREA NO. / SUBAREA AREA - ACRE
- AREA TRIBUTARY BOUNDARY
- SUBAREA BOUNDARY
- TRACT BOUNDARY
- STORM DRAIN
- FLOW PATH
- DMA C - 2 DWELLING UNITS/ACRE
- DMA B - INFILTRATION BASIN (WQ)
- DMA A -PERVIOUS AREA UNDEVELOPED LAND
- DRAINAGE PATTERN



The stencil, no bigger than 8", shall be blue on a white background with lettering 2 1/2" in height. In lieu of a stencil, a catch basin curb marker, circular or rectangular, at least 4" in height or diameter, may be used.

60 30 0 60 120 180

SCALE: 1"=60'

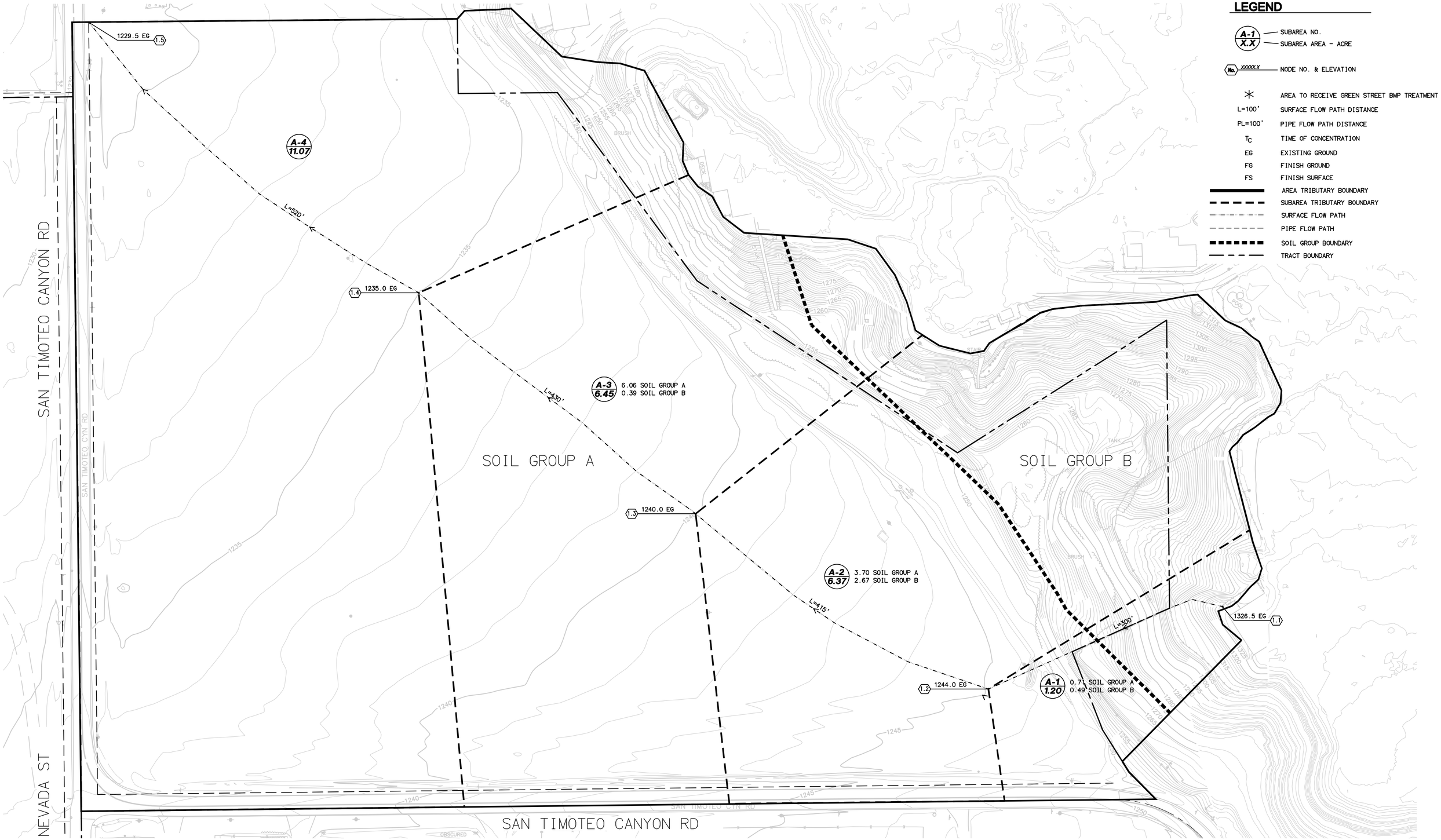
CANYON RANCH
WATER QUAILITY EXHIBIT

PROACTIVE ENGINEERING CONSULTANTS

1/18/2023

Plotted: Jan 18, 2023 - 7:13pm By: PEC-LT-21-01

Drawing Name: Z:\10.068_Canyon Ranch\Hydro\WQMP\Redlands\Exhibit\City of Redlands WQMP.dwg



Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 or 1-800-422-4133

50 0 50 100 150

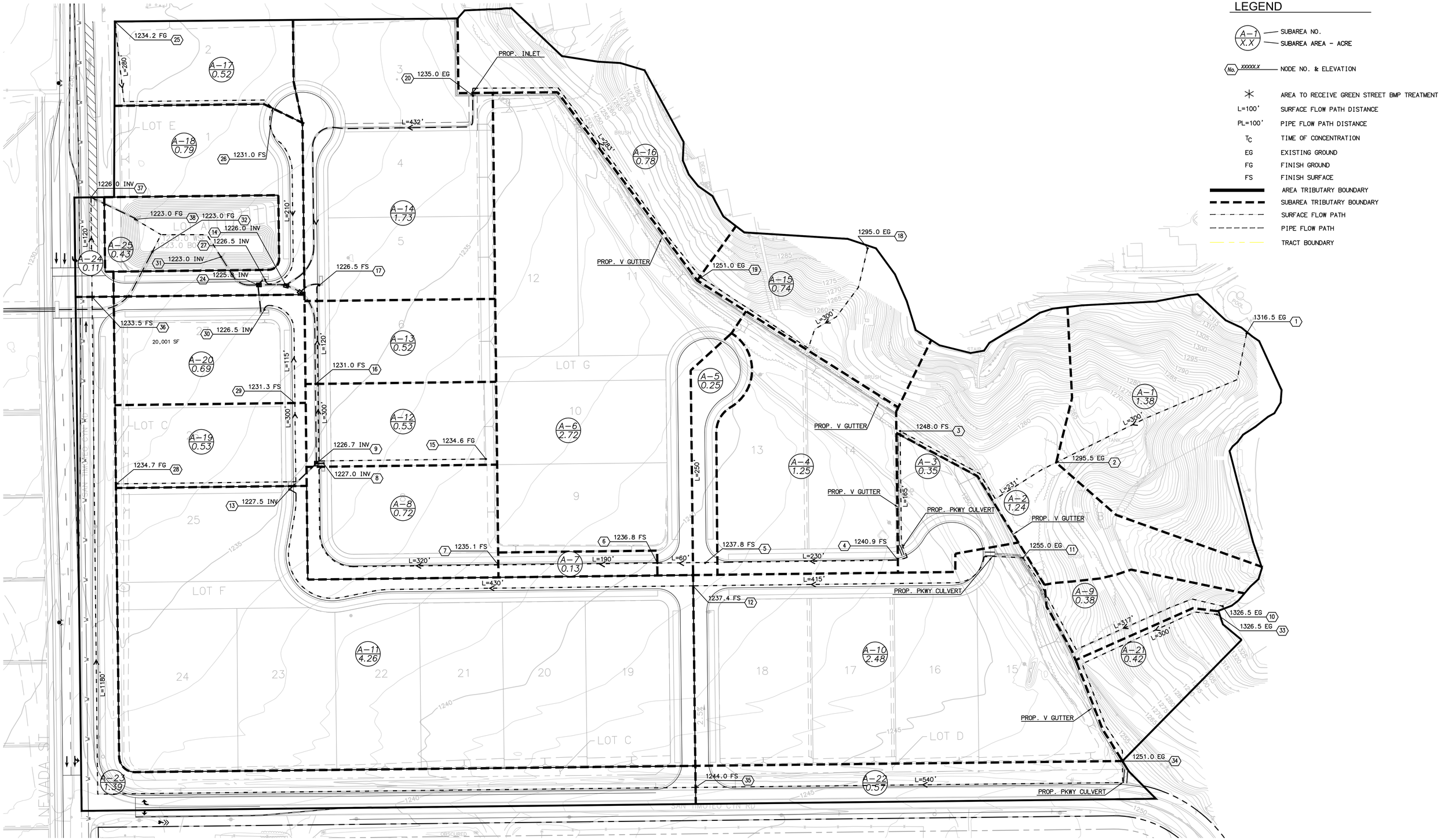
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DRAWN:	CE
CHECKED:	SG
APPROVED:	

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS
WWW.PROACTIVEENGINEERING.NET
200 South Main Street, Corona, CA 92882 Suite 300
951•280•3300

CITY OF REDLANDS

TTM 20402
EXISTING HYDROLOGY MAP

SHEET NO.
1 OF 1



Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
OR
1-800-422-4133

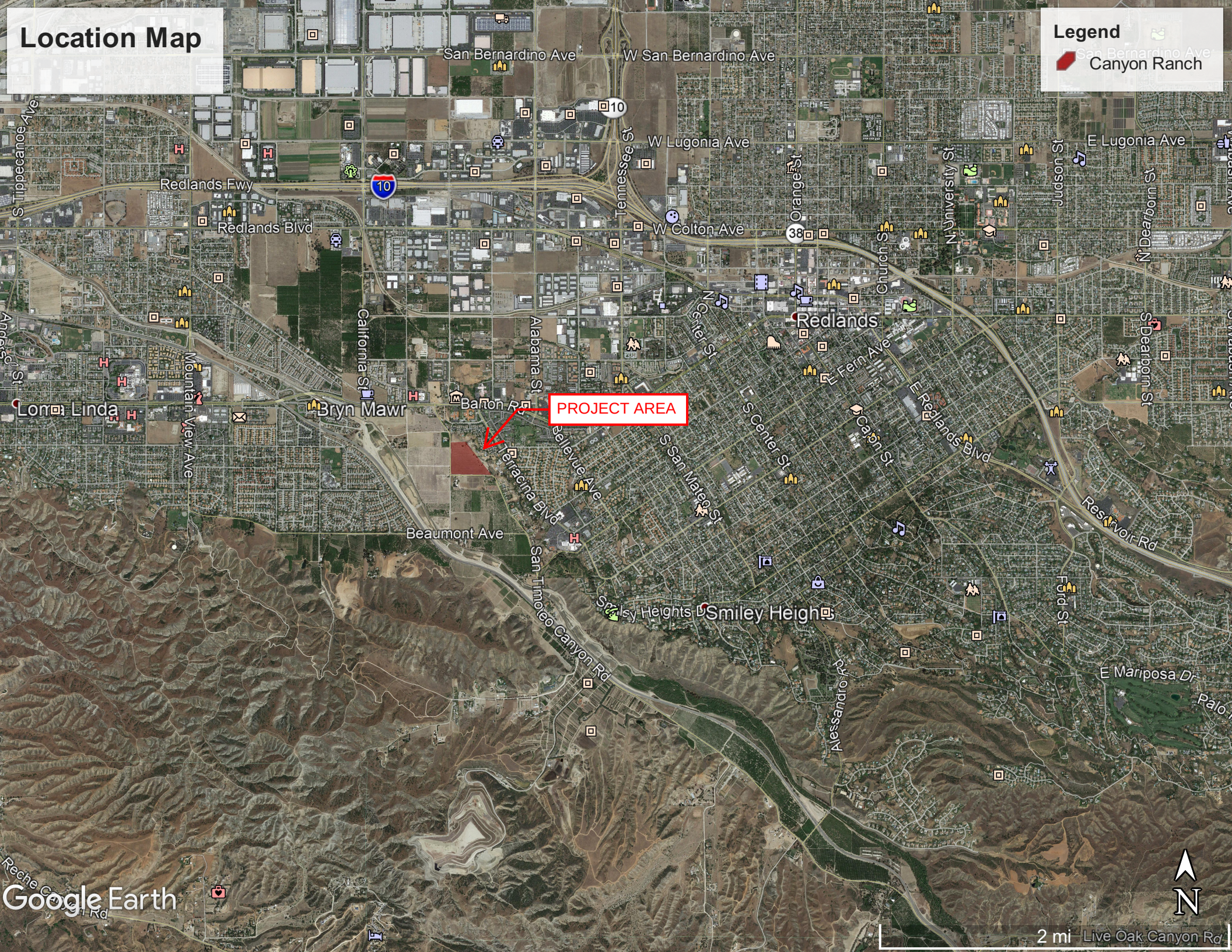
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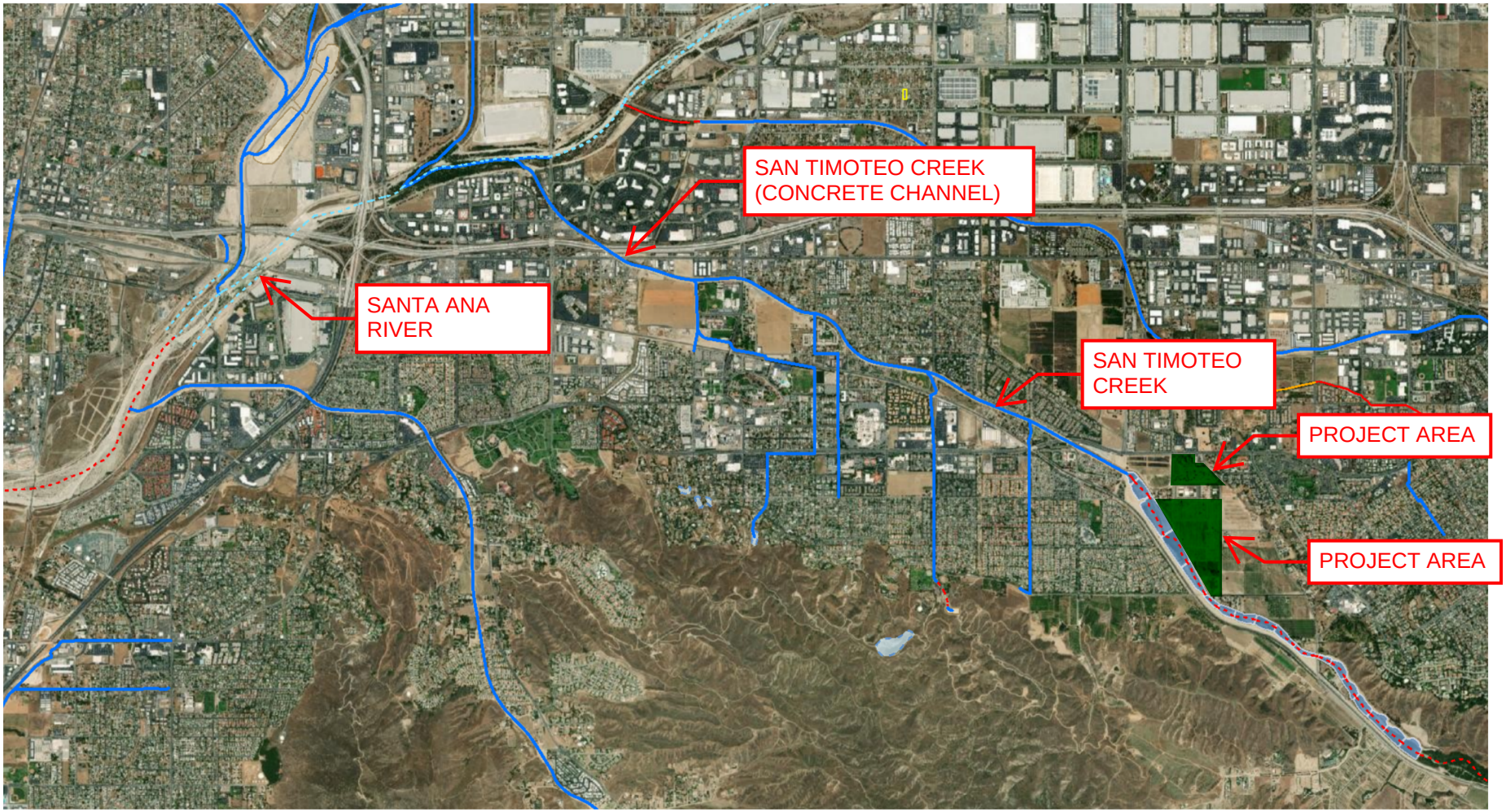
PREPARED BY:
PROACTIVE
ENGINEERING CONSULTANTS
WWW.PROACTIVEENGINEERING.NET
200 South Main Street, Corona, CA 92882 Suite 300
951•280•3300

CITY OF REDLANDS

TTM 20402
PROPOSED HYDROLOGY MAP

SHEET NO.
1 OF 1


Location Map
Legend
Canyon Ranch
PROJECT AREA
San Bernardino Ave
W San Bernardino Ave
W Lugonia Ave
E Lugonia Ave
Redlands Fwy
Redlands Blvd
W Colton Ave
Tennessee St
Orange St
University St
Judson St
N Dearborn St
S Dearborn St
Church St
N Center St
S Center St
Redlands
E Fern Ave
E Redlands Blvd
Canyon St
California St
Alabama St
Mountain View Ave
Loma Linda
Bryn Mawr
Barton Rd
Bellevue Ave
Pepper Ave
Beaumont Ave
San Timoteo Canyon Rd
S San Mateo St
Reservoir Rd
Ford St
Smiley Heights Dr
Smiley Heights
E Mariposa Dr
Alessandro Rd
Live Oak Canyon Rd
Google Earth
2 mi
N



1 Miles

RBF CONSULTING GIS

Site Address: permitrack.sbcounty.gov/wap

County of San Bernardino
Stormwater Facility Mapping

Receiving Waters M

6.2. Electronic Data Submittal

6.3. Post Construction

RECORDING REQUESTED BY:
County of San Bernardino
Department of Public Works

AND WHEN RECORDED MAIL TO:
County of San Bernardino
Department of Public Works
825 E. Third Street, Room 117
San Bernardino, CA 92415-0835

SPACE ABOVE THIS LINE FOR RECORDER'S USE

COVENANT AND AGREEMENT REGARDING WATER QUALITY MANAGEMENT PLAN AND STORMWATER BEST MANAGEMENT PRACTICES TRANSFER, ACCESS AND MAINTENANCE

TO BE COMPLETED DURING FINAL ENGINEERING

THIS PAGE ADDED TO PROVIDE ADEQUATE SPACE FOR RECORDING INFORMATION

Covenant and Agreement Regarding Water Quality Management Plan and Stormwater Best Management Practices
Transfer, Access and Maintenance

OWNER NAME: **Steve Vliss**

PROPERTY ADDRESS: **530 Technology, Suite 100**

Irvine, CA 92618

APN: **0293-141-38**
0293-132-01

THIS AGREEMENT is made and entered into in

Redlands ,California, this _____ day of

_____ , by and between

Highpointe Canyon Ranch LLC , hereinafter

referred to as Owner, and the COUNTY OF SAN BERNARDINO, a political subdivision of the State of California, hereinafter referred to as "the County";

WHEREAS, the Owner owns real property ("Property") in the County of San Bernardino, State of California, more specifically described in Exhibit "A" and depicted in Exhibit "B", each of which exhibits is attached hereto and incorporated herein by this reference; and

WHEREAS, at the time of initial approval of development project known as

Canyon Ranch within the Property described herein, the County required the project to employ Best Management Practices, hereinafter referred to as "BMPs," to minimize pollutants in urban runoff; and

WHEREAS, the Owner has chosen to install and/or implement BMPs as described in the Water Quality Management Plan, dated _____, on file with the County and incorporated herein by this reference, hereinafter referred to as "WQMP", to minimize pollutants in urban runoff and to minimize other adverse impacts of urban runoff; and

WHEREAS, said WQMP has been certified by the Owner and reviewed and approved by the County; and

WHEREAS, the Owner is aware that periodic and continuous maintenance, including, but not necessarily limited to, filter material replacement and sediment removal, is required to assure peak performance of all BMPs in the WQMP and that, furthermore, such maintenance activity will require compliance with all Local, State, or Federal laws and regulations, including those pertaining to confined space and waste disposal methods, in effect at the time such maintenance occurs.

NOW THEREFORE, it is mutually stipulated and agreed as follows:

1. Owner shall comply with the WQMP.

2. All maintenance or replacement of BMPs proposed as part of the WQMP are the sole responsibility of the Owner in accordance with the terms of this Agreement.

3. Owner hereby provides the County's designee complete access, of any duration, to the BMPs and their immediate vicinity at any time, upon reasonable notice, or in the event of emergency, as determined by the County Director of Public Works, no advance notice, for the purpose of inspection, sampling, testing of the BMPs, and in case of emergency, to undertake all necessary repairs or other preventative measures at owner's expense as provided in paragraph 5 below. The County shall make every effort at all times to minimize or avoid interference with Owner's use of the Property. Denial of access to any premises or facility that contains WQMP features is a breach of this Agreement and may also be a violation of the County's Pollutant Discharge Elimination System regulations, which on the effective date of this Agreement are found in County Code Sections 35.0101 et seq. If there is reasonable cause to believe that an illicit discharge or breach of this Agreement is occurring on the premises then the authorized enforcement agency may seek issuance of a search warrant from any court of competent jurisdiction in addition to other enforcement actions. Owner recognizes that the County may perform routine and regular inspections, as well as emergency inspections, of the BMPs. Owner or Owner's successors or assigns shall pay County for all costs incurred by County in the inspection, sampling, testing of the BMPs within thirty (30) calendar days of County invoice.

4. Owner shall use its best efforts diligently to maintain all BMPs in a manner assuring peak performance at all times. All reasonable precautions shall be exercised by Owner and Owner's representative or contractor in the removal and extraction of any material(s) from the BMPs and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. As may be requested from time to time by the County, the Owner shall provide the County with documentation identifying the material(s) removed, the quantity, and disposal destination), testing construction or reconstruction.

5. In the event Owner, or its successors or assigns, fails to accomplish the necessary maintenance contemplated by this Agreement, within five (5) business days of being given written notice by the County , the County is hereby authorized to cause any maintenance necessary to be done and charge the entire cost and expense against the Property and/or to the Owner or Owner's successors or assigns, including administrative costs, attorneys fees and interest thereon at the maximum rate authorized by the County Code from the date of the notice of expense until paid in full. Owner or Owner's successors or assigns shall pay County within thirty (30) calendar days of County invoice.

6. The County may require the owner to post security in form and for a time period satisfactory to the County to guarantee the performance of the obligations stated herein. Should the Owner fail to perform the obligations under the Agreement, the County may, in the case of a cash bond, act for the Owner using the proceeds from it, or in the case of a surety bond, require the surety(ies) to perform the obligations of this Agreement.

7. The County agrees, from time to time, within ten (10) business days after request of Owner, to execute and deliver to Owner, or Owner's designee, an estoppel certificate requested by Owner, stating that this Agreement is in full force and effect, and that Owner is not in default hereunder with regard to any maintenance or payment obligations (or specifying in detail the nature of Owner's default). Owner shall pay all costs and expenses incurred by the County in its investigation of whether to issue an estoppel certificate within thirty (30) calendar days after receipt of a County invoice and prior to the County's issuance of such certificate. Where the County cannot issue an estoppel certificate, Owner shall pay the County within thirty (30) calendar days of receipt of a County invoice.

8. Owner shall not change any BMPs identified in the WQMP without an amendment to this Agreement approved by authorized representatives of both the County and the Owner.

9. County and Owner shall comply with all applicable laws, ordinances, rules, regulations, court orders and government agency orders now or hereinafter in effect in carrying out the terms of this Agreement. If a provision of this Agreement is terminated or held to be invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions shall remain in full effect.

10. In addition to any remedy available to County under this Agreement, if Owner violates any term of this Agreement and does not cure the violation within the time already provided in this Agreement, or, if not provided, within thirty (30) calendar days, or within such time authorized by the County if said cure reasonably requires more than the subject time, the County may bring an action at law or in equity in a court of competent jurisdiction to enforce compliance by the Owner with the terms of this Agreement. In such action, the County may recover any damages to which the County may be entitled for the violation, enjoin the violation by temporary or permanent injunction without the necessity of proving actual damages or the inadequacy of otherwise available legal remedies, or obtain other equitable relief, including, but not limited to, the restoration of the Property and/or the BMPs identified in the WQMP to the condition in which it/they existed prior to any such violation or injury.

11. This Agreement shall be recorded in the Office of the Recorder of San Bernardino County, California, at the expense of the Owner and shall constitute notice to all successors and assigns of the title to said Property of the obligation herein set forth, and also a lien in such amount as will fully reimburse the County, including interest as herein above set forth, subject to foreclosure in event of default in payment.

12. In event of legal action occasioned by any default or action of the Owner, or its successors or assigns, then the Owner and its successors or assigns agree(s) to hold the County harmless and pay all costs incurred by the County in enforcing the terms of this Agreement, including reasonable attorney's fees and costs, and that the same shall become a part of the lien against said Property.

13. It is the intent of the parties hereto that burdens and benefits herein undertaken shall constitute covenants that run with said Property and constitute a lien there against.

14. The obligations herein undertaken shall be binding upon the heirs, successors, executors, administrators and assigns of the parties hereto. The term "Owner" shall include not only the present Owner, but also its heirs, successors, executors, administrators, and assigns. Owner shall notify any successor to title of all or part of the Property about the existence of this Agreement. Owner shall provide such notice prior to such successor obtaining an

interest in all or part of the Property. Owner shall provide a copy of such notice to the County at the same time such notice is provided to the successor.

15. Time is of the essence in the performance of this Agreement.

16. Any notice to a party required or called for in this Agreement shall be served in person, or by deposit in the U.S. Mail, first class postage prepaid, to the address set forth below. Notice(s) shall be deemed effective upon receipt, or seventy-two (72) hours after deposit in the U.S. Mail, whichever is earlier. A party may change a notice address only by providing written notice thereof to the other party.

17. Owner agrees to indemnify, defend (with counsel reasonably approved by the County) and hold harmless the County and its authorized officers, employees, agents and volunteers from any and all claims, actions, losses, damages, and/or liability arising out of this Agreement from any cause whatsoever, including the acts, errors or omissions of any person and for any costs or expenses incurred by the County on account of any claim except where such indemnification is prohibited by law. This indemnification provision shall apply regardless of the existence or degree of fault of indemnitees. The Owner's indemnification obligation applies to the County's "active" as well as "passive" negligence but does not apply to the County's "sole negligence" or "willful misconduct" within the meaning of Civil Code Section 2782, or to any claims, actions, losses, damages, and/or liabilities, to the extent caused by the acts or omissions of any third party contractors undertaking any work (other than field inspections) or other maintenance on the Property on behalf of the County under this Agreement..

[REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]

IF TO COUNTY :	**IF TO OWNER:**
Director of Public Works 825 E. Third Street, Room 117 San Bernardino, CA 92415-0835	Steve Vliss 530 Technology, Suite 100 Irvine, CA

IN WITNESS THEREOF, the parties hereto have affixed their signatures as of the date first written above.

OWNER:	Steve Vliss	
Company/Trust:	Highpoint Canyon Ranch LLC	**FOR:** Maintenance Agreement, dated
Signature:		, for the
Name:		project known as
Title:		Canyon Ranch
Date:		
		(APN) 0293-141-38 0293-132-01
OWNER:		
Company/Trust:		
Signature:		
Name:		As described in the WQMP dated
Title:		
Date:		

NOTARIES ON FOLLOWING PAGE

A notary acknowledgement is required for recordation.

ACCEPTED BY:

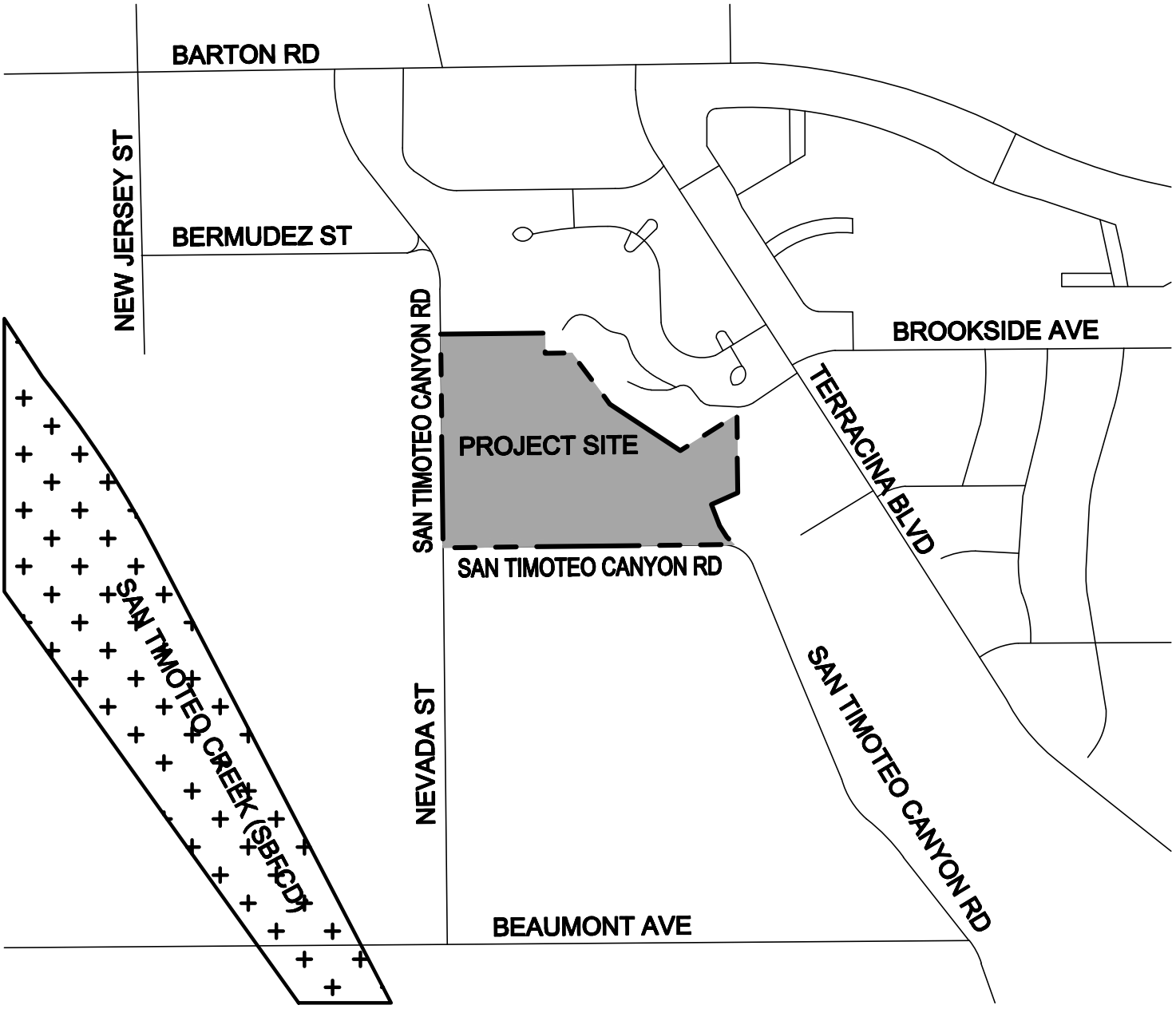
BRENDON BIGGS, M.S., P.E., Director of Public Works

Date: _____

Attachment: Notary Acknowledgement

ATTACHMENT 1
Notary Acknowledgement)

EXHIBIT A
(Legal Description)



CANYON RANCH
VICINITY MAP

PROACTIVE
ENGINEERING CONSULTANTS

01/04/2021

H:\PDATA\13642B\CADD\LAND\DLV\HYDRO\HYDROLOGY-EXISTING.DWG TMENG 1/22/16 1:11 pm

O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

TO BE COMPLETED DURING FINAL ENGINEERING

6.4. Other Supporting Documentation

Construction Plans

Grading and Drainage Plans

SOILS ENGINEER

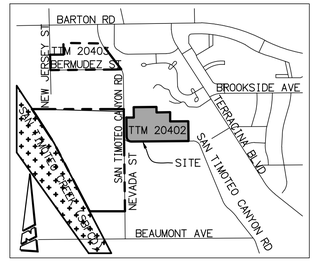
LEIGHTON GEOTECHNICAL
17781 COWAN
IRVINE, CA 92614
PHONE: (949) 681-4265
PROPOSAL/REPORT #1-0260

DEVELOPER

HIGHPOINTE COMMUNITIES
530 TECHNOLOGY, SUITE #100
IRVINE, CA 92618
PHONE: (949) 472-0800

OWNER

CANYON RANCH DEVELOPMENT
25522 ALLEN WAY
LOMA LINDA, CA 92354



VICINITY MAP
N.T.S.

EXISTING

CURRENT USE:	AGRICULTURAL
CURRENT USE:	RESIDENTAL
APN #:	029-313-201 & 029-314-137
ZONING DESIGNATION:	AGRICULTURAL
GENERAL PLAN 2035 DESIGNATION:	VERY LOW DENSITY RESIDENTIAL (VLDR)

PROPOSED

NUMBER OF LOTS	27
SITE ACREAGE:	21.4 AC
PROPOSED DENSITY:	1.3 DU/AC
RESIDENTIAL & STREET ACREAGE:	19.5 AC (90.6%)
DETENTION BASIN ACREAGE (LOT A):	0.4 AC (1.9%)
OPEN SPACE,PARK, DRAINAGE ACREAGE (LOT B):	1.6 AC (7.5%)
LOT SIZES:	20,000 MIN
LOT DIMENSIONS:	100 FT X 200 FT MIN
ZONING:	RA

PROPOSED EASEMENTS

1	PROPOSED ENTRY MONUMENT EASEMENT
2	PROPOSED 10'EASEMENT FOR STORM DRAIN LINE

LEGEND & ABBREVIATIONS

- TRACT BOUNDARY
- PR RIGHT-OF-WAY
- PR LOT LINE
- BLOCK WALL
- PR DOMESTIC WATER
- EXISTING EASEMENT
- CITY BOUNDARY
- INTERIM STREET STRIPING
- PROPOSED AC PAVING
- EXISTING AC PAVING
- EX. POWER POLE (APPROXIMATE LOCATION)
- XXX.X — PROPOSED PAD ELEVATION

FL	FLOW LINE
TC	TOP OF CURB
FS	FINISHED SURFACE
FG	FINISHED GRADE
GB	GRADE BREAK
HP	HIGH POINT
LP	LOW POINT
EP	EDGE OF PAVEMENT
EG	EXISTING GROUND
TL	TRAVEL LANE
PL	PROPERTY LINE
R/W	RIGHT-OF-WAY
PIP	PROTECT IN PLACE
EX	EXISTING
PR	PROPOSED
APN	ASSESSOR'S PARCEL NUMBER
DW	DOMESTIC WATER
SS	SANITARY SEWER
SD	STORM DRAIN
PR	PROPOSED
AC	ASPHALT CONCRETE
LNDSP	LANDSCAPING
ESMT	EASEMENT
PP	POWERPOLE
FUT	FUTURE

PUBLIC UTILITY COMPANIES

SEWER:
CITY OF REDLANDS
P.O. BOX 6905
REDLANDS, CA 92375-0903
(909) 798-7516

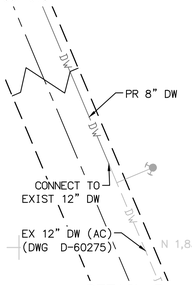
WATER:
CITY OF REDLANDS
P.O. BOX 6905
REDLANDS, CA 92375-0903
(909) 798-7516

ELECTRIC:
SOUTHERN CALIFORNIA EDISON
287 TENNESSEE STREET
REDLANDS, CA 92373
(909) 307-6731

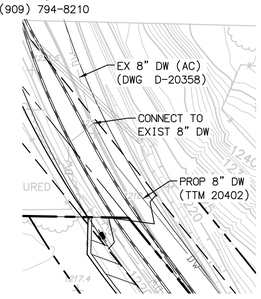
GAS:
SOUTHERN CALIFORNIA GAS
1981 W. LUGONIA AVENUE
REDLANDS, CA 92374-9720
(800) 427-2200

CABLE:
TIME WARNER CABLE
1722 ORANGE TREE LANE
REDLANDS, CA 92373
(909) 793-2321

TELEPHONE:
VERIZON INC.
1500 CRAFTON AVENUE
MENTONE, CA 92359
(909) 794-8210



DETAIL B
1"=40'



DETAIL C
1"=40'

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 or 1-800-422-4133

PROACTIVE ENGINEERING CONSULTANTS
200 South Main Street, Suite 300
Corona, CA 92882 (951) 280-3300

REGISTERED PROFESSIONAL ENGINEER SCOTT P. GILBERT NO. 65194 CIVIL STATE OF CALIFORNIA

PLANS PREPARED UNDER THE SUPERVISION OF:

SCOTT P. GILBERT R.C.E. #65194 — DATE

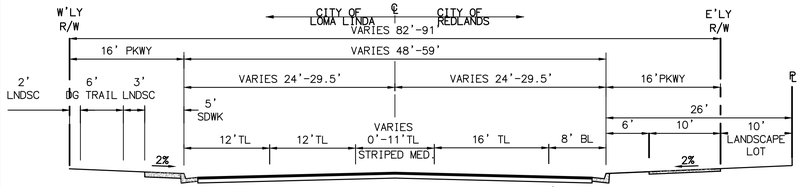
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DRAWN:	CE
CHECKED:	SG
APPROVED:	

CITY OF REDLANDS
TENTATIVE TRACT MAP # 20402

SHEET NO.
1 OF 2

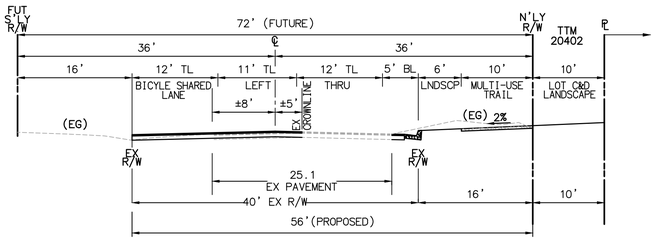
PROJECT NO.

REVISION DATE: JANUARY 11,2023



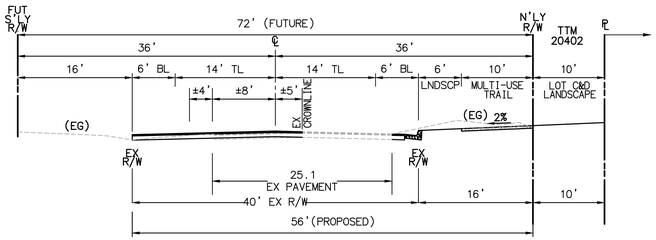
RURAL ARTERIAL- SAN TIMOTEO CANYON ROAD NORTH/SOUTH

NORTH OF NEVADA STREET
STREET SECTION PER CITY OF REDLANDS STD. DWG. NO.701-0 (EAST OF CENTERLINE)
STREET SECTION PER CITY OF LOMA LINDA STD. DWG. NO. R-1 (WEST OF CENTERLINE)
N.T.S.



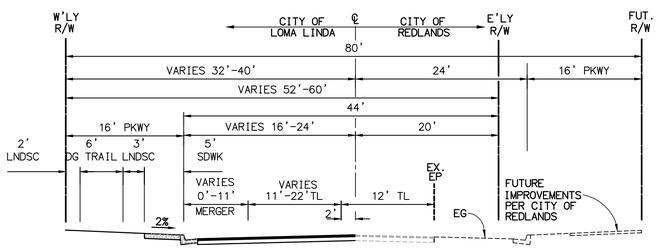
RURAL ARTERIAL- SAN TIMOTEO CANYON ROAD EAST/WEST

APPROXIMATELY ALONG LOTS 23 - 24
N.T.S.



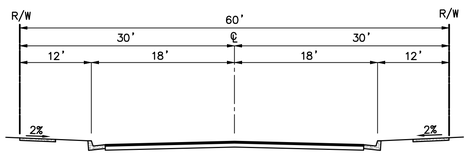
RURAL ARTERIAL- SAN TIMOTEO CANYON ROAD EAST/WEST

APPROXIMATELY ALONG LOTS 15-22
N.T.S.



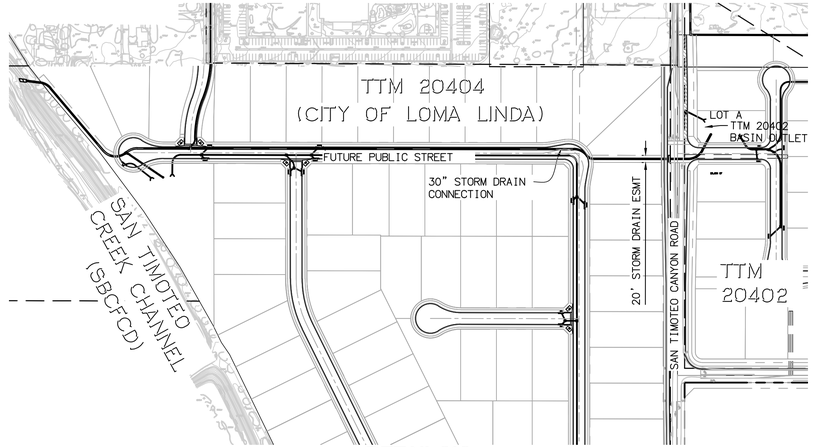
RURAL ARTERIAL - NEVADA STREET

MODIFIED LOMA LINDA STANDARD (R-1)
N.T.S.



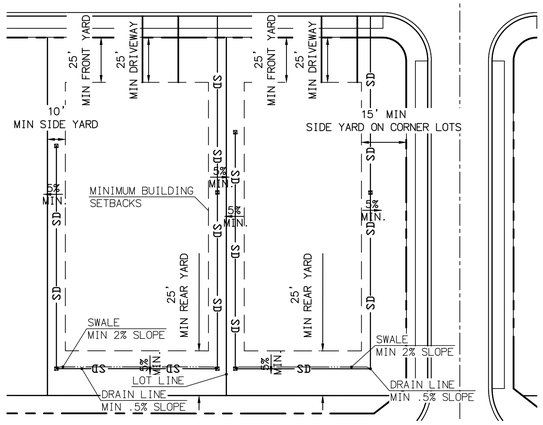
LOCAL STREET (STANDARD) - A, B & C STREET

N.T.S.



DETAIL "A"

1"=200'

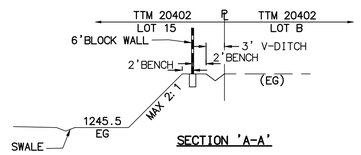


TYPICAL LOT DRAINAGE DETAIL

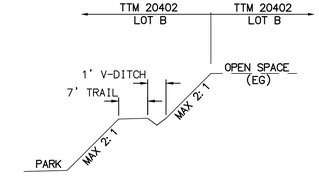
NOT TO SCALE

COMMON AREA LOT TABLE			
#	PURPOSE	AREA	MAINTENANCE
A	WATER QUALITY BASIN	17,026 SF	HOA
B	OPEN SPACE,PARK, DRAINAGE	67,823 SF	HOA
C	LANDSCAPING	11,942 SF	HOA
D	LANDSCAPING	3,050 SF	HOA
E	LANDSCAPING	7,401 SF	HOA

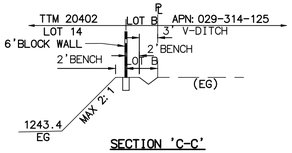
EXISTING EASEMENTS			
#	DESCRIPTION	BENEFICIARY	DISPOSITION
⑤	AN EASEMENT FOR PIPE LINE AND INCIDENTAL PURPOSES, RECORDED MARCH 27, 1888 IN BOOK 73 OF DEEDS, PAGE 120.	WEST REDLANDS WATER COMPANY	TO BE QUITCLAIMED
⑥	AN EASEMENT FOR PIPE LINE AND INCIDENTAL PURPOSES, RECORDED NOVEMBER 20, 1889 IN BOOK 106 OF DEEDS, PAGE 116.	H.H. DANIELS	TO BE QUITCLAIMED
⑦	AN EASEMENT FOR PIPE LINE AND INCIDENTAL PURPOSES, RECORDED JUNE 12, 1890 IN BOOK 115 OF DEEDS, PAGE 158.	H.H. DANIELS	TO BE QUITCLAIMED
⑨	AN EASEMENT FOR POLE LINES AND INCIDENTAL PURPOSES, RECORDED DECEMBER 17, 1910 IN BOOK 470 OF DEEDS, PAGE 3.	PACIFIC TELEPHONE AND TELEGRAPH COMPANY	TO BE QUITCLAIMED
⑩	AN EASEMENT FOR POLE LINES AND INCIDENTAL PURPOSES, RECORDED APRIL 2, 1912 IN BOOK 504 OF DEEDS, PAGE 235.	SOUTHERN CALIFORNIA EDISON CO.	TO BE QUITCLAIMED
⑪	AN EASEMENT FOR POLE LINES AND INCIDENTAL PURPOSES, RECORDED MAY 10, 1912 IN BOOK 505 OF DEEDS, PAGE 96.	SOUTHERN CALIFORNIA EDISON CO.	TO BE QUITCLAIMED
⑫	AN EASEMENT FOR POLES, CONDUITS AND INCIDENTAL PURPOSES, RECORDED JULY 25, 1955 AS BOOK 3698, PAGE 72 OF OFFICIAL RECORDS	SOUTHERN CALIFORNIA EDISON CO.	TO BE QUITCLAIMED
⑬	AN EASEMENT FOR POLE LINES AND INCIDENTAL PURPOSES, RECORDED NOVEMBER 28, 1960 AS BOOK 5292, PAGE 98 OF OFFICIAL RECORDS	SOUTHERN CALIFORNIA EDISON CO.	TO BE QUITCLAIMED



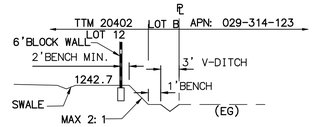
SECTION 'A-A'



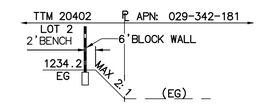
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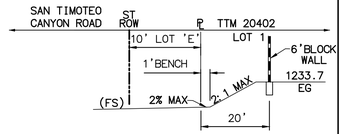
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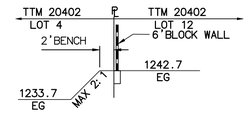
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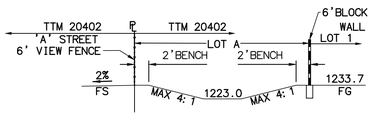
SECTION 'E-E'



SECTION 'F-F'



SECTION 'G-G'



SECTION 'H-H'

REVISION DATE: JANUARY 11,2023

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 or 1-800-422-4133

PROACTIVE ENGINEERING CONSULTANTS
200 South Main Street, Suite 300
Corona, CA 92882 (951) 280-3300

REGISTERED PROFESSIONAL ENGINEER SCOTT P. GILBERT NO. 65194 CIVIL STATE OF CALIFORNIA

PLANS PREPARED UNDER THE SUPERVISION OF:

SCOTT P. GILBERT
R.C.E. #65194
DATE

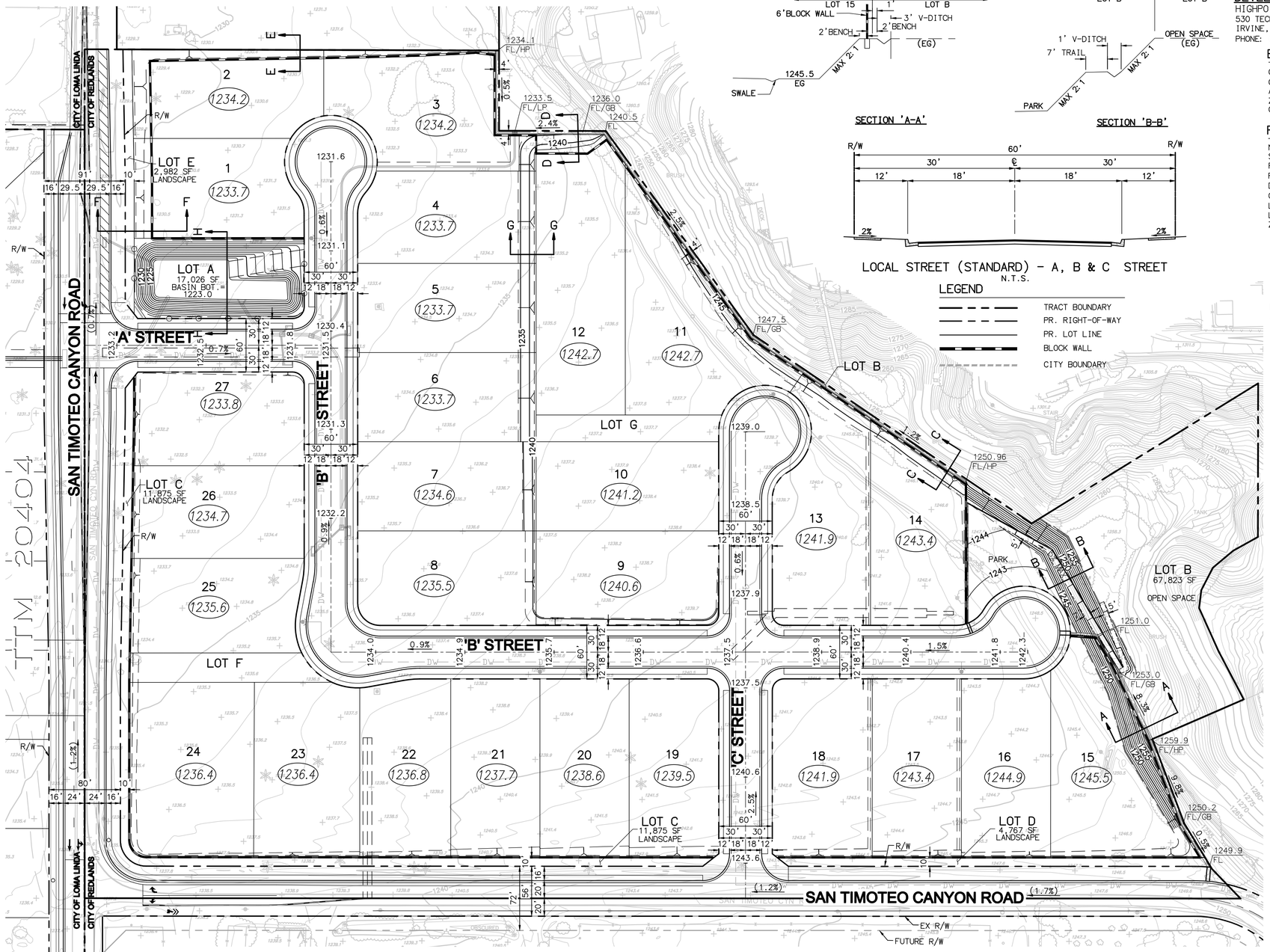
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DESIGN:	CE
DRAWN:	CE
CHECKED:	SG
APPROVED:	

CITY OF REDLANDS

TENTATIVE TRACT MAP # 20402

SHEET NO. 2 OF 2

PROJECT NO.



SECTION 'A-A'

SECTION 'B-B'

LOCAL STREET (STANDARD) - A, B & C STREET
N.T.S.

LEGEND

- TRACT BOUNDARY
- PR. RIGHT-OF-WAY
- PR. LOT LINE
- BLOCK WALL
- CITY BOUNDARY

DEVELOPER
HIGHPOINTE COMMUNITIES
530 TECHNOLOGY, SUITE #100
IRVINE, CA 92618
PHONE: (949) 472-0800

OWNER
CANYON RANCH DEVELOPMENT
25522 ALLEN WAY
LOMA LINDA, CA 92354

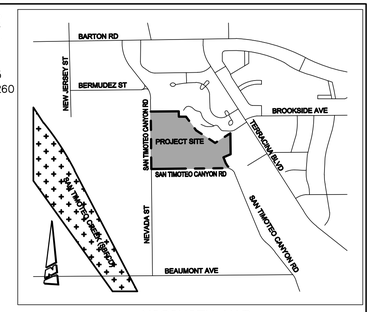
SOILS ENGINEER
LEIGHTON GEOTECHNICAL
17781 COWAN
IRVINE, CA 92614
PHONE: (949) 681-4265
PROPOSAL/REPORT #1-0260

EXISTING

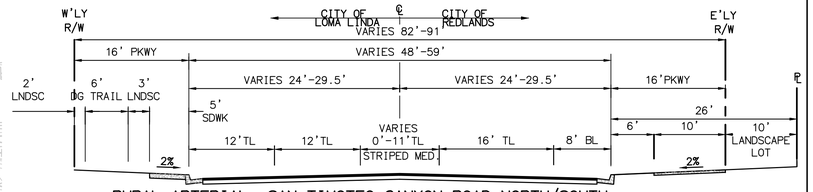
CURRENT USE:	AGRICULTURAL
CURRENT USE:	RESIDENTIAL
APN #:	029-313-201 & 029-314-137
ZONING DESIGNATION:	AGRICULTURAL
GENERAL PLAN 2035 DESIGNATION:	VERY LOW DENSITY RESIDENTIAL (VLDR)

PROPOSED

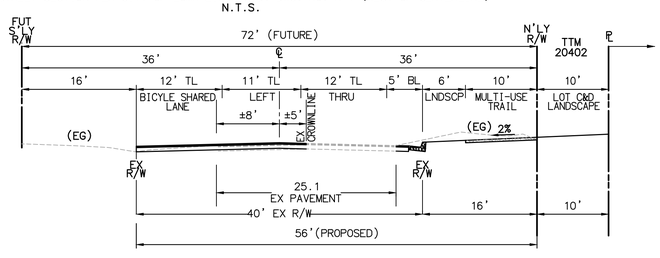
NUMBER OF LOTS	27
SITE ACREAGE:	21.4 AC
PROPOSED DENSITY:	1.3 DU/AC
RESIDENTIAL & STREET ACREAGE:	19.5 AC (90.6%)
DETENTION BASIN ACREAGE (LOT A):	0.4 AC (1.9%)
OPEN SPACE,PARK, DRAINAFE ACREAGE (LOT B):	1.6 AC (7.5%)
LOT SIZES:	20,000 MIN
LOT DIMENSIONS:	100 FT X 200 FT MIN
ZONING:	RA



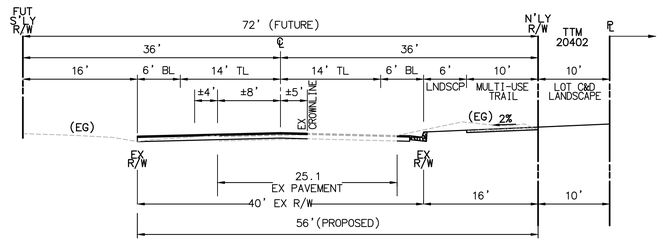
VICINITY MAP
N.T.S.



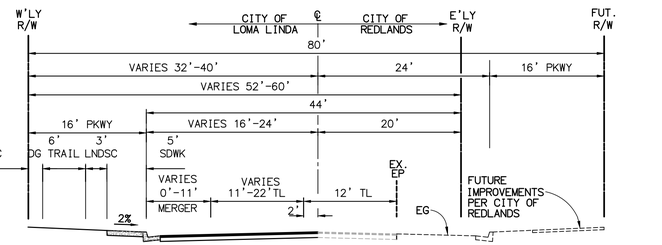
RURAL ARTERIAL- SAN TIMOTEO CANYON ROAD NORTH/SOUTH
NORTH OF NEVADA STREET
STREET SECTION PER CITY OF REDLANDS STD. DWG. NO.701-0 (EAST OF CENTERLINE)
STREET SECTION PER CITY OF LOMA LINDA STD. DWG. NO. R-1 (WEST OF CENTERLINE)
N.T.S.



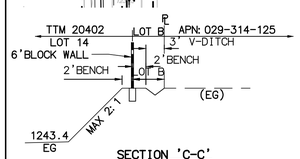
RURAL ARTERIAL- SAN TIMOTEO CANYON ROAD EAST/WEST
APPROXIMATELY ALONG LOTS 23 - 24
N.T.S.



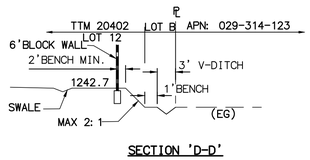
RURAL ARTERIAL- SAN TIMOTEO CANYON ROAD EAST/WEST
APPROXIMATELY ALONG LOTS 15-22
N.T.S.



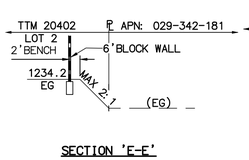
RURAL ARTERIAL - NEVADA STREET
MODIFIED LOMA LINDA STANDARD (R-1)
N.T.S.



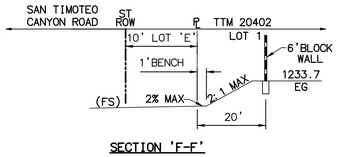
SECTION 'C-C'



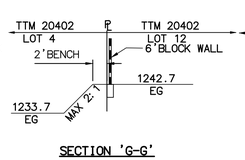
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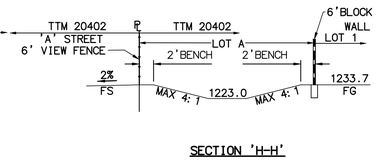
SECTION 'E-E'



SECTION 'F-F'

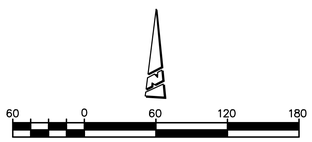


SECTION 'G-G'



SECTION 'H-H'

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OR
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PROACTIVE
ENGINEERING CONSULTANTS
200 South Main Street, Suite 300
Corona, CA 92882 (951) 280-3300

PLANS PREPARED
UNDER THE SUPERVISION OF:

SCOTT P. GILBERT
R.C.E. #65194
DATE

REGISTERED PROFESSIONAL ENGINEER
SCOTT P. GILBERT
NO. 65194
CIVIL
STATE OF CALIFORNIA

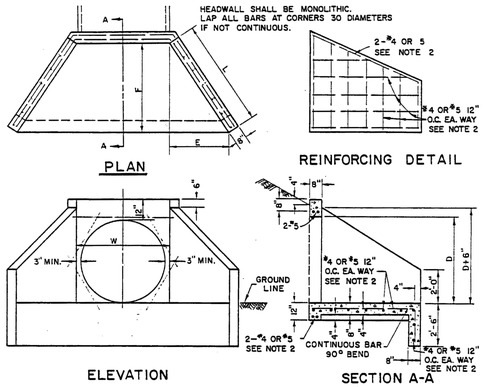
SCALE:	1"=60'
DESIGN:	CE
DRAWN:	CE
CHECKED:	SG
APPROVED:	

CITY OF REDLANDS

PRELIMINARY GRADING EXHIBIT
TTM 20402

SHEET NO.
1 OF 2
PROJECT NO.

REVISION DATE: JANUARY 11, 2023



DIMENSIONS				
PIPE DIAM	L	E	F	W
24"	4'-9"	2'-8"	4'-0"	2'-6"
30"	5'-5"	3'-0"	4'-6"	3'-0"
36"	6'-0"	3'-4"	5'-0"	3'-8"
42"	6'-7"	3'-8"	5'-6"	4'-2"
48"	7'-3"	4'-0"	6'-0"	4'-10"
54"	8'-2"	4'-6"	6'-9"	5'-4"

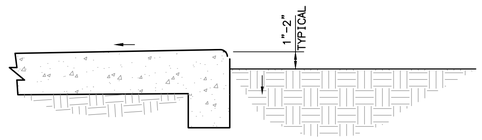
NOTES:

1. HEADWALL SHALL BE CONSTRUCTED OF CLASS A CONCRETE.
2. REINFORCING STEEL SHALL BE NO. 4 BARS FOR "W" UP TO 60". ABOVE "W"=60" NO. 5 BARS SHALL BE USED. 2" MIN CLEARANCE,30 DIAMETER LAP. ALL STEEL.
3. ADJACENT SLOPES SHALL BE 1½ TO 1 OR FLATTER.
4. MULTIPLE PIPES TO BE SET WITH LONGITUDINAL CENTERS 1 2/3 DIAMETERS APART.
5. ALL EXPOSED CORNERS TO BE ROUNDED 3/4" RADIUS.
6. W SHALL BE INCREASED WHEN MULTIPLE PIPES OR PIPES ON SKEW ARE USED.

SOURCE: SAN BERNARDINO COUNTY

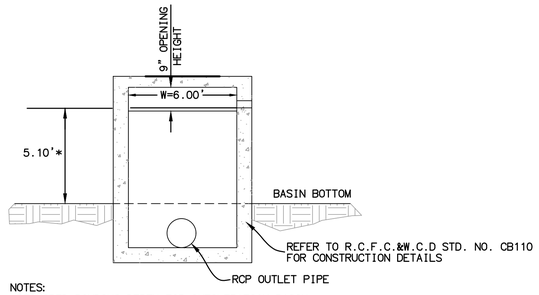
PROPOSED HEADWALL DETAIL

N.T.S.



LANDSCAPE PARALLEL TO WALKWAY

N.T.S.



NOTES:
*REQUIRED PONDING DEPTH FOR INFILTRATION BASIN

PROPOSED BASIN OUTLET

N.T.S.

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OR
1-800-422-4133

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ENGINEERING CONSULTANTS
200 South Main Street, Suite 300
Corona, CA 92882 (951) 280-3300

PLANS PREPARED
UNDER THE SUPERVISION OF:

SCOTT P. GILBERT
R.C.E. #65194

DATE

REGISTERED PROFESSIONAL ENGINEER
SCOTT P. GILBERT
NO. 65194
CIVIL
STATE OF CALIFORNIA

SCALE:	1"=60'
DESIGN:	CE
DRAWN:	CE
CHECKED:	SG
APPROVED:	

CITY OF REDLANDS

PRELIMINARY GRADING EXHIBIT
TTM 20402

SHEET NO.
2 OF 2

PROJECT NO.

PR DOMESTIC WATER CONNECTION 450' NORTH ALONG SAN TIMOTEO CYN RD., SEE DETAIL B, RIGHT

029-342-181

CITY OF LOMA LINDA

CITY OF REDLANDS

SAN TIMOTEO CANYON ROAD

TRACT 20404

'A' STREET

'B' STREET

'B'STREET

'C' STREET

NEVADA ST

R/W

LOT A

LOT B

LOT C

LOT D

LOT E

LOT G

EX 2" REDLANDS DW TO BE ABANDONED

8" DW

24" SD

48" SD

36" SD

18" SD

1225.0 INV

1225.8 INV

1225.9 INV

1226.0 INV

1226.5 INV

1226.7 INV

1227.0 INV

1227.50 INV

1229.0 INV

20,001 SF

PR FH

8" PIPE END PLUG

V-DITCH

PARKWAY DRAIN

EX R/W

FUTURE R/W

029-314-123

029-314-125

029-314-129

029-314-130

029-314-132

029-314-119

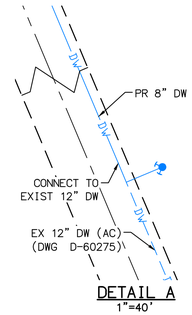
029-314-106

029-314-204

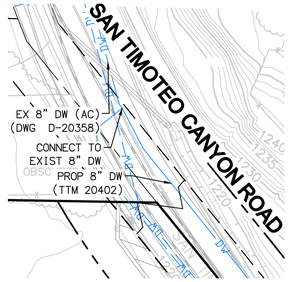
029-314-203

029-314-205

PR DOMESTIC WATER CONNECTION 180' SOUTH ALONG SAN TIMOTEO CYN RD. SEE DETAIL A, RIGHT



DETAIL A
1"=40'



DETAIL B
1"=40'

LEGEND

- PR. DOMESTIC WATER — DW — DW
- PR. STORM DRAIN
- PR. SEPTIC HOOKUP (S)
- EX. DOMESTIC WATER — DW — DW
- EX. POWER LINE — DHL — DHL
- EX. POWER POLE

NOTE

EXISTING POWER POLES TO BE REMOVED AND EXISTING OVERHEAD LINES TO BE UNDERGROUND

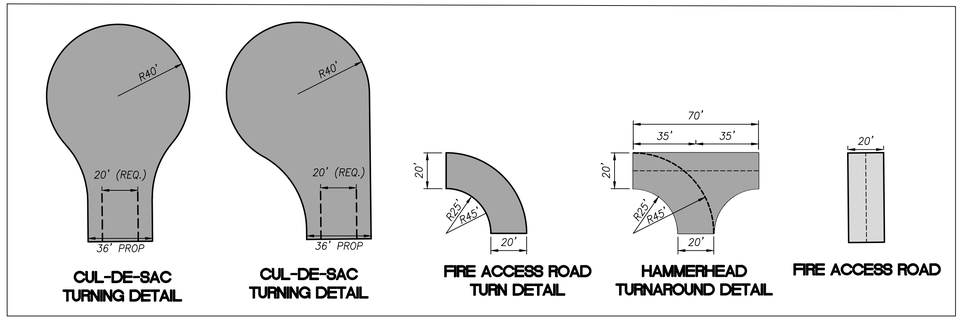
TRACT 20402
UTILITY COMPOSITE

PROACTIVE
ENGINEERING CONSULTANTS
200 South Main Street, Suite 300
Corona, CA 92882 (951) 280-3300

JANUARY 11, 2023

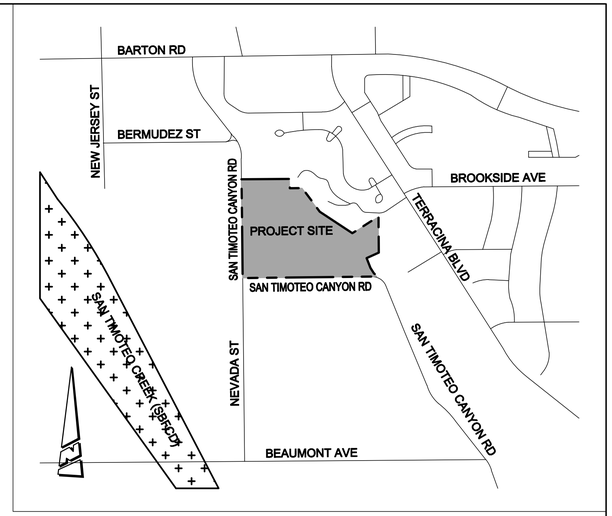
Z:\10.068_CANYON RANCH\DRAWINGS\EXHIBITS\20402 UTILITY MASTER EXHIBIT.DWG

REDLANDS FIRE DEPARTMENT – FIRE ACCESS STANDARDS



LEGEND

- TRACT BOUNDARY
- PR. RIGHT-OF-WAY
- PR. LOT LINE
- CITY BOUNDARY
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANTS



VICINITY MAP

NTS

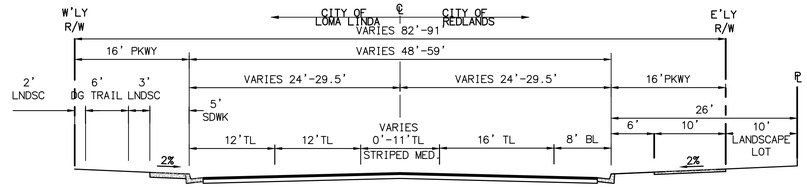
SECTION A–A
LOCAL STREET (STANDARD) – A, B & C STREET

N.T.S.

RURAL ARTERIAL – NEVADA STREET

MODIFIED LOMA LINDA STANDARD (R-1)

N.T.S.



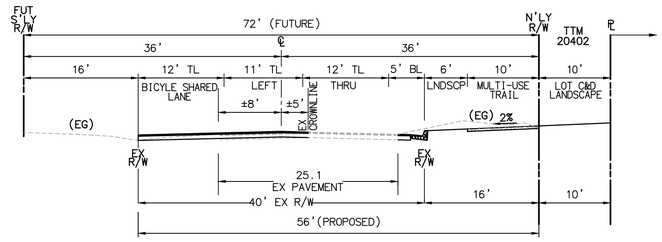
RURAL ARTERIAL– SAN TIMOTEO CANYON ROAD NORTH/SOUTH

NORTH OF NEVADA STREET

STREET SECTION PER CITY OF REDLANDS STD. DWG. NO.701-O (EAST OF CENTERLINE)

STREET SECTION PER CITY OF LOMA LINDA STD. DWG. NO. R-1 (WEST OF CENTERLINE)

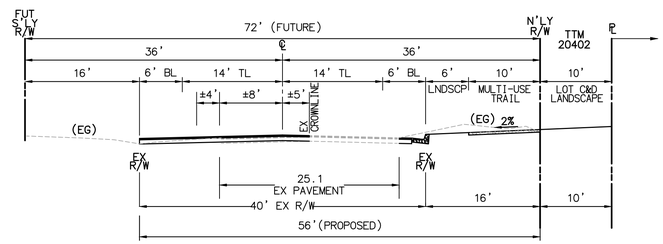
N.T.S.



RURAL ARTERIAL– SAN TIMOTEO CANYON ROAD EAST/WEST

APPROXIMATELY ALONG LOTS 23 – 24

N.T.S.



RURAL ARTERIAL– SAN TIMOTEO CANYON ROAD EAST/WEST

APPROXIMATELY ALONG LOTS 15-22

N.T.S.

REVISION DATE: JANUARY 11, 2023

80 0 80 160 240

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REVISIONS				
⚠ SHT.	DESCRIPTION	DATE	BY	APRD

PREPARED BY:
PROACTIVE
ENGINEERING CONSULTANTS
WWW.PROACTIVEENGINEERING.NET
200 South Main Street, Corona, CA 92882 Suite 300
951•280•3300

SCALE:	1"=80'
DESIGN:	CE
DRAWN:	CE
CHECKED:	SG
APPROVED:	

CITY OF REDLANDS
TTM 20402
FIRE MASTER PLAN
20,000 SQ FT MIN LOTS

SHEET NO. 1 OF 1

PROJECT NO.

Soils Information

Geotechnical Study and Other Infiltration Testing Data

National Flood Hazard Layer FIRMette

FEMA



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

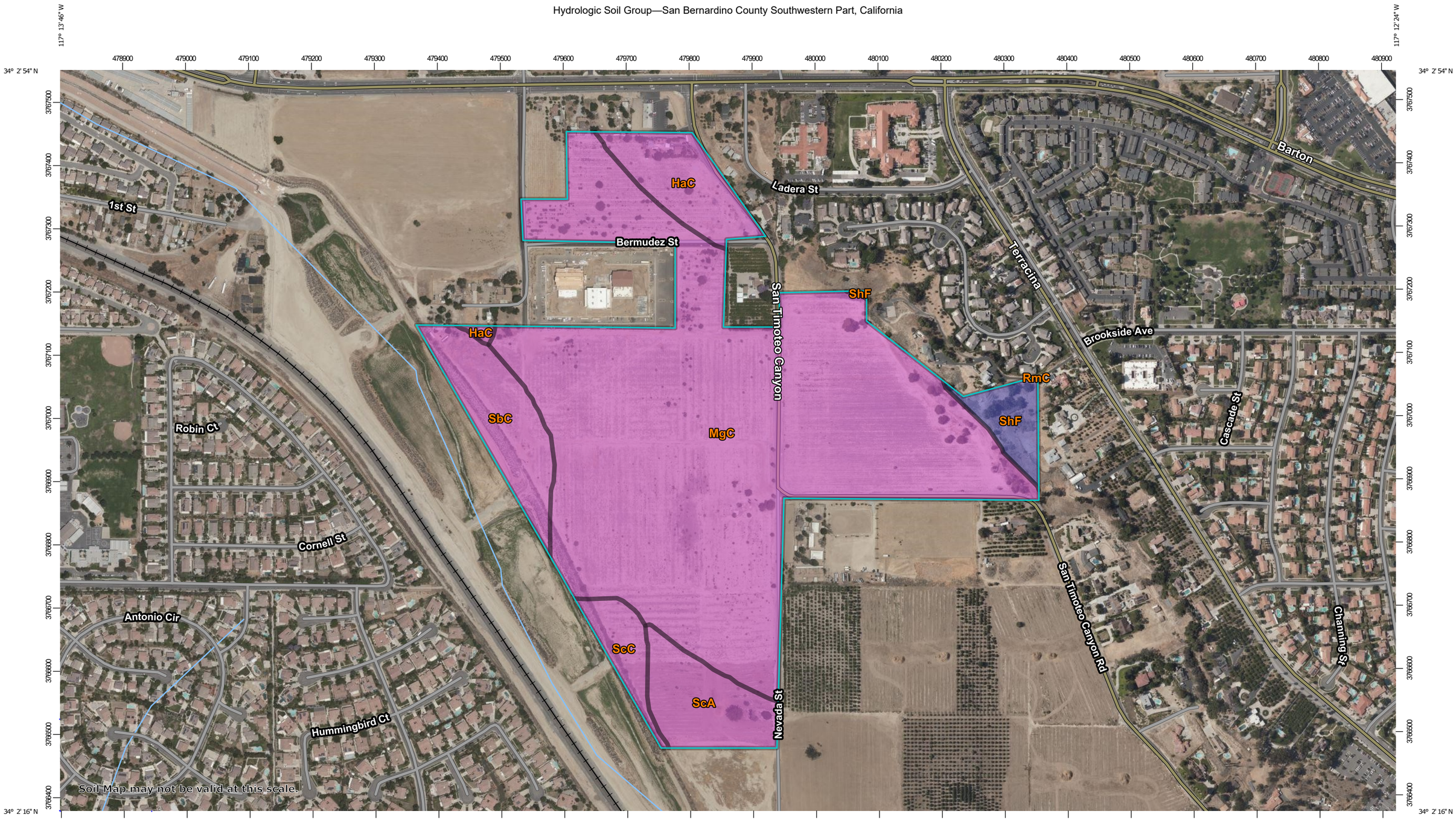
N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/22/2020 at 2:12 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



117° 13' 46" W
117° 12' 24" W
34° 2' 54" N
34° 2' 16" N
478800 478900 479000 479100 479200 479300 479400 479500 479600 479700 479800 479900 480000 480100 480200 480300 480400 480500 480600 480700 480800 480900
3767500 3767400 3767300 3767200 3767100 3767000 3766900 3766800 3766700 3766600 3766500 3766400

Map Scale: 1:5,720 if printed on B landscape (17" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: San Bernardino County Southwestern Part, California
Survey Area Data: Version 12, May 27, 2020

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

Date(s) aerial images were photographed: Apr 1, 2018—Jun 30, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
HaC	Hanford coarse sandy loam, 2 to 9 percent slopes	A	6.1	5.9%
MgC	Metz coarse sandy loam, 2 to 9 percent slopes	A	77.8	75.3%
RmC	Ramona sandy loam, 2 to 9 percent slopes, MLRA 19	C	0.0	0.0%
SbC	San Emigdio gravelly sandy loam, 2 to 9 percent slopes	A	7.3	7.1%
ScA	San Emigdio fine sandy loam, 0 to 2 percent slopes	A	6.4	6.2%
ScC	San Emigdio fine sandy loam, 2 to 9 percent slopes	A	2.8	2.7%
ShF	Saugus sandy loam, 30 to 50 percent slopes	B	2.9	2.8%
Totals for Area of Interest			**103.2**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOAA Atlas 14, Volume 6, Version 2
Location name: Redlands, California, USA*
Latitude: 34.0442°, Longitude: -117.2193°
Elevation: 1228.12 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	**0.096** (0.080-0.117)	**0.124** (0.103-0.150)	**0.160** (0.133-0.195)	**0.190** (0.156-0.233)	**0.231** (0.184-0.294)	**0.263** (0.205-0.342)	**0.296** (0.224-0.394)	**0.330** (0.243-0.453)	**0.377** (0.266-0.539)	**0.413** (0.282-0.613)
10-min	**0.138** (0.115-0.167)	**0.177** (0.147-0.215)	**0.229** (0.190-0.279)	**0.272** (0.224-0.334)	**0.331** (0.263-0.421)	**0.377** (0.293-0.490)	**0.424** (0.322-0.565)	**0.473** (0.349-0.649)	**0.540** (0.381-0.773)	**0.593** (0.404-0.878)
15-min	**0.167** (0.139-0.202)	**0.214** (0.178-0.260)	**0.277** (0.230-0.338)	**0.329** (0.271-0.404)	**0.401** (0.318-0.509)	**0.456** (0.355-0.592)	**0.513** (0.389-0.683)	**0.572** (0.422-0.784)	**0.653** (0.461-0.935)	**0.717** (0.488-1.06)
30-min	**0.246** (0.205-0.298)	**0.316** (0.263-0.384)	**0.409** (0.339-0.498)	**0.486** (0.399-0.596)	**0.591** (0.470-0.751)	**0.673** (0.523-0.874)	**0.757** (0.574-1.01)	**0.844** (0.622-1.16)	**0.963** (0.680-1.38)	**1.06** (0.720-1.57)
60-min	**0.362** (0.301-0.439)	**0.465** (0.387-0.565)	**0.602** (0.499-0.733)	**0.714** (0.588-0.877)	**0.869** (0.691-1.11)	**0.990** (0.770-1.29)	**1.11** (0.844-1.48)	**1.24** (0.915-1.70)	**1.42** (1.00-2.03)	**1.56** (1.06-2.30)
2-hr	**0.515** (0.429-0.624)	**0.659** (0.548-0.801)	**0.850** (0.705-1.04)	**1.01** (0.829-1.24)	**1.22** (0.972-1.56)	**1.39** (1.08-1.81)	**1.56** (1.18-2.08)	**1.74** (1.28-2.38)	**1.98** (1.40-2.84)	**2.17** (1.48-3.22)
3-hr	**0.635** (0.529-0.770)	**0.813** (0.676-0.987)	**1.05** (0.868-1.27)	**1.24** (1.02-1.52)	**1.50** (1.19-1.91)	**1.71** (1.33-2.22)	**1.92** (1.45-2.55)	**2.13** (1.57-2.92)	**2.43** (1.71-3.47)	**2.66** (1.81-3.94)
6-hr	**0.896** (0.746-1.09)	**1.15** (0.953-1.39)	**1.48** (1.22-1.80)	**1.75** (1.44-2.14)	**2.11** (1.68-2.69)	**2.40** (1.86-3.11)	**2.69** (2.04-3.58)	**2.99** (2.20-4.09)	**3.39** (2.40-4.85)	**3.71** (2.53-5.50)
12-hr	**1.19** (0.993-1.45)	**1.53** (1.27-1.86)	**1.97** (1.63-2.40)	**2.33** (1.92-2.86)	**2.82** (2.24-3.58)	**3.19** (2.48-4.14)	**3.57** (2.71-4.76)	**3.96** (2.92-5.43)	**4.49** (3.17-6.42)	**4.90** (3.34-7.26)
24-hr	**1.59** (1.41-1.83)	**2.05** (1.81-2.36)	**2.65** (2.34-3.06)	**3.13** (2.74-3.66)	**3.79** (3.21-4.57)	**4.29** (3.56-5.28)	**4.80** (3.89-6.04)	**5.32** (4.19-6.88)	**6.01** (4.55-8.11)	**6.55** (4.79-9.13)
2-day	**1.95** (1.73-2.25)	**2.55** (2.26-2.95)	**3.34** (2.95-3.87)	**3.98** (3.49-4.65)	**4.86** (4.11-5.85)	**5.53** (4.59-6.80)	**6.22** (5.04-7.83)	**6.92** (5.46-8.96)	**7.88** (5.96-10.6)	**8.62** (6.31-12.0)
3-day	**2.10** (1.86-2.42)	**2.78** (2.46-3.21)	**3.70** (3.26-4.28)	**4.45** (3.90-5.19)	**5.50** (4.65-6.62)	**6.31** (5.24-7.76)	**7.15** (5.79-9.00)	**8.02** (6.32-10.4)	**9.23** (6.98-12.4)	**10.2** (7.45-14.2)
4-day	**2.25** (1.99-2.59)	**3.01** (2.66-3.47)	**4.02** (3.55-4.66)	**4.87** (4.26-5.68)	**6.06** (5.13-7.30)	**6.99** (5.80-8.59)	**7.95** (6.44-10.0)	**8.96** (7.07-11.6)	**10.4** (7.85-14.0)	**11.5** (8.40-16.0)
7-day	**2.61** (2.32-3.01)	**3.52** (3.11-4.06)	**4.74** (4.18-5.48)	**5.76** (5.04-6.71)	**7.17** (6.08-8.64)	**8.29** (6.88-10.2)	**9.45** (7.66-11.9)	**10.7** (8.41-13.8)	**12.4** (9.37-16.7)	**13.7** (10.0-19.1)
10-day	**2.85** (2.52-3.28)	**3.85** (3.40-4.44)	**5.20** (4.59-6.02)	**6.33** (5.54-7.38)	**7.91** (6.70-9.53)	**9.15** (7.60-11.3)	**10.5** (8.47-13.2)	**11.8** (9.31-15.3)	**13.7** (10.4-18.5)	**15.2** (11.1-21.2)
20-day	**3.52** (3.11-4.05)	**4.79** (4.24-5.53)	**6.51** (5.75-7.54)	**7.96** (6.97-9.29)	**10.00** (8.47-12.0)	**11.6** (9.63-14.3)	**13.3** (10.8-16.7)	**15.1** (11.9-19.5)	**17.6** (13.3-23.7)	**19.6** (14.3-27.3)
30-day	**4.14** (3.67-4.78)	**5.66** (5.01-6.54)	**7.73** (6.81-8.94)	**9.46** (8.28-11.0)	**11.9** (10.1-14.4)	**13.9** (11.5-17.0)	**15.9** (12.9-20.0)	**18.1** (14.2-23.4)	**21.1** (16.0-28.5)	**23.5** (17.2-32.8)
45-day	**4.96** (4.39-5.72)	**6.78** (5.99-7.82)	**9.25** (8.16-10.7)	**11.3** (9.92-13.2)	**14.3** (12.1-17.2)	**16.7** (13.8-20.5)	**19.1** (15.5-24.1)	**21.8** (17.2-28.2)	**25.5** (19.3-34.3)	**28.4** (20.8-39.7)
60-day	**5.79** (5.13-6.67)	**7.89** (6.98-9.11)	**10.8** (9.49-12.5)	**13.2** (11.5-15.4)	**16.6** (14.1-20.0)	**19.3** (16.0-23.8)	**22.2** (18.0-28.0)	**25.3** (19.9-32.7)	**29.6** (22.4-39.9)	**33.1** (24.2-46.1)

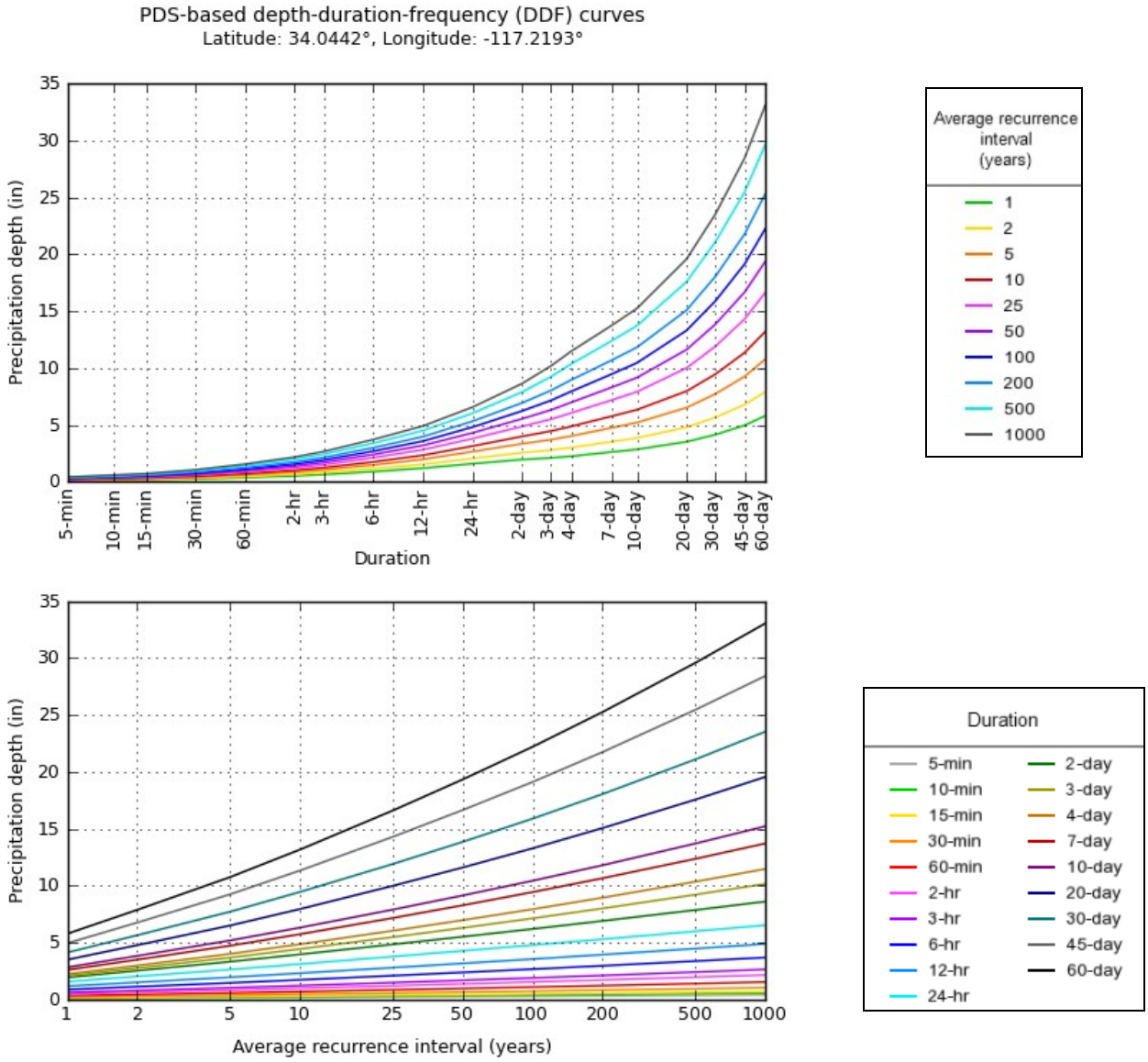
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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

Please refer to NOAA Atlas 14 document for more information.

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PF graphical



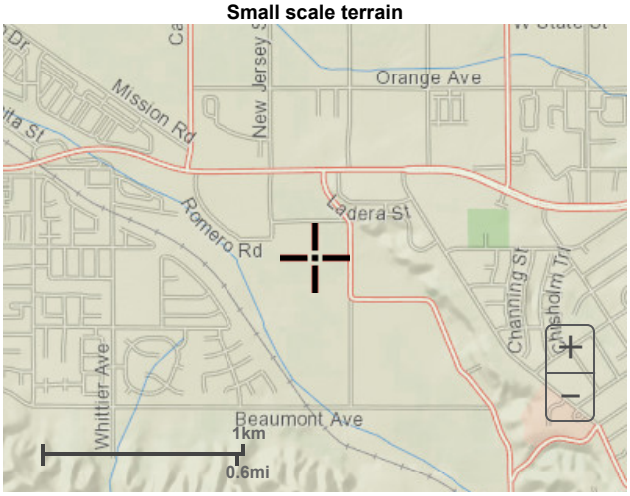
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Thu Sep 3 00:20:07 2020

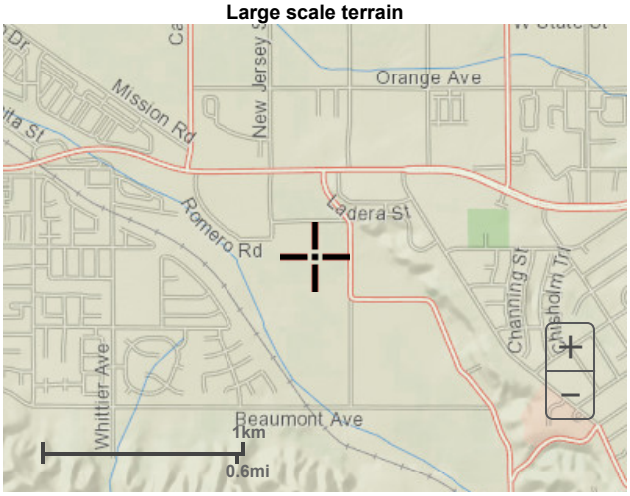
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Maps & aerials

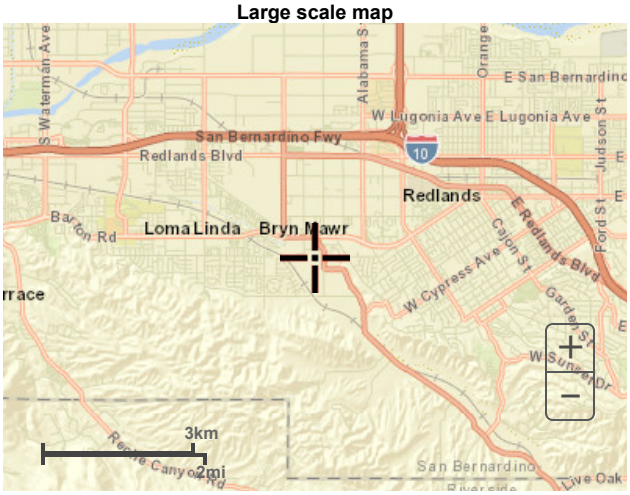
Small scale terrain



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

Disclaimer

BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Site Design & Landscape Planning SD-10



Design Objectives

- ✓ Maximize Infiltration
- ✓ Provide Retention
- ✓ Slow Runoff
- ✓ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

CASQA California Stormwater Quality Association

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “ redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Roof Runoff Controls SD-11



Rain Garden

Design Objectives

- ✓ Maximize Infiltration
- ✓ Provide Retention
- ✓ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ✓ Contain Pollutants
- Collect and Convey

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain

barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say ¼ to ½ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Supplemental Information

Examples

- City of Ottawa's Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, "Low-Impact Development", January/February 2003. www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD. www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition

Efficient Irrigation SD-12



Design Objectives

- ✓ Maximize Infiltration
- ✓ Provide Retention
- ✓ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Pervious Pavements SD-20



Design Objectives

- ✓ Maximize Infiltration
- ✓ Provide Retention
- ✓ Slow Runoff
- ✓ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Pervious paving is used for light vehicle loading in parking areas. The term describes a system comprising a load-bearing, durable surface together with an underlying layered structure that temporarily stores water prior to infiltration or drainage to a controlled outlet. The surface can itself be porous such that water infiltrates across the entire surface of the material (e.g., grass and gravel surfaces, porous concrete and porous asphalt), or can be built up of impermeable blocks separated by spaces and joints, through which the water can drain. This latter system is termed 'permeable' paving. Advantages of pervious pavements is that they reduce runoff volume while providing treatment, and are unobtrusive resulting in a high level of acceptability.

Approach

Attenuation of flow is provided by the storage within the underlying structure or sub base, together with appropriate flow controls. An underlying geotextile may permit groundwater recharge, thus contributing to the restoration of the natural water cycle. Alternatively, where infiltration is inappropriate (e.g., if the groundwater vulnerability is high, or the soil type is unsuitable), the surface can be constructed above an impermeable membrane. The system offers a valuable solution for drainage of spatially constrained urban areas.

Significant attenuation and improvement in water quality can be achieved by permeable pavements, whichever method is used. The surface and subsurface infrastructure can remove both the soluble and fine particulate pollutants that occur within urban runoff. Roof water can be piped into the storage area directly, adding areas from which the flow can be attenuated. Also, within lined systems, there is the opportunity for stored runoff to be piped out for reuse.

Suitable Applications

Residential, commercial and industrial applications are possible. The use of permeable pavement may be restricted in cold regions, arid regions or regions with high wind erosion. There are some specific disadvantages associated with permeable pavement, which are as follows:

- Permeable pavement can become clogged if improperly installed or maintained. However, this is countered by the ease with which small areas of paving can be cleaned or replaced when blocked or damaged.

- Their application should be limited to highways with low traffic volumes, axle loads and speeds (less than 30 mph limit), car parking areas and other lightly trafficked or non-trafficked areas. Permeable surfaces are currently not considered suitable for adoptable roads due to the risks associated with failure on high speed roads, the safety implications of ponding, and disruption arising from reconstruction.

- When using un-lined, infiltration systems, there is some risk of contaminating groundwater, depending on soil conditions and aquifer susceptibility. However, this risk is likely to be small because the areas drained tend to have inherently low pollutant loadings.

- The use of permeable pavement is restricted to gentle slopes.

- Porous block paving has a higher risk of abrasion and damage than solid blocks.

Design Considerations

Designing New Installations

If the grades, subsoils, drainage characteristics, and groundwater conditions are suitable, permeable paving may be substituted for conventional pavement on parking areas, cul de sacs and other areas with light traffic. Slopes should be flat or very gentle. Scottish experience has shown that permeable paving systems can be installed in a wide range of ground conditions, and the flow attenuation performance is excellent even when the systems are lined.

The suitability of a pervious system at a particular pavement site will, however, depend on the loading criteria required of the pavement.

Where the system is to be used for infiltrating drainage waters into the ground, the vulnerability of local groundwater sources to pollution from the site should be low, and the seasonal high water table should be at least 4 feet below the surface.

Ideally, the pervious surface should be horizontal in order to intercept local rainfall at source. On sloping sites, pervious surfaces may be terraced to accommodate differences in levels.

Design Guidelines

The design of each layer of the pavement must be determined by the likely traffic loadings and their required operational life. To provide satisfactory performance, the following criteria should be considered:

- The subgrade should be able to sustain traffic loading without excessive deformation.

- The granular capping and sub-base layers should give sufficient load-bearing to provide an adequate construction platform and base for the overlying pavement layers.

- The pavement materials should not crack of suffer excessive rutting under the influence of traffic. This is controlled by the horizontal tensile stress at the base of these layers.

There is no current structural design method specifically for pervious pavements. Allowances should be considered the following factors in the design and specification of materials:

- Pervious pavements use materials with high permeability and void space. All the current UK pavement design methods are based on the use of conventional materials that are dense and relatively impermeable. The stiffness of the materials must therefore be assessed.

- Water is present within the construction and can soften and weaken materials, and this must be allowed for.

- Existing design methods assume full friction between layers. Any geotextiles or geomembranes must be carefully specified to minimize loss of friction between layers.

- Porous asphalt loses adhesion and becomes brittle as air passes through the voids. Its durability is therefore lower than conventional materials.

The single sized grading of materials used means that care should be taken to ensure that loss of finer particles between unbound layers does not occur.

Positioning a geotextile near the surface of the pervious construction should enable pollutants to be trapped and retained close to the surface of the construction. This has both advantages and disadvantages. The main disadvantage is that the filtering of sediments and their associated pollutants at this level may hamper percolation of waters and can eventually lead to surface ponding. One advantage is that even if eventual maintenance is required to reinstate infiltration, only a limited amount of the construction needs to be disturbed, since the sub-base below the geotextile is protected. In addition, the pollutant concentration at a high level in the structure allows for its release over time. It is slowly transported in the stormwater to lower levels where chemical and biological processes may be operating to retain or degrade pollutants.

The design should ensure that sufficient void space exists for the storage of sediments to limit the period between remedial works.

- Pervious pavements require a single size grading to give open voids. The choice of materials is therefore a compromise between stiffness, permeability and storage capacity.

- Because the sub-base and capping will be in contact with water for a large part of the time, the strength and durability of the aggregate particles when saturated and subjected to wetting and drying should be assessed.

- A uniformly graded single size material cannot be compacted and is liable to move when construction traffic passes over it. This effect can be reduced by the use of angular crushed rock material with a high surface friction.

In pollution control terms, these layers represent the site of long term chemical and biological pollutant retention and degradation processes. The construction materials should be selected, in addition to their structural strength properties, for their ability to sustain such processes. In general, this means that materials should create neutral or slightly alkaline conditions and they should provide favorable sites for colonization by microbial populations.

Construction/Inspection Considerations

- Permeable surfaces can be laid without cross-falls or longitudinal gradients.

- The blocks should be lain level

- They should not be used for storage of site materials, unless the surface is well protected from deposition of silt and other spillages.
- The pavement should be constructed in a single operation, as one of the last items to be built, on a development site. Landscape development should be completed before pavement construction to avoid contamination by silt or soil from this source.
- Surfaces draining to the pavement should be stabilized before construction of the pavement.
- Inappropriate construction equipment should be kept away from the pavement to prevent damage to the surface, sub-base or sub-grade.

Maintenance Requirements

The maintenance requirements of a pervious surface should be reviewed at the time of design and should be clearly specified. Maintenance is required to prevent clogging of the pervious surface. The factors to be considered when defining maintenance requirements must include:

- Type of use
- Ownership
- Level of trafficking
- The local environment and any contributing catchments

Studies in the UK have shown satisfactory operation of porous pavement systems without maintenance for over 10 years and recent work by Imbe et al. at 9th ICUD, Portland, 2002 describes systems operating for over 20 years without maintenance. However, performance under such regimes could not be guaranteed, Table 1 shows typical recommended maintenance regimes:

Table 1 Typical Recommended Maintenance Regimes	
Activity	**Schedule**
■ Minimize use of salt or grit for de-icing ■ Keep landscaped areas well maintained ■ Prevent soil being washed onto pavement	Ongoing
■ Vacuum clean surface using commercially available sweeping machines at the following times: - End of winter (April) - Mid-summer (July / August) - After Autumn leaf-fall (November)	2/3 x per year
■ Inspect outlets	Annual
■ If routine cleaning does not restore infiltration rates, then reconstruction of part of the whole of a pervious surface may be required. ■ The surface area affected by hydraulic failure should be lifted for inspection of the internal materials to identify the location and extent of the blockage. ■ Surface materials should be lifted and replaced after brush cleaning. Geotextiles may need complete replacement. ■ Sub-surface layers may need cleaning and replacing. ■ Removed silts may need to be disposed of as controlled waste.	As needed (infrequent) Maximum 15-20 years

Permeable pavements are up to 25 % cheaper (or at least no more expensive than the traditional forms of pavement construction), when all construction and drainage costs are taken into account. (Accepting that the porous asphalt itself is a more expensive surfacing, the extra cost of which is offset by the savings in underground pipework etc.) (Niemczynowicz, et al., 1987)

Table 1 gives US cost estimates for capital and maintenance costs of porous pavements (Landphair et al., 2000)

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “ redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Additional Information

Cost Considerations

Permeable pavements are up to 25 % cheaper (or at least no more expensive than the traditional forms of pavement construction), when all construction and drainage costs are taken into account. (Accepting that the porous asphalt itself is a more expensive surfacing, the extra cost of which is offset by the savings in underground pipework etc.) (Niemczynowicz, et al., 1987)

Table 2 gives US cost estimates for capital and maintenance costs of porous pavements (Landphair et al., 2000)

Table 2 Engineer's Estimate for Porous Pavement

Porous Pavement													
Item	Units	Price	Cycles/ Year	Quant. 1 Acre WS	Total	Quant. 2 Acre WS	Total	Quant. 3 Acre WS	Total	Quant. 4 Acre WS	Total	Quant. 5 Acre WS	Total
Grading	SY	$2.00		604	$1,208	1209	$2,418	1812	$3,624	2419	$4,838	3020	$6,040
Paving	SY	$19.00		212	$4,028	424	$8,056	636	$12,084	848	$16,112	1060	$20,140
Excavation	CY	$3.60		201	$724	403	$1,451	604	$2,174	806	$2,902	1008	$3,629
Filter Fabric	SY	$1.15		700	$805	1400	$1,610	2000	$2,300	2800	$3,220	3600	$4,140
Stone Fill	CY	$16.00		201	$3,216	403	$6,448	604	$9,664	806	$12,896	1008	$16,128
Sand	CY	$7.00		100	$700	200	$1,400	300	$2,100	400	$2,800	500	$3,500
Sight Well	EA	$300.00		2	$600	3	$900	4	$1,200	7	$2,100	7	$2,100
Seeding	LF	$0.05		644	$32	1288	$64	1932	$97	2576	$129	3220	$161
Check Dam	CY	$35.00		0	$0	0	$0	0	$0	0	$0	0	$0
Total Construction Costs					**$10,105**		**$19,929**		**$29,619**		**$40,158**		**$49,798**
Construction Costs Amortized for 20 Years					**$505**		**$996**		**$1,481**		**$2,008**		**$2,490**
Annual Maintenance Expense													
Item	Units	Price	Cycles/ Year	Quant. 1 Acre WS	Total	Quant. 2 Acre WS	Total	Quant. 3 Acre WS	Total	Quant. 4 Acre WS	Total	Quant. 5 Acre WS	Total
Sweeping	AC	$250.00	6	1	$1,500	2	$3,000	3	$4,500	4	$6,000	5	$7,500
Washing	AC	$250.00	6	1	$1,500	2	$3,000	3	$4,500	4	$6,000	5	$7,500
Inspection	MH	$20.00	5	5	$100	5	$100	5	$100	5	$100	5	$100
Deep Clean	AC	$450.00	0.5	1	$225	2	$450	3	$675	3.9	$878	5	$1,125
Total Annual Maintenance Expense					**$3,960**		**$7,792**		**$11,651**		**$15,483**		**$19,370**

Supplemental Information

■

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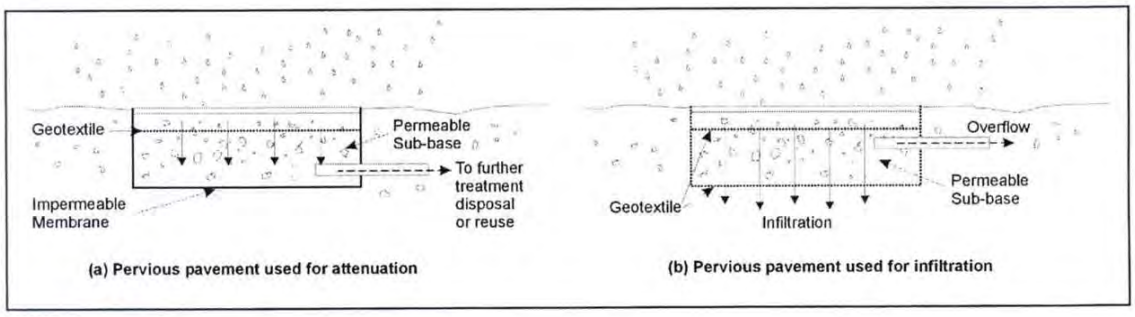
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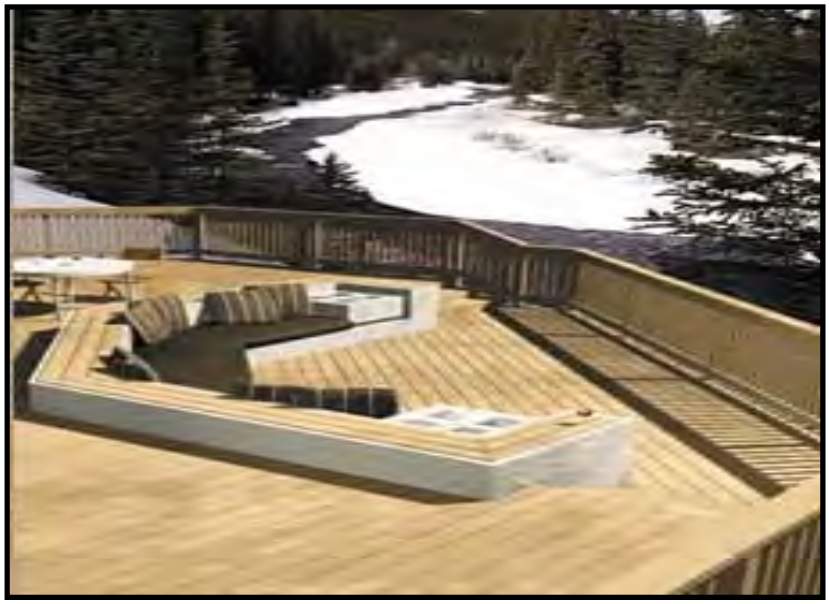
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Schematics of a Pervious Pavement System

Alternative Building Materials SD-21



Design Objectives

- ✓ Maximize Infiltration
- ✓ Provide Retention
- ✓ Source Control
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutant
- Collect and Convey

Description

Alternative building materials are selected instead of conventional materials for new construction and renovation. These materials reduce potential sources of pollutants in stormwater runoff by eliminating compounds that can leach into runoff, reducing the need for pesticide application, reducing the need for painting and other maintenance, or by reducing the volume of runoff.

Approach

Alternative building materials are available for use as lumber for decking, roofing materials, home siding, and paving for driveways, decks, and sidewalks.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Decking

One of the most common materials for construction of decks and other outdoor construction has traditionally been pressure treated wood, which is now being phased out. The standard treatment is called CCA, for chromated copper arsenate. The key ingredients are arsenic (which kills termites, carpenter ants and other insects), copper (which kills the fungi that cause wood to rot) and chromium (which reacts with the other ingredients to bind them to the wood). The amount of arsenic is far from trivial. A deck just 8 feet x 10 feet contains more than 1 1/3 pounds of this highly potent poison. Replacement materials include a new type of pressure treated wood, plastic and composite lumber.

There are currently over 20 products in the market consisting of plastic or plastic-wood composites. Plastic lumber is made from 100% recycled plastic, # 2 HDPE and polyethylene plastic milk jugs

and soap bottles. Plastic-wood composites are a combination of plastic and wood fibers or sawdust. These materials are a long lasting exterior weather, insect, and chemical resistant wood lumber replacement for non structural applications. Use it for decks, docks, raised garden beds and planter boxes, pallets, hand railings, outdoor furniture, animal pens, boat decks, etc.

New pressure treated wood uses a much safer recipe, ACQ, which stands for ammoniacal copper quartenary. It contains no arsenic and no chromium. Yet the American Wood Preservers Association has found it to be just as effective as the standard formula. ACQ is common in Japan and Europe.

Roofing

Several studies have indicated that metal used as roofing material, flashing, or gutters can leach metals into the environment. The leaching occurs because rainfall is slightly acidic and slowly dissolved the exposed metals. Common traditional applications include copper sheathing and galvanized (zinc) gutters.

Coated metal products are available for both roofing and gutter applications. These products eliminate contact of bare metal with rainfall, eliminating one source of metals in runoff. There are also roofing materials made of recycled rubber and plastic that resemble traditional materials.

A less traditional approach is the use of green roofs. These roofs are not just green, they're alive. Planted with grasses and succulents, low- profile green roofs reduce the urban heat island effect, stormwater runoff, and cooling costs, while providing wildlife habitat and a connection to nature for building occupants. These roofs are widely used on industrial facilities in Europe and have been established as experimental installations in several locations in the US, including Portland, Oregon. Their feasibility is questionable in areas of California with prolonged, dry, hot weather.

Paved Areas

Traditionally, concrete is used for construction of patios, sidewalks, and driveways. Although it is non-toxic, these paved areas reduce stormwater infiltration and increase the volume and rate of runoff. This increase in the amount of runoff is the leading cause of stream channel degradation in urban areas.

There are a number of alternative materials that can be used in these applications, including porous concrete and asphalt, modular blocks, and crushed granite. These materials, especially modular paving blocks, are widely available and a well established method to reduce stormwater runoff.

Building Siding

Wood siding is commonly used on the exterior of residential construction. This material weathers fairly rapidly and requires repeated painting to prevent rotting. Alternative “new” products for this application include cement-fiber and vinyl. Cement-fiber siding is a masonry product made from Portland cement, sand, and cellulose and will not burn, cup, swell, or shrink.

Pesticide Reduction

A common use of powerful pesticides is for the control of termites. Chlordane was used for many years for this purpose and is now found in urban streams and lakes nationwide. There are a

number of physical barriers that can be installed during construction to help reduce the use of pesticides.

Sand barriers for subterranean termites are a physical deterrent because the termites cannot tunnel through it. Sand barriers can be applied in crawl spaces under pier and beam foundations, under slab foundations, and between the foundation and concrete porches, terraces, patios and steps. Other possible locations include under fence posts, underground electrical cables, water and gas lines, telephone and electrical poles, inside hollow tile cells and against retaining walls.

Metal termite shields are physical barriers to termites which prevent them from building invisible tunnels. In reality, metal shields function as a helpful termite detection device, forcing them to build tunnels on the outside of the shields which are easily seen. Metal termite shields also help prevent dampness from wicking to adjoining wood members which can result in rot, thus making the material more attractive to termites and other pests. Metal flashing and metal plates can also be used as a barrier between piers and beams of structures such as decks, which are particularly vulnerable to termite attack.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of "redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

There are no good, independent, comprehensive sources of information on alternative building materials for use in minimizing the impacts of stormwater runoff. Most websites or other references to "green" or "alternative" building materials focus on indoor applications, such as formaldehyde free plywood and low VOC paints, carpets, and pads. Some supplemental information on alternative materials is available from the manufacturers.

Fires are a source of concern in many areas of California. Information on the flammability of alternative decking materials is available from the University of California Forest Product Laboratory (UCFPL) website at: http://www.ucfpl.ucop.edu/WDDeckIntro.htm

Infiltration Basin TC-11



Design Considerations

- Soil for Infiltration
- Slope
- Aesthetics

Targeted Constituents

✓	Sediment	■
✓	Nutrients	■
✓	Trash	■
✓	Metals	■
✓	Bacteria	■
✓	Oil and Grease	■
✓	Organics	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

Description

An infiltration basin is a shallow impoundment that is designed to infiltrate stormwater. Infiltration basins use the natural filtering ability of the soil to remove pollutants in stormwater runoff. Infiltration facilities store runoff until it gradually exfiltrates through the soil and eventually into the water table. This practice has high pollutant removal efficiency and can also help recharge groundwater, thus helping to maintain low flows in stream systems. Infiltration basins can be challenging to apply on many sites, however, because of soils requirements. In addition, some studies have shown relatively high failure rates compared with other management practices.

California Experience

Infiltration basins have a long history of use in California, especially in the Central Valley. Basins located in Fresno were among those initially evaluated in the National Urban Runoff Program and were found to be effective at reducing the volume of runoff, while posing little long-term threat to groundwater quality (EPA, 1983; Schroeder, 1995). Proper siting of these devices is crucial as underscored by the experience of Caltrans in siting two basins in Southern California. The basin with marginal separation from groundwater and soil permeability failed immediately and could never be rehabilitated.

Advantages

- Provides 100% reduction in the load discharged to surface waters.
- The principal benefit of infiltration basins is the approximation of pre-development hydrology during which a

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significant portion of the average annual rainfall runoff is infiltrated and evaporated rather than flushed directly to creeks.

- If the water quality volume is adequately sized, infiltration basins can be useful for providing control of channel forming (erosion) and high frequency (generally less than the 2-year) flood events.

Limitations

- May not be appropriate for industrial sites or locations where spills may occur.
- Infiltration basins require a minimum soil infiltration rate of 0.5 inches/hour, not appropriate at sites with Hydrologic Soil Types C and D.
- If infiltration rates exceed 2.4 inches/hour, then the runoff should be fully treated prior to infiltration to protect groundwater quality.
- Not suitable on fill sites or steep slopes.
- Risk of groundwater contamination in very coarse soils.
- Upstream drainage area must be completely stabilized before construction.
- Difficult to restore functioning of infiltration basins once clogged.

Design and Sizing Guidelines

- Water quality volume determined by local requirements or sized so that 85% of the annual runoff volume is captured.
- Basin sized so that the entire water quality volume is infiltrated within 48 hours.
- Vegetation establishment on the basin floor may help reduce the clogging rate.

Construction/Inspection Considerations

- Before construction begins, stabilize the entire area draining to the facility. If impossible, place a diversion berm around the perimeter of the infiltration site to prevent sediment entrance during construction or remove the top 2 inches of soil after the site is stabililized. Stabilize the entire contributing drainage area, including the side slopes, before allowing any runoff to enter once construction is complete.
- Place excavated material such that it can not be washed back into the basin if a storm occurs during construction of the facility.
- Build the basin without driving heavy equipment over the infiltration surface. Any equipment driven on the surface should have extra-wide (“low pressure”) tires. Prior to any construction, rope off the infiltration area to stop entrance by unwanted equipment.
- After final grading, till the infiltration surface deeply.
- Use appropriate erosion control seed mix for the specific project and location.

Performance

As water migrates through porous soil and rock, pollutant attenuation mechanisms include precipitation, sorption, physical filtration, and bacterial degradation. If functioning properly, this approach is presumed to have high removal efficiencies for particulate pollutants and moderate removal of soluble pollutants. Actual pollutant removal in the subsurface would be expected to vary depending upon site-specific soil types. This technology eliminates discharge to surface waters except for the very largest storms; consequently, complete removal of all stormwater constituents can be assumed.

There remain some concerns about the potential for groundwater contamination despite the findings of the NURP and Nightingale (1975; 1987a,b,c; 1989). For instance, a report by Pitt et al. (1994) highlighted the potential for groundwater contamination from intentional and unintentional stormwater infiltration. That report recommends that infiltration facilities not be sited in areas where high concentrations are present or where there is a potential for spills of toxic material. Conversely, Schroeder (1995) reported that there was no evidence of groundwater impacts from an infiltration basin serving a large industrial catchment in Fresno, CA.

Siting Criteria

The key element in siting infiltration basins is identifying sites with appropriate soil and hydrogeologic properties, which is critical for long term performance. In one study conducted in Prince George's County, Maryland (Galli, 1992), all of the infiltration basins investigated clogged within 2 years. It is believed that these failures were for the most part due to allowing infiltration at sites with rates of less than 0.5 in/hr, basing siting on soil type rather than field infiltration tests, and poor construction practices that resulted in soil compaction of the basin invert.

A study of 23 infiltration basins in the Pacific Northwest showed better long-term performance in an area with highly permeable soils (Hilding, 1996). In this study, few of the infiltration basins had failed after 10 years. Consequently, the following guidelines for identifying appropriate soil and subsurface conditions should be rigorously adhered to.

- Determine soil type (consider RCS soil type 'A, B or C' only) from mapping and consult USDA soil survey tables to review other parameters such as the amount of silt and clay, presence of a restrictive layer or seasonal high water table, and estimated permeability. The soil should not have more than 30% clay or more than 40% of clay and silt combined. Eliminate sites that are clearly unsuitable for infiltration.

- Groundwater separation should be at least 3 m from the basin invert to the measured ground water elevation. There is concern at the state and regional levels of the impact on groundwater quality from infiltrated runoff, especially when the separation between groundwater and the surface is small.

- Location away from buildings, slopes and highway pavement (greater than 6 m) and wells and bridge structures (greater than 30 m). Sites constructed of fill, having a base flow or with a slope greater than 15% should not be considered.

- Ensure that adequate head is available to operate flow splitter structures (to allow the basin to be offline) without ponding in the splitter structure or creating backwater upstream of the splitter.

- Base flow should not be present in the tributary watershed.

Secondary Screening Based on Site Geotechnical Investigation

- At least three in-hole conductivity tests shall be performed using USBR 7300-89 or Bouwer-Rice procedures (the latter if groundwater is encountered within the boring), two tests at different locations within the proposed basin and the third down gradient by no more than approximately 10 m. The tests shall measure permeability in the side slopes and the bed within a depth of 3 m of the invert.

- The minimum acceptable hydraulic conductivity as measured in any of the three required test holes is 13 mm/hr. If any test hole shows less than the minimum value, the site should be disqualified from further consideration.

- Exclude from consideration sites constructed in fill or partially in fill unless no silts or clays are present in the soil boring. Fill tends to be compacted, with clays in a dispersed rather than flocculated state, greatly reducing permeability.

- The geotechnical investigation should be such that a good understanding is gained as to how the stormwater runoff will move in the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water.

Additional Design Guidelines

(1) Basin Sizing - The required water quality volume is determined by local regulations or sufficient to capture 85% of the annual runoff.

(2) Provide pretreatment if sediment loading is a maintenance concern for the basin.

(3) Include energy dissipation in the inlet design for the basins. Avoid designs that include a permanent pool to reduce opportunity for standing water and associated vector problems.

(4) Basin invert area should be determined by the equation:

$$A = \frac{WQV}{kt}$$

where A = Basin invert area (m^2)

WQV = water quality volume (m^3)

k = 0.5 times the lowest field-measured hydraulic conductivity (m/hr)

t = drawdown time (48 hr)

(5) The use of vertical piping, either for distribution or infiltration enhancement shall not be allowed to avoid device classification as a Class V injection well per 40 CFR146.5(e)(4).

Maintenance

Regular maintenance is critical to the successful operation of infiltration basins. Recommended operation and maintenance guidelines include:

- Inspections and maintenance to ensure.
- Observe drain time for the design storm after completion or modification of the facility to confirm that the desired drain time has been obtained.
- Schedule semiannual inspections for beginning and end of the wet season to identify potential problems such as erosion of the basin side slopes and invert, standing water, trash and debris, and sediment accumulation.
- Remove accumulated trash and debris in the basin at the start and end of the wet season.
- Inspect for standing water at the end of the wet season.
- Trim vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons.
- Remove accumulated sediment and regrade when the accumulated sediment volume exceeds 10% of the basin.
- If erosion is occurring within the basin, revegetate immediately and stabilize with an erosion control mulch or mat until vegetation cover is established.
- To avoid reversing soil development, scarification or other disturbance should only be performed when there are actual signs of clogging, rather than on a routine basis. Always remove deposited sediments before scarification, and use a hand-guided rotary tiller, if possible, or a disc harrow pulled by a very light tractor.

Cost

Infiltration basins are relatively cost-effective practices because little infrastructure is needed when constructing them. One study estimated the total construction cost at about $2 per ft (adjusted for inflation) of storage for a 0.25-acre basin (SWRPC, 1991). As with other BMPs, these published cost estimates may deviate greatly from what might be incurred at a specific site. For instance, Caltrans spent about $18/ft^3 for the two infiltration basins constructed in southern California, each of which had a water quality volume of about 0.34 ac.-ft. Much of the higher cost can be attributed to changes in the storm drain system necessary to route the runoff to the basin locations.

Infiltration basins typically consume about 2 to 3% of the site draining to them, which is relatively small. Additional space may be required for buffer, landscaping, access road, and fencing. Maintenance costs are estimated at 5 to 10% of construction costs.

One cost concern associated with infiltration practices is the maintenance burden and longevity. If improperly maintained, infiltration basins have a high failure rate. Thus, it may be necessary to replace the basin with a different technology after a relatively short period of time.

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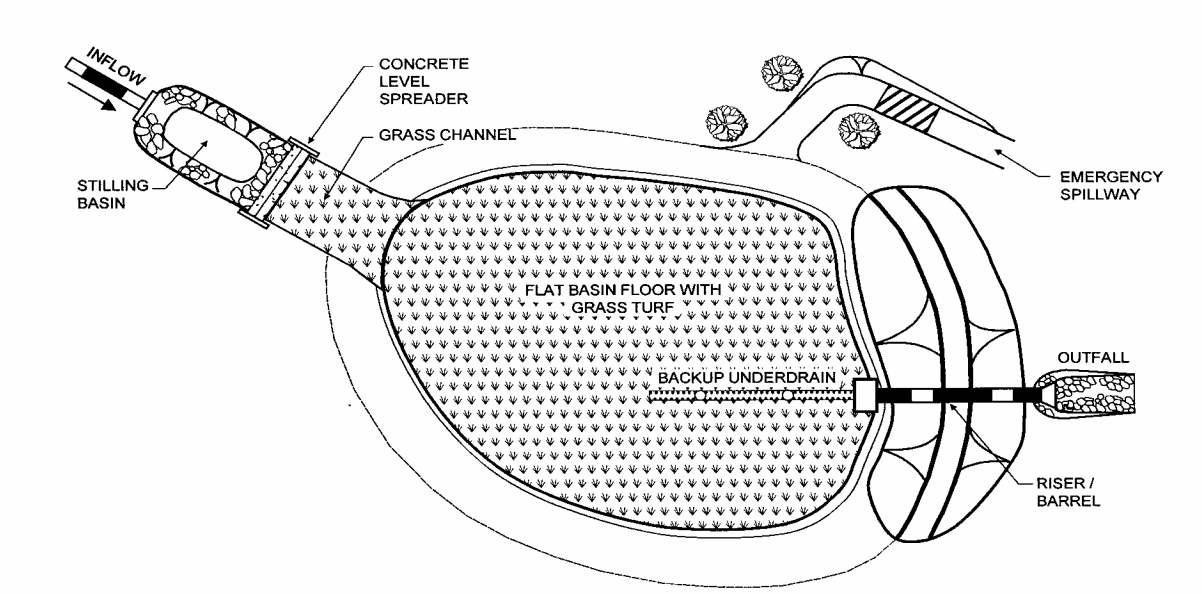
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Information Resources

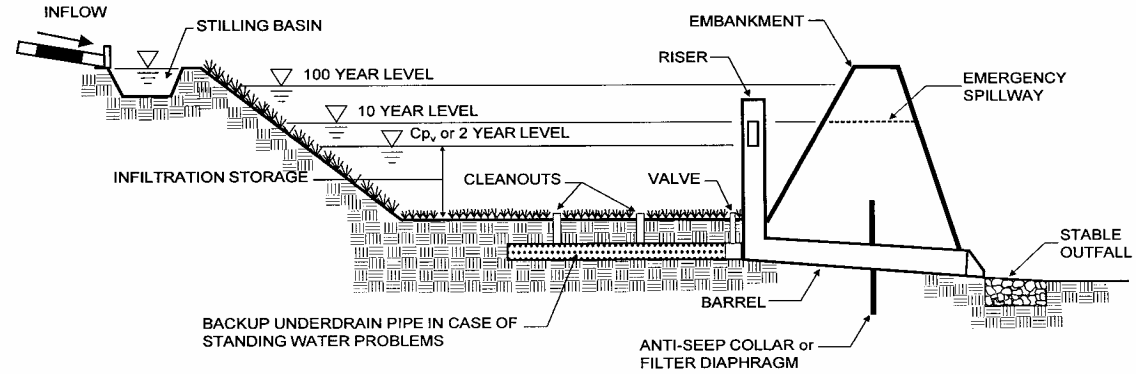
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PLAN VIEW



PROFILE

Drain Inserts MP-52

Description

Drain inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris. There are a multitude of inserts of various shapes and configurations, typically falling into one of three different groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are one box; that is, the setting area and filtration through media occur in the same box. Some products consist of one or more trays or mesh grates. The trays may hold different types of media. Filtration media vary by manufacturer. Types include polypropylene, porous polymer, treated cellulose, and activated carbon.

California Experience

The number of installations is unknown but likely exceeds a thousand. Some users have reported that these systems require considerable maintenance to prevent plugging and bypass.

Advantages

- Does not require additional space as inserts as the drain inlets are already a component of the standard drainage systems.
- Easy access for inspection and maintenance.
- As there is no standing water, there is little concern for mosquito breeding.
- A relatively inexpensive retrofit option.

Limitations

Performance is likely significantly less than treatment systems that are located at the end of the drainage system such as ponds and vaults. Usually not suitable for large areas or areas with trash or leaves than can plug the insert.

Design and Sizing Guidelines

Refer to manufacturer's guidelines. Drain inserts come any many configurations but can be placed into three general groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are

Design Considerations

- Use with other BMPs
- Fit and Seal Capacity within Inlet

Targeted Constituents

- ✓ Sediment
- ✓ Nutrients
- ✓ Trash
- ✓ Metals
- Bacteria
- ✓ Oil and Grease
- ✓ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

CASQA California Stormwater Quality Association

one box; that is, the setting area and filtration through media occurs in the same box. One manufacturer has a double-box. Stormwater enters the first box where setting occurs. The stormwater flows into the second box where the filter media is located. Some products consist of one or more trays or mesh grates. The trays can hold different types of media. Filtration media vary with the manufacturer: types include polypropylene, porous polymer, treated cellulose, and activated carbon.

Construction/Inspection Considerations

Be certain that installation is done in a manner that makes certain that the stormwater enters the unit and does not leak around the perimeter. Leakage between the frame of the insert and the frame of the drain inlet can easily occur with vertical (drop) inlets.

Performance

Few products have performance data collected under field conditions.

Siting Criteria

It is recommended that inserts be used only for retrofit situations or as pretreatment where other treatment BMPs presented in this section area used.

Additional Design Guidelines

Follow guidelines provided by individual manufacturers.

Maintenance

Likely require frequent maintenance, on the order of several times per year.

Cost

- The initial cost of individual inserts ranges from less than $100 to about $2,000. The cost of using multiple units in curb inlet drains varies with the size of the inlet.
- The low cost of inserts may tend to favor the use of these systems over other, more effective treatment BMPs. However, the low cost of each unit may be offset by the number of units that are required, more frequent maintenance, and the shorter structural life (and therefore replacement).

References and Sources of Additional Information

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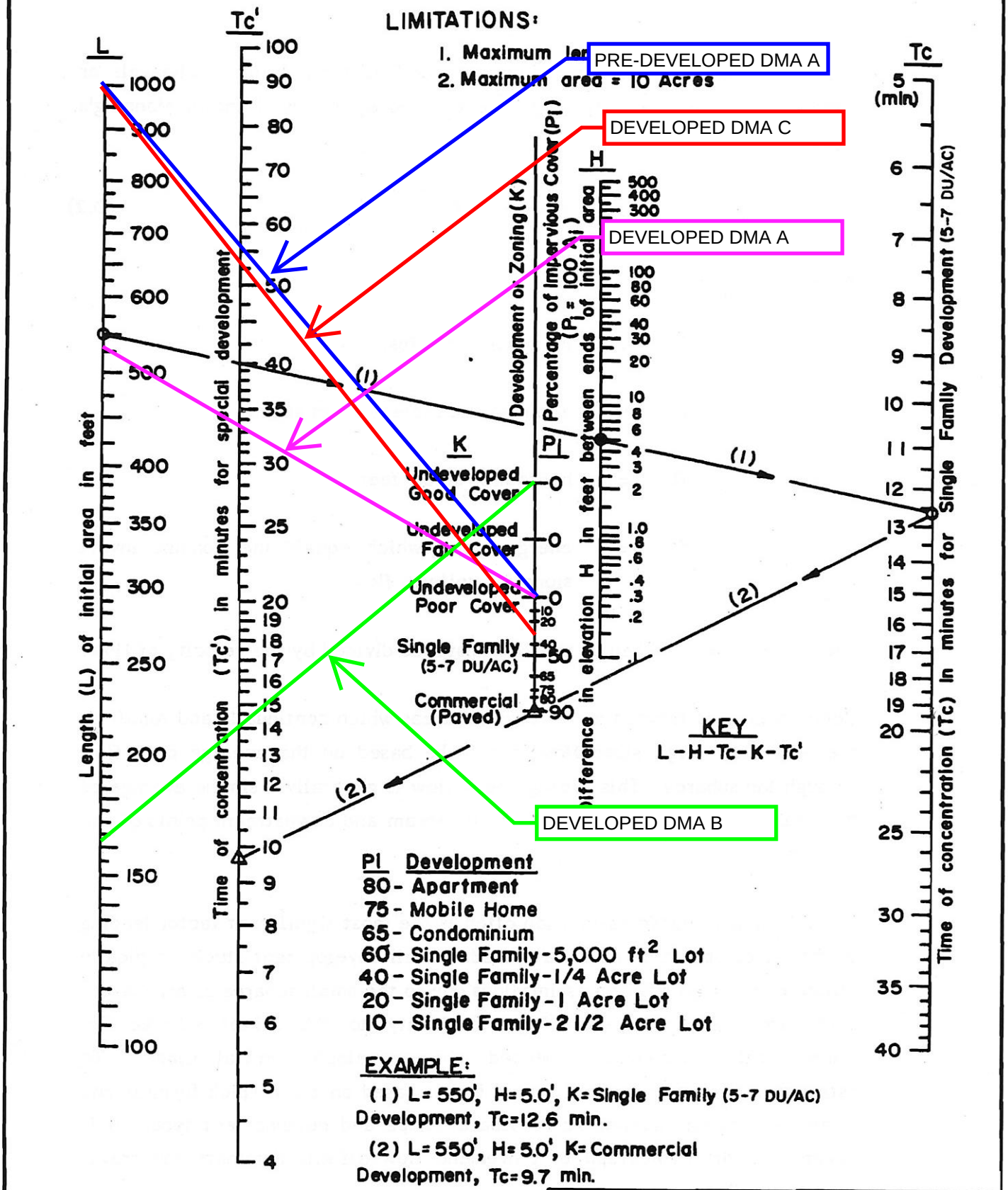
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Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

Educational Materials

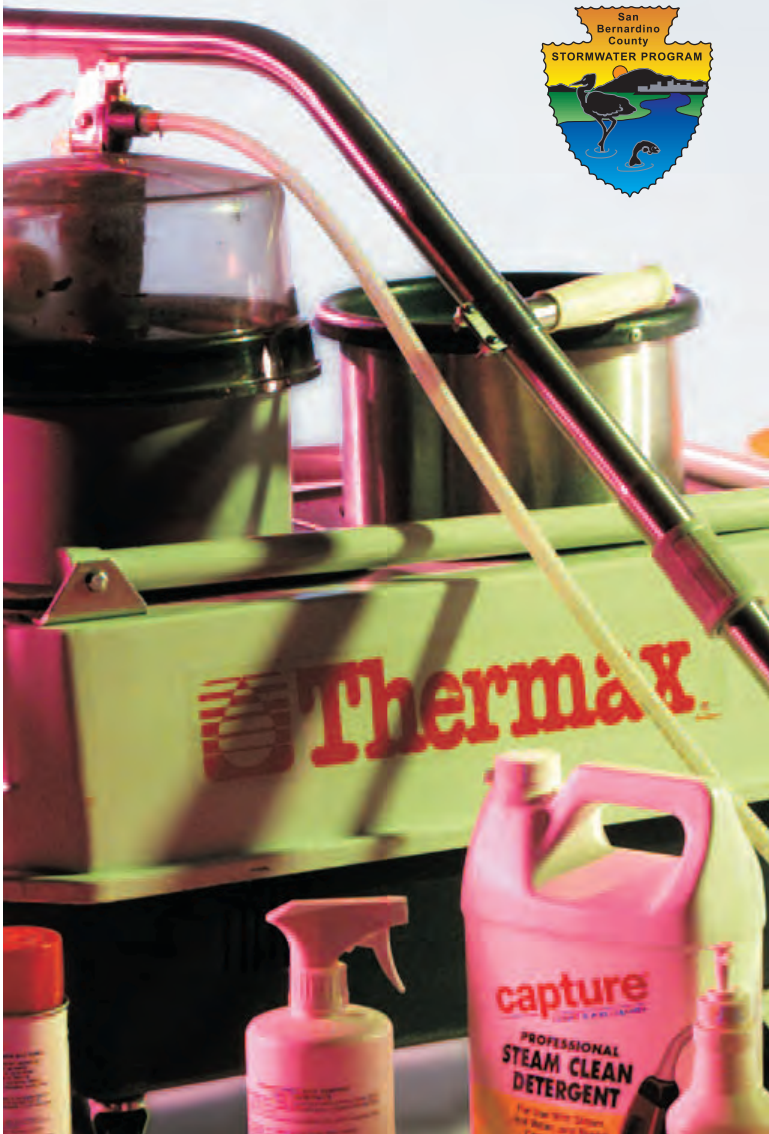
BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

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STORMWATER Pollution Prevention

CARPET CLEANING ACTIVITIES



STORMWATER Pollution Prevention

Stormwater Management Practices for Carpet Cleaning Activities

Toxic chemicals and discharged waste water from carpet, drapery, furniture and window cleaning often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates local waterways, making them unsafe for people and wildlife. Following these best management practices will prevent pollution, comply with regulations and protect public health.

These guidelines apply even if the cleaning products are labeled "nontoxic" or "biodegradable". Although these products may be less harmful to the environment, they can still have harmful effects if they enter the storm drain untreated.



Dispose of Wastewater Properly
Wastewater from cleaning equipment must be discharged into a sink, toilet, or other drain connected to the sanitary sewer system within sanitary sewer discharge limits, hauled off and disposed of properly, or may be discharged to a pervious area, for example, a lawn area, as long as it does not overflow into the street, gutter, parking lot or storm drain. Wastewater should never be discharged into a street, gutter, parking lot or storm drain.

Filter Wastewater
Carpet cleaning wastewater should be filtered before discharging it to the sanitary sewer since fibers and other debris in the wastewater can clog pipes. The filtered material can be disposed of in the garbage, provided that the waste is not contaminated with hazardous pollutants.

To report illegal dumping call
(877) WASTE18
or visit our website:
sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM



WASH YOUR CAR THE ECO-FRIENDLY WAY!

When possible, wash in a professional car wash.

1. **Locate** the nearest storm drain and ensure that wash water does not flow into it.



2. **Wash** in a contained area or on grass*, gravel or other permeable surface. Dispose of excess soapy water into the sanitary sewer *(ie. sink or toilet)* or onto grass.

3. **Use** eco-friendly cleaning products (*non-toxic, phosphate free or biodegradable*). Use as little soap as possible and wipe brake dust off tires with a rag before washing.

4. **Conserve** water by using a high pressure hose and turn off the water when not in use.

**Some local ordinances may not allow a car to be parked on the front lawn. Check with your City's Building and Code department if you are unsure.*

How Does Eco Car Washing Help Local Waterways?

When excess wash water travels through the street it has the potential to pick up oil, grease and other chemicals along the way before it ends up in the curb, gutter and the storm drain system. **This contaminated water then travels to our creeks and the Santa Ana River making it unsafe for people and wildlife.**

To report illegal dumping, call **(877) WASTE18** or visit **sbcountystormwater.org**
To find a Hazardous Waste Facility, call **(800) OILY CAT**

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¡LAVE SU AUTO DE MANERA ECOLÓGICA!

Cuando sea posible, lávelo en un lavadero profesional de autos.

1. **Ubique** el desagüe pluvial más cercano y asegúrese de que nada pueda entrar en él o que pueda descargarse allí.



2. **Lave** su auto sobre el cesped, grava u otras superficies permeables. Elimine el exceso de agua jabonosa en un drenaje sanitario *(por ejemplo, lavamanos o inodoro)* o en el césped.

3. **Use** productos de limpieza ecológicos *(no tóxicos, sin fosfato o biodegradables)*. Use la menor cantidad de jabón posible y limpie el polvo de frenos de los neumáticos con un trapo antes de lavar.

4. **Conserve** agua usando una manguera de alta presión y cierre el agua cuando no la use.

** Es posible que algunas ordenanzas locales no permitan estacionar sobre el césped en el frente de la casa. Consulte con el departamento de Código Urbano y Edificación de su ciudad si no está seguro.*

¿De qué Manera el Lavado de Autos Ecológico Ayuda a Proteger los Canales Fluviales Locales?

Cuando el exceso de agua de lavado viaja por la calle, es posible que recoja aceite, grasa y otros elementos químicos en el camino antes de que llegue en el desagüe pluvial y el sistema de la boca de tormenta. **Esa agua contaminada luego viaja hacia nuestros arroyos y al Río Santa Ana, haciendo que sea inseguro para la gente y los animales.**

Para reportar actividades ilegales, llame a **(877) WASTE18** o visite **sbcountystormwater.org**. Para encontrar un establecimiento de Desechos Peligrosos, llame al **(800) OILY CAT**

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Pool Discharge Tips

Maintain your pool properly and help protect the environment

DID YOU KNOW?

Routine swimming pool maintenance generates a variety of wastes such as cleaning wastewater, filter back-wash residues, biocides and acid washes that can contribute to stormwater pollution. Chlorine and other pool chemicals can harm our waterways when they are discharged improperly.



Share these good housekeeping practices with your pool service personnel to keep pollutants out of our waterways:

HOLD IT BEFORE YOU DRAIN IT.

- De-chlorinate the water before draining the pool to the storm drain.
- Consult with your pool contractor before de-chlorinating the pool to learn about your options.

IMPORTANT:

- Dispose of filter backwash solids in the trash or landscape area.
- Neutralize acid washes before discharging to the sewer. Do not discharge to the storm drain.

SHUT: Shut off the chlorination system or stop adding chlorine.

HOLD: Hold the water in the pool for at least 5 days or add a de-chlorinating agent.

TEST: Use a pool testing kit to ensure the level of chlorine is at 0.1ppm before discharging the water.

- Make sure all debris is removed and chemicals are dissipated.
- pH of pool water should be between 6.5 and 8.5 before discharging.
- Make sure the water is free of any discoloration, mosquitoes, dirt or algae.

DRAIN: Check with your city for local requirements before discharging your pool to the storm drain or sewer.

- **Alternative 1:** Sanitary Sewer — Some cities allow pools to be drained to the sanitary sewer during non-peak hours.
- **Alternative 2:** Lawn or Garden — Discharge the pool water through the lawn or garden. The flow should be controlled to prevent erosion problems or the water entering a neighbor's property.
- **For Saltwater Pools:** Saltwater pools should only be drained to the sewer or hauled away.

To report illegal dumping, call (877) WASTE18 or visit sbcountystormwater.org

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Consejos para Vaciar su Piscina

Conserve su piscina en buen estado y ayude a proteger el medio ambiente

¿Sabía que...?

El mantenimiento de la piscina genera desechos, como las aguas residuales de limpieza, los residuos del agua estancada de los filtros y los lavados al ácido y otros químicos, que pueden contribuir a la contaminación de las aguas en las alcantarillas. El cloro y otros productos químicos para piscinas pueden dañar el medio ambiente cuando se desechan de manera inadecuada.



Comparta estas buenas prácticas de limpieza con su personal de servicio de piscinas para mantener las alcantarillas libres de contaminantes:

ESPERE ANTES DE VACIAR.

- Debe eliminar el cloro del agua antes de vaciar la piscina en las alcantarillas.
- Consulte con su contratista de piscina para obtener más información sobre sus opciones.

IMPORTANTE:

- Deseche los sólidos del agua estancada de los filtros en la basura o en el jardín.
- Neutralice los lavados al ácido antes de vaciarlos en la alcantarilla. No deseche nada contaminante en las alcantarillas.

CORTAR:

Corte el sistema de cloración o deje de agregar cloro.

CONSERVAR:

Conserve el agua en la piscina 5 días o agregue un agente de descloración.

PROBAR:

Utilice un equipo de pruebas para piscinas con el fin de asegurar que el nivel de cloro esté en 0.1ppm antes de vaciar el agua.

- Asegúrese de retirar todos los desechos y disipar los químicos.
- El pH del agua de la piscina debe estar entre 6.5 y 8.5 antes del vaciado.
- Asegúrese de que el agua no contenga contaminacion, zancudos, suciedad o algas.

VACIAR:

Verifique los requisitos locales de su ciudad antes de vaciar su piscina en el desagüe de las alcantarillas.

- **Alternativa 1:** Drenaje Sanitario — Algunas ciudades permiten que las piscinas se vacíen en el drenaje sanitario.
- **Alternativa 2:** Césped o Jardín — Vacíe el agua de la piscina en el césped o jardín. Se debe controlar la corriente de agua para evitar problemas de erosión o que el agua entre en la propiedad del vecino.
- **Para las Piscinas de Agua Salada:** Estas piscinas solo se deben ser vaciados en la alcantarilla o se debe transportar el agua y los residuos a algún lugar adecuado.

Para reportar desechos ilegales, comuníquese al (877) WASTE18 o visite sbcountystormwater.org
facebook.com/sbcountystormwater

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WISHFUL THINKING...



UNTIL THIS IS A REALITY,

PLEASE PICK UP AFTER YOUR PET.

San Bernardino County STORMWATER PROGRAM

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or (877) WASTE18

Artwork Courtesy of the City of Los Angeles Stormwater Program.

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MOBILE VEHICLE CLEANING & MAINTENANCE

DISCHARGE INTO THE STORM DRAIN, ACCIDENTAL OR NOT, CAN LEAD TO ENFORCEMENT ACTIONS, WHICH CAN INCLUDE FINES.

These best management practices will help you **prevent polluted water and other materials from flowing into the street, gutter and storm drain.**

WASH WATER DISPOSAL



- Wash in contained area that has been bermed up to contain the wash water.

- When washing items contaminated by hazardous materials, wash water should be collected and hauled off-site for proper disposal.
- Wash in customers wash bay or pump wastewater to the wash bays' pretreatment system.

! Engine cleaning must be performed at a facility that has the equipment to properly process the contaminated wash water runoff.

HAZARDOUS WASTE SPILL CLEAN-UP & DISPOSAL



- Stop the source of the spill immediately. Locate the nearest storm drain and ensure nothing can enter or be discharged into it.
- Use tarps and drip pans to prevent spills.

- If a spill occurs, use an absorbent material such as kitty litter or absorbent pads.
- Clean up the excess. Properly dispose of absorbent material used to clean up spills - contact an approved hauler for assistance/disposal. Sweep work area thoroughly after cleaning.
- Keep toxics out of the trash by disposing of them properly, this includes absorbent materials used to clean up toxic waste spills. Toxic materials may include used motor oil and oil filters, antifreeze, batteries and gasoline. Make sure to maintain hauling records for all hazardous waste.

To report illegal dumping, call (877) WASTE18 or visit sbcountystormwater.org
To report toxic spills call (800) 33 TOXIC
To dispose of hazardous waste, call the CUPA Program (909) 386-8401

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Regulatory information

The Federal Water Pollution Control Act prohibits the discharge of any pollutant to navigable waters from a point source unless the discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. The 1987 passage of the Water Quality Act established NPDES permit requirements for discharges of storm water. The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

Industrial facilities and construction sites are regulated by the Regional Water Quality Control Board and State Water Resources Control Board, through general storm water permits. Most industrial, manufacturing or transportation businesses that store materials, products or equipment outdoors, or conduct vehicle washing or process operations outdoors are required to obtain coverage under the State Water Resources Control Board's General Industrial Activities Stormwater Permit. For more information about this permit, visit www.swrcb.ca.gov/stormwtr/industrial.html or contact your local storm water coordinator.

If your business conducts construction activities, including clearing, grading, stockpiling or excavation that results in soil disturbances of at least one acre, you are subject to the State Water Resources Control Board's General Construction Activities Stormwater Permit. To find out more about this storm water permit for construction, visit: www.swrcb.ca.gov/stormwtr/construction.html.

Cities and counties are regulated through permits issued by the Regional Boards. Since 1990, operators of large storm drain systems such as San Bernardino County's have been required to:

- Develop a storm water management program designed to prevent harmful pollutants from being dumped or washed by storm water runoff, into the storm water system, then discharged into local water bodies; and
- Obtain a National Pollutant Discharge Elimination System (NPDES) permit.

The NPDES permit programs in California are administered by the State Water Resources Control Board and by nine regional boards that issue NPDES permits and enforce regulations within their respective region.

San Bernardino County lies within the jurisdiction of the Santa Ana Region. This regional board issues a permit to the San Bernardino County Permittees, which includes the County of San Bernardino, San Bernardino County Flood Control District and incorporated cities of San Bernardino County. Since the program's inception, the County of San Bernardino has served as the principal permittee.



Documents & reports:

The following documents describe the regulations and programs for water quality in San Bernardino County. You can review the latest Basin Plan, National Pollutant Discharge Elimination System (NPDES) Permit and Drainage Area Management Plan (DAMP).

- **Basin Plans:** The document for each region of the State Water Quality Board's jurisdiction, including Santa Ana, is the Water Quality Control Plan, commonly referred to as the Basin Plan. It is the foundation for the regulatory programs of each regional board. The Basin Plan documents the beneficial uses of the region's ground and surface waters, existing water quality conditions, problems, and goals, and actions by the regional board and others that are necessary to achieve and maintain water quality standards.

▶Water Control Plan for the Santa Ana River Basin

- **Municipal National Pollutant Discharge Elimination System (NPDES) Permits:** The permits of each region outline additional steps for a storm water management program and specify requirements to help protect the beneficial uses of the receiving waters. They require permittees to develop and implement Best Management Practices (BMPs) to control/reduce the discharge of pollutants to waters of the United States to the maximum extent practicable (MEP).

  ▶Santa Ana Regional Water Quality Control Board Municipal NPDES Permit Order No. R8-2002-0012

- **Report of Waste Discharge:** The Report of Waste Discharge (ROWD) describes the San Bernardino Stormwater Program, implemented by the County and cities to comply with their jointly held stormwater permit. It is the principle policy and guidance document for the NPDES Stormwater Program.

  ▶Report of Waste Discharge 2000

- **San Bernardino County Storm Water Program Annual Status Report:** The Annual Status Report is a requirement of the NPDES permit for submittal to the Regional Boards and United States Environmental Protection Agency. The report presents an analysis and assessment of permit compliance activities.

▶Annual report - will be posted soon

For more information about how you can prevent stormwater pollution:

www.sbcountystormwater.org

IT'S A WIN WIN
FOR A FREE RAIN BARREL

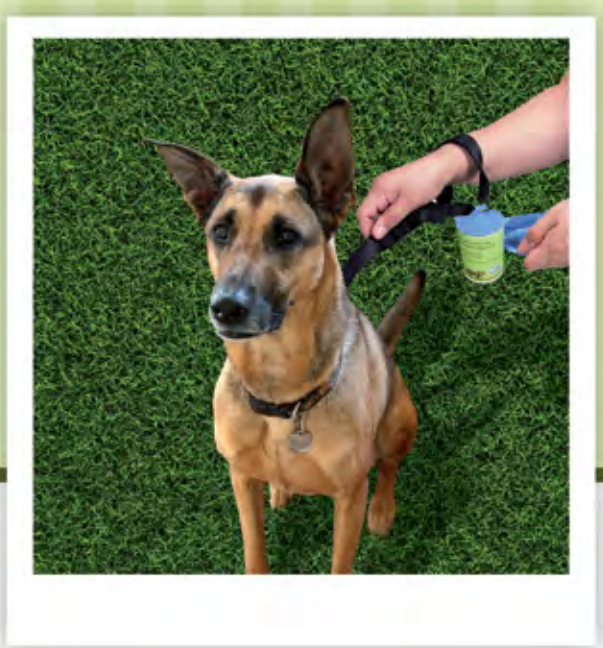
Be part of the solution and join the great giveaway!

Sign up for San Bernardino County Stormwater's e-newsletter for a chance to win this FREE rain barrel (estimated value: $125 dollars).

Note: we will not share, sell or otherwise distribute email addresses to other organizations or companies.

EVERY DROP COUNTS!

Safely capture rainwater on your property and then reuse it for your home's irrigation. Join others in saving on water expenses and preserving our local waterways.





PICK UP
After Your Pet!



Protect the health of your pet and the environment

For more information about current campaigns visit **sbcountystormwater.org/dog**

facebook.com/sbcountystormwater

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San Bernardino County Stormwater Program

WHY IT MATTERS



PROTECT
YOUR FAMILY AND YOUR PET

- Dog waste can infect children and adults with disease-causing bacteria and parasites.
- Your dog can get infected from the waste of other dogs.

PROTECT
OUR ENVIRONMENT



Leaving dog waste on the streets or on your property can have a negative impact on water quality. Pet waste that's not disposed of properly flows untreated through the storm drain system and directly into our local water bodies. Pet waste is a pollutant that contains nutrients, parasites and bacteria that can affect the quality of our rivers and the ocean and make the water unsafe for swimming, drinking or fishing.

BAG IT AND TRASH IT

It's that simple to protect our health and the environment!



- Keep a supply of bags near your dog leash or tie them to the leash
- Use a poop scooper
- Bring several plastic bags with you
- Reuse plastic grocery bags or purchase special doggie waste bags at pet supplies stores
- Make sure your pet's waste gets into a trash can

Encourage your neighbors and other pet owners to do the right thing and pick up after their pets.










¡RECOJA los desechos de sus mascotas!



Proteja la salud de su mascota y el medio ambiente

Si desea más información, visite
sbcountystormwater.org/dog

facebook.com/sbcountystormwater

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San Bernardino County Stormwater Program

POR QUÉ ES IMPORTANTE



PROTEJA
A SU FAMILIA Y A SU MASCOTA

- Los desechos de los perros pueden infectar a niños y adultos con enfermedades causadas por bacterias y parásitos.
- Su perro puede contraer una infección de los desechos de otros perros.

PROTEJA
EL MEDIO AMBIENTE



Dejar desechos de perros en la calle o en su propiedad puede tener un impacto negativo en la calidad del agua. Los desechos de mascotas que no se eliminan de la propiedad fluyen sin tratamiento por el sistema de drenaje de tormentas y llegan directamente a las masas de agua locales. Los desechos de mascotas son agentes contaminantes que contienen nutrientes, parásitos y bacterias que pueden afectar la calidad de nuestros ríos y océanos, y hacer que el agua no sea segura para nadar, beber o pescar.

COLÓQUELA EN UNA BOLSA Y TÍRELA EN LA BASURA

Así de simple es proteger nuestra salud y el medio ambiente.



- Guarde algunas bolsas cerca de la correa de su perro o átelas a la correa;
- Use una cuchara para recojer el desecho;
- Lleve varias bolsas plásticas;
- Reutilice bolsas plásticas de comestibles o compre bolsas especiales para desechos de perros en las tiendas para mascotas;
- Asegúrese de tirar los desechos de su perro en un cesto de basura.

Aliente a sus vecinos y otros dueños de mascotas a hacer lo correcto y levantar los desechos de sus mascotas.








WE DID IT OURSELVES AND WE DID IT RIGHT

When painting your home, protect your family and community.

- **PAINTS** that are water-based are less toxic and should be used whenever possible.
- **BRUSHES** with water-based paint should be washed in the sink. Those with oil-based paint should be cleaned with paint thinner.
- **SAFELY** dispose of unwanted paint. The County of San Bernardino offers 9 HHW Centers that accept paint and other toxic waste FREE of charge.

To report illegal dumping, call
(877) WASTE18 or visit
sbcountystormwater.org

San Bernardino County
STORMWATER PROGRAM

Artwork Courtesy of the City of Los Angeles Stormwater Program. Printed on recycled paper.



LO HICIMOS NOSOTROS MISMOS
Y LO HICIMOS BIEN

Cuando pinte su casa, proteja a su familia y a su comunidad.

- **PINTURAS** a base de agua son menos tóxicas y debe de utilizarlas cuando sea posible.
- **BROCHAS** a base de agua deben ser lavadas en el lavabo. Esas con pintura a base de aceite deben ser limpiadas con disolvente.
- **SANAMENTE** deshágase de la pintura que no necesita. El Condado de San Bernardino ofrece 9 centros de recolección que aceptan pintura y otros desechos tóxicos GRATUITAMENTE.

Para reportar actividades ilegales llamar al
(877) WASTE18 o visite
sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

Arte Cortesía del Programa de Agua Pluvial de la Ciudad de Los Angeles. Impreso en papel reciclado.

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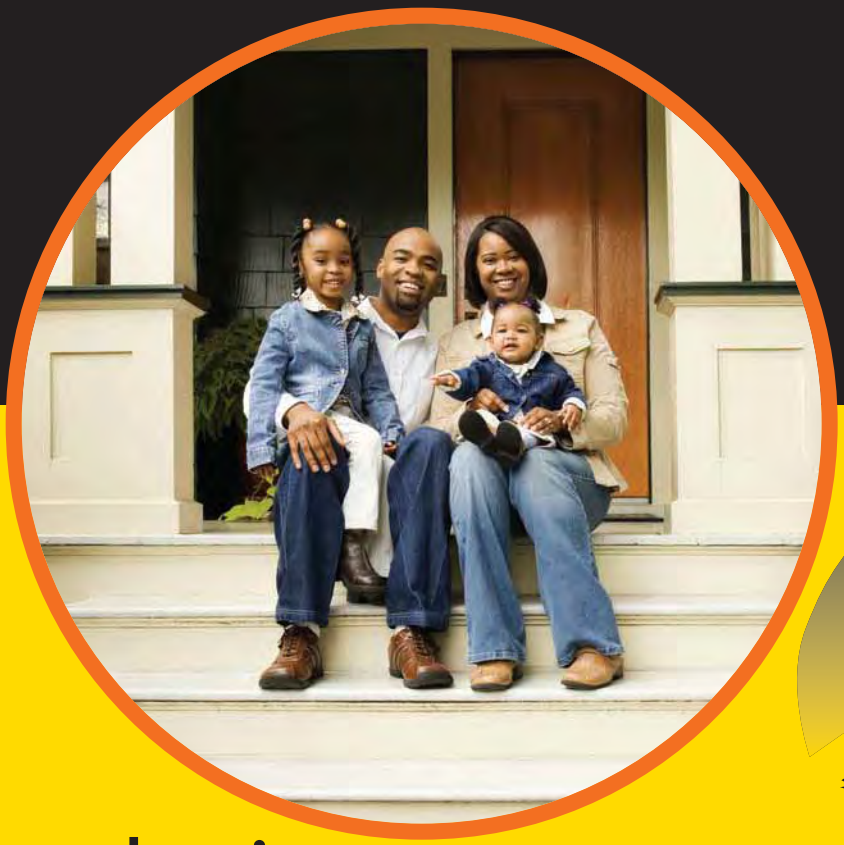
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San Bernardino County STORMWATER PROGRAM

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Paint SAFELY



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WE DID IT OURSELVES
AND WE DID IT RIGHT



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(877) WASTE18 or visit
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San Bernardino County STORMWATER PROGRAM

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Pinte De Manera

SANA



PINTURAS a base de agua son menos tóxicas y debe de utilizarlas cuando sea posible.

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San Bernardino County STORMWATER PROGRAM

Arte Cortesía del Programa de Agua Pluvial de la Ciudad de Los Angeles. Impreso en papel reciclado.

Mobile vehicle maintenance

Wash in a designated area that has been bermed up to contain the wash water.

Common water control devices are: recycling systems; pretreatment or sewer discharge systems; limited recycling systems; wash pits(portable vinyl wash pads), vacuum sludge filtering systems; wet-dry vacuums, sump pumps; drain covers; portable dams; vacu-brooms; oil absorbent pads, booms, pillows, and tubes; plastic sheeting; filter tubs; buckets; pans; and squeegees.

When cleaning engines using chemical additives like soaps, solvents or degreasers, the cleaning must be performed at a facility that has the equipment to properly process the contaminated wastewater runoff, or using a leak-proof ground cover device that will catch and contain all contaminated wastewater runoff for later disposal in a manner that complies with city, county, state and federal codes.

Wastewater from cleaning equipment must be discharged into a sink, toilet, or other drain connected to the sanitary sewer

LANDSCAPE MAINTENANCE

DISCHARGE TO THE STORM DRAIN, **ACCIDENTAL OR NOT**, COULD LEAD TO ENFORCEMENT ACTIONS, WHICH COULD INCLUDE FINES.

Follow the best practices below to **prevent water pollution from landscaping activities.**

RECYCLE YARD WASTE



- Recycle leaves, grass clippings and other yard waste.
- Do not blow, sweep, rake or hose yard waste into the street or catch basin.
- **Try grasscycling:** the natural recycling of grass by leaving clippings on the lawn when mowing.

  For more information, please visit: **www.calrecycle.ca.gov/organics/grasscycling**

USE FERTILIZERS, HERBICIDES AND PESTICIDES SAFELY



- Fertilizers, herbicides and pesticides are often carried into the storm drain system by sprinkler runoff. Use natural and non-toxic alternatives as often as possible.
- If you must use chemical fertilizers, herbicides or pesticides:
  - Spot apply, rather than blanketing entire areas.
  - Avoid applying near curbs and driveways, and **never** before a rain.
  - Apply fertilizers as needed: when plants could best use it and when the potential runoff would be low.
  - Follow the manufacturer's instructions carefully—this will not only give the best results, but will save money.

USE WATER WISELY



- Control the amount of water and direction of sprinklers. Sprinklers should only be on long enough to allow water to soak into the ground, but not so long as to cause runoff.
- Periodically inspect, fix leaks and realign sprinkler heads.
- Plant native vegetation to reduce the need of water, fertilizers, herbicides and pesticides.

HOMEOWNERS

KEEP THESE TIPS IN MIND WHEN HIRING PROFESSIONAL LANDSCAPERS AND REMIND AS NECESSARY.

Leftover pesticides, fertilizers, and herbicides contaminate landfills and should be disposed of through a Hazardous Waste Facility.

For more information on proper disposal call,

(909) 382-5401 or 1-800-OILY CAT.

*FREE for San Bernardino County residents only. Businesses can call for cost inquiries and to schedule an appointment.

To report illegal dumping, call (877) WASTE18 or visit sbcountystormwater.org
To report toxic spills, call 1(800) 33 TOXIC
To dispose of hazardous waste, call 1(800) OILY CAT

sbcountystormwater.org

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MANTENIMIENTO DE JARDINERÍA

LAS DESCARGAS A LOS DESAGUES PLUVIALES, DE MANERA ACCIDENTAL O NO, PUEDEN INDUCIR A LA APLICACIÓN DE MULTAS Y OTRAS MEDIDAS.

Siga las mejores prácticas descritas debajo para evitar la contaminación del agua por actividades de jardinería.

RECICLAJE DE LOS DESECHOS DE JARDÍN



- Reciclar las hojas, recortes de césped y otros desechos de jardín.
- No soplar, barrer, o usar la manguera para empujar los desechos de jardín a la calle.
- **Poner a prueba el reciclaje de césped (grasscycling): la manera natural de reciclar el césped dejando los recortes sobre el césped cuando son cortados. Para más información, visite la página web: www.calrecycle.ca.gov/organics/grasscycling**

USAR FERTILIZANTES, HERBICIDAS Y PESTICIDAS DE MANERA SEGURA



- Los fertilizantes, herbicidas y pesticidas son arrastrados con frecuencia hacia el sistema de desagüe pluvial mediante el escurrimiento de los rociadores. Use alternativas naturales no tóxicas siempre que sea posible.
- Si tiene que usar fertilizantes, herbicidas o pesticidas químicos:
  Aplicar solo en el sitio necesario, en lugar de cubrir todas las áreas.
  Evitar aplicar cerca de los bordillos y las calzadas, y nunca antes de que llueva.
  Aplicar los fertilizantes cuando sea necesario: esto es, cuando las plantas mejor podrían usarlo y el posible escurrimiento sea bajo.
  Seguir las instrucciones del fabricante cuidadosamente – esto no solo le proporcionará los mejores resultados, pero le permitirá ahorrar dinero.

USAR EL AGUA DE MANERA PRUDENTE



- Controlar la cantidad de agua y la orientación de los rociadores. Los rociadores deben ser **solo lo suficientemente largos como para** permitir que el agua remoje el suelo, pero no tan largos que causen un escurrimiento.
- Inspeccione, repare los escapes y alinee los aspersores periódicamente.
- Siembre plantas nativas para reducir el uso de agua, fertilizantes, herbicidas y pesticidas.

PROPIETARIOS DE HOGARES

Tengan en cuenta estos consejos cuando contraten a paisajistas profesionales y recuérdenselos según sea necesario.



Los sobrantes de pesticidas, fertilizantes y herbicidas contaminan los vertederos y deben ser desechados a través de Plantas de Tratamiento para Residuos Peligrosos.

Para más información sobre el manejo adecuado de residuos peligrosos, llame a (909) 382-5401 o 1-800-OILY CAT.

*GRATIS únicamente para los residentes del Condado de San Bernardino. Las empresas pueden llamar para indagar sobre los costos y concertar una cita.

Para denunciar el vertido ilegal de basura, llame al (877) WASTE18 o visite sbcountystormwater.org
Para denunciar derrames tóxicos, llame al 1(800) 33 TOXIC
Para desechar residuos peligrosos, llame al 1(800) OILY CAT

sbcountystormwater.org

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San Bernardino County STORMWATER PROGRAM

FOR MORE INFORMATION ON PREVENTING STORMWATER POLLUTION

CALL 1(800) CLEANUP OR VISIT WWW.SBCOUNTY.GOV/STORMWATER

The San Bernardino County Stormwater Program is a cooperative effor t including the Flood Control District, the County of San Bernardino,and the cities of
Big Bear Lake, Chino, Chino Hills, Colton, Fontana, Grand T errace, Highland, Loma Linda, Montclair, Ontario, Rancho Cucamonga, Redlands, Rialto, San Ber nardino, Upland, and Yucaipa.

Stormwater Pollution Prevention

Best Management Practices for Homeowner's Associations, Property Managers and Property Owners

Your Guide To Maintaining Water Friendly Standards In Your Community

sbcountystormwater.org

Big Bear · Chino · Chino Hills · Colton · Fontana · Grand Terrace · Highland · Loma Linda · Montclair · Ontario · Rancho Cucamonga
Redlands · Rialto · San Bernardino · San Bernardino County · San Bernardino County Flood Control District · Upland · Yucaipa

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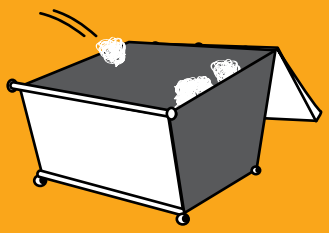
COMMERCIAL TRASH ENCLOSURES

FOLLOW THESE **REQUIREMENTS** TO **KEEP OUR WATERWAYS CLEAN**

Trash enclosures, such as those found in commercial and apartment complexes, typically contain materials that are intended to find their way to a landfill or a recycling facility. **These materials are NOT meant to go into our local lakes and rivers.**

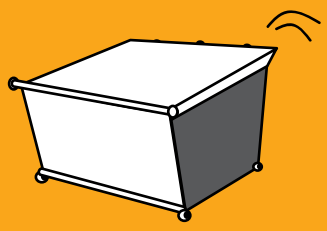
PROTECT WATER QUALITY BY FOLLOWING THESE SIMPLE STEPS

PUT TRASH INSIDE



Place trash inside the bin (preferably in sealed bags)

CLOSE THE LID



Prevent rain from entering the bin in order to avoid leakage of polluted water runoff

KEEP TOXICS OUT



- Paint
- Grease, fats and used oils
- Batteries, electronics and fluorescent lights

SOME ADDITIONAL GUIDELINES, INCLUDE

✓ SWEEP FREQUENTLY
Sweep trash enclosure areas frequently, instead of hosing them down, to prevent polluted water from flowing into the streets and storm drains.

✓ FIX LEAKS
Address trash bin leaks immediately by using dry clean up methods and report to your waste hauler to receive a replacement.

✓ CONSTRUCT ROOF
Construct a solid cover roof over the existing trash enclosure structure to prevent rainwater from coming into contact with trash and garbage. Check with your local City/County for Building Codes.

In San Bernardino County, stormwater pollution is caused by food waste, landscape waste, chemicals and other debris that are washed into storm drains and end up in our waterways - untreated! You can be part of the solution by maintaining a water-friendly trash enclosure.

THANK YOU FOR HELPING TO KEEP SAN BERNARDINO COUNTY CLEAN AND HEALTHY!

San Bernardino County STORMWATER PROGRAM

In the event of a spill or discharge to a storm drain or waterway, contact San Bernadino County Stormwater immediately: (877) WASTE18 | sbcountystormwater.org/report

sbcountystormwater.org

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CESQG PROGRAM

Conditionally Exempt Small Quantity Generator

WHAT IS A CESQG?

Businesses that generate 27 gallons or 220 lbs. of hazardous waste, or 2.2 lbs. of extremely hazardous waste per month are called "Conditionally Exempt Small Quantity Generators," or CESQGs. San Bernardino County Household Hazardous Program provides waste management services to CESQG businesses. The most common CESQGs in San Bernardino County are painters, print shops, auto shops, builders, agricultural operators and property managers, but there are many others. When you call, be ready to describe the types and amounts of waste your business generates in a typical month. If you generate hazardous waste on a regular basis, you must:

- Register with San Bernardino County Fire Department (909) 386-8401 as a hazardous waste generator.
- To obtain an EPA ID# and application form from the State visit www.dtsc.ca.gov.
- Manage hazardous waste in accordance with all applicable local, state and federal laws and regulations.

HOW DO I GET SERVICE?

To arrange an appointment for the CESQG Program, call 1-800-OILY CAT or 909-382-5401. Be ready to describe the type and amount of hazardous waste your business is ready to dispose of, and the types and size(s) of containers that the waste is in.

Waste Type and Cost

There is a small handling fee involved in the collection of hazardous waste from your business. Disposal costs depend on the type of waste.

Aerosols	$1.29/lb.
Automobile motor oil	$.73/gal.
Anti-freeze	$1.57/gal.
Contaminated oil	$4.48/gal.
Car batteries	$.62/ea.
Corrosive liquids, solids	$2.80/lb.
Flammable solids, liquids	$1.57/lb.
Latex Paint	$.73/lb.
Mercury	$10.08/lb.
NiCad/Alkaline Batteries	$2.13/lb.
Oil Base Paints	$1.00/lb.
Oil Filters	$.56/ea.
Oxidizers	$9.63/lb.
PCB Ballasts	$5.94/lb.
Pesticides (most)	$2.91/lb.
Photofixer, developer	$4.31/gal.
Television & Monitors	$11.20/ea.
Additional Handling	$138.00/hr.

Rates subject to change without notice

WE CANNOT ACCEPT

- Radioactives
- Water reactives
- Explosives
- Compressed gas cylinders
- Medical or biohazardous waste
- Asbestos
- Remediation wastes

HAZARDOUS WASTE

WHY IS THE FIRE DEPARTMENT COLLECTING HAZARDOUS WASTE?

Small Quantity Generators often have difficulty disposing of small quantities of hazardous waste. Hazardous waste companies usually have a minimum amount of waste that they will pick up, or charge a minimum fee for service. Typically, the minimum fee exceeds the cost of disposal for the hazardous waste. This leaves the small quantity generator in a difficult situation. Some respond by storing hazardous waste until it becomes economical for the hazardous waste transporter to pick it up, putting the business out of compliance by exceeding regulatory accumulation time limits. Other businesses simply store their hazardous wastes indefinitely, creating an unsafe work environment and exceeding accumulation time limits. Yet other businesses attempt to illegally dispose of their waste at household hazardous waste collection facilities. These facilities are not legally permitted to accept commercial wastes, nor are prepared to provide legal documentation for commercial hazardous waste disposal. In answer to the problems identified above, the San Bernardino County Fire Department Household Hazardous Program instituted the Conditionally Exempt Small Quantity Generator Program.

PAYMENT FOR SERVICES

The CESQG Program will prepare an invoice for your business at the time of service. You can pay at the time of service with cash or a check, or you can mail your payment to the Fire Department within 30 days. Please note that we do not accept credit card payments. The preferred method of payment is to handle payment at time of service. Additional charges may apply for accounts not paid within 30 days.

ARE THERE ANY OTHER WAYS THAT I CAN SAVE MONEY ON HAZARDOUS WASTE DISPOSAL?

Yes! First, start by reducing the amount of waste that you produce by changing processes or process chemicals, at your business. Next, examine if there is a way that you can recycle your waste back into your processes. Network with similar businesses or trade associations for waste minimization and pollution prevention solutions.

WHAT IF YOUR BUSINESS DOES NOT QUALIFY?

Call the San Bernardino County Fire Department Field Services Division for assistance with hazardous waste management at 909-386-8401. If you reduce the amount of waste you generate each month to 27 gallons or less, you may qualify in the future.

WHAT HAPPENS TO YOUR HAZARDOUS WASTE?

Hazardous waste collected by the CESQG Program is transported to a state permitted processing facility in San Bernardino. The waste is further processed at this point and packaged for off-site recycling (oil filters, oil, latex paint, antifreeze, and batteries) or destructive incineration (pesticides, corrosives, flammables, oil based paint).

San Bernardino County Fire Department
CESQG Program
2824 East "W" Street
San Bernardino, CA 92415-0799
Phone: 909-382-5401
Fax: 909-382-5413
www.sbcfire.org/hazmat/hhw.asp
Email: jschwab@sbcfire.org

WHEN WORKING OUTDOORS USE THE 3Cs

CUANDO TRABAJE AL AIRE LIBRE UTILICE LAS 3Cs

CONTROL | CONTROL



Locate the nearest storm drain and ensure nothing can enter or be discharged into it.
Ubique el desagüe de aguas pluviales más cercano y asegúrese de que nada pueda ingresar a éste ni descargarse en él.

CONTAIN | CONTENER



Isolate your area to prevent material from potentially flowing or being blown away.
Aísle su área para evitar que el material pueda discurrirse o ser llevado por el viento.

CAPTURE | CAPTURAR



Sweep up debris and place it in the trash. Clean up spills with an absorbent material (e.g. kitty litter) or vacuum with a Wet-Vac and dispose of properly.
Recoja los restos y colóquelos en la basura. Limpie los derrames con un material absorbente (como la arena para gatos) o aspírelos con una Wet-Vac (aspiradora de humedad) y deséchelos correctamente.

COMMERCIAL LANDSCAPE

DISCHARGE TO THE STORM DRAIN, **ACCIDENTAL OR NOT**, COULD LEAD TO ENFORCEMENT ACTIONS, WHICH COULD INCLUDE FINES.

Follow the best practices below to **prevent water pollution from landscaping activities.**

RECYCLE YARD WASTE



- Recycle leaves, grass clippings and other yard waste.
- Do not blow, sweep, rake or hose yard waste into the street or catch basin.
- **Try grasscycling:** the natural recycling of grass by leaving clippings on the lawn when mowing.

  For more information, please visit: **www.calrecycle.ca.gov/organics/grasscycling**

USE FERTILIZERS, HERBICIDES AND PESTICIDES SAFELY



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  - Spot apply, rather than blanketing entire areas.
  - Avoid applying near curbs and driveways, and **never** before a rain.
  - Apply fertilizers as needed: when plants could best use it and when the potential runoff would be low.
  - Follow the manufacturer's instructions carefully—this will not only give the best results, but will save money.

USE WATER WISELY



- Control the amount of water and direction of sprinklers. Sprinklers should only be on long enough to allow water to soak into the ground, but not so long as to cause runoff.
- Periodically inspect, fix leaks and realign sprinkler heads.
- Plant native vegetation to reduce the need of water, fertilizers, herbicides and pesticides.

HOMEOWNERS

KEEP THESE TIPS IN MIND WHEN HIRING PROFESSIONAL LANDSCAPERS AND REMIND AS NECESSARY.



Leftover pesticides, fertilizers, and herbicides contaminate landfills and should be disposed of through a Hazardous Waste Facility.

For more information on proper disposal call,

(909) 382-5401 or 1-800-OILY CAT.

*FREE for San Bernardino County residents only. Businesses can call for cost inquiries and to schedule an appointment.

In the event of a spill or discharge to a storm drain or waterway, contact San Bernadino County Stormwater immediately: (877) WASTE18 | sbcountystormwater.org/report

sbcountystormwater.org

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Redlands • Rialto • San Bernadino • San Bernadino County • San Bernadino County Flood Control District • Upland • Yucaipa

SIDEWALK, PLAZA, ENTRY MONUMENT & FOUNTAIN MAINTENANCE

Pollutants on sidewalks and other pedestrian traffic areas and plazas are typically due to littering and vehicle use. Fountain water containing chlorine and copperbased algaecides is toxic to aquatic life. Proper inspection, cleaning, and repair of pedestrian areas and HOA owned surfaces and structures can reduce pollutant runoff from these areas. Maintaining these areas may involve one or more of the following activities:

1. **Surface Cleaning**
2. **Graffiti Cleaning**
3. **Sidewalk Repair**
4. **Controlling Litter**
5. **Fountain Maintenance**

POLLUTION PREVENTION:

Pollution prevention measures have been considered and incorporated in the model procedures. Implementation of these measures may be more effective and reduce or eliminate the need to implement other more complicated or costly procedures. Possible pollution prevention measures for sidewalk, plaza, and fountain maintenance and cleaning include:

- Use dry cleaning methods whenever practical for surface cleaning activities.
- Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal).
- Once per year, educate HOA staff and tenants on pollution prevention measures.

MODEL PROCEDURES:

1. Surface Cleaning

Discharges of wash water to the storm water drainage system from cleaning or hosing of impervious surfaces is prohibited.

Sidewalks, Plazas

✓ Use dry methods (e.g. sweeping, backpack blowers, vacuuming) whenever practical to clean sidewalks and plazas rather than hosing, pressure washing, or steam cleaning. DO NOT sweep or blow material into curb; use devices that contain the materials.

✓ If water must be used, block storm drain inlets and contain runoff. Discharge wash water to landscaping or contain and dispose of properly.

SIDEWALK, PLAZA, ENTRY MONUMENT & FOUNTAIN MAINTENANCE

Parking Areas, Driveways, Drive-thru

✓ Parking facilities should be swept/vacuumed on a regular basis. Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.

✓ If water must be used, block storm drain inlets and contain runoff. Discharge wash water to landscaping or contain and dispose of properly.

✓ Sweep all parking lots at least once before the onset of the wet season.

✓ Use absorbents to pick up oil; then dry sweep.

✓ Appropriately dispose of spilled materials and absorbents.

OPTIONAL:

- Consider increasing sweeping frequency based on factors such as traffic volume, land use, field observations of sediment and trash accumulation, proximity to water courses, etc.

Building Surfaces, Decks, etc., without loose paint

✓ Use high-pressure water, no soap.

✓ If water must be used, block storm drain inlets and contain runoff. Discharge wash water to landscaping or contain and dispose of properly.

Unpainted Building Surfaces, Wood Decks, etc.

✓ If water must be used, block storm drain inlets and contain runoff. Discharge wash water to landscaping or contain and dispose of properly.

✓ Use biodegradable cleaning agents to remove deposits.

✓ Make sure pH is between 6.5 and 8.5 THEN discharge to landscaping (if cold water without a cleaning agent) otherwise dispose of properly.

2. Graffiti Cleaning

Graffiti Removal

✓ Avoid graffiti abatement activities during rain events.

✓ When graffiti is removed by painting over, implement the procedures under Painting and Paint Removal in the Roads, Streets, and Highway Operation and Maintenance procedure sheet.

✓ Protect nearby storm drain inlets prior to removing graffiti from walls, signs, sidewalks, or other structures needing graffiti abatement. Clean up afterwards by sweeping or vacuuming thoroughly, and/or by using absorbent and properly disposing of the absorbent.

SIDEWALK, PLAZA, ENTRY MONUMENT & FOUNTAIN MAINTENANCE

✓ Note that care should be taken when disposing of waste since it may need to be disposed of as hazardous waste.

OPTIONAL:

• Consider using a waterless and non-toxic chemical cleaning method for graffiti removal (e.g. gels or spray compounds).

3. Sidewalk Repair

Surface Removal and Repair

✓ Schedule surface removal activities for dry weather if possible.

✓ Avoid creating excess dust when breaking asphalt or concrete.

✓ Take measures to protect nearby storm drain inlets prior to breaking up asphalt or concrete (e.g. place hay bales or sand bags around inlets). Clean afterwards by sweeping up material.

✓ Designate an area for clean up and proper disposal of excess materials.

✓ Remove and recycle as much of the broken pavement as possible.

✓ When making saw cuts in pavement, use as little water as possible. Cover each storm drain inlet with filter fabric during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains shovel or vacuum the slurry, remove from site and dispose of properly.

✓ Always dry sweep first to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains. Once dry sweeping is complete, the area may be hosed down if needed. Discharge wash water to landscaping, pump to the sanitary sewer if permitted to do so or contain and dispose of properly.

Concrete Installation and Repair

✓ Avoid mixing excess amounts of fresh concrete or cement mortar on-site. Only mix what is needed for the job.

✓ Wash concrete trucks off-site or in designated areas on-site, such that there is no discharge of concrete wash water into storm drain inlets, open ditches, streets, or other storm water conveyance structures. (See Concrete Waste Management BMP WM – 8)

SIDEWALK, PLAZA, ENTRY MONUMENT & FOUNTAIN MAINTENANCE

✓ Store dry and wet concrete materials under cover, protected from rainfall and runoff and away from drainage areas. After job is complete remove temporary stockpiles (asphalt materials, sand, etc.) and other materials as soon as possible.

✓ Return leftover materials to the transit mixer. Dispose of small amounts of excess concrete, grout, and mortar in the trash.

✓ When washing concrete to remove fine particles and expose the aggregate, contain the wash water for proper disposal.

✓ Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stock pile, or dispose in the trash.

✓ Protect applications of fresh concrete from rainfall and runoff until the material has hardened.

4. Litter Control

✓ Enforce anti-litter laws.

✓ Provide litter receptacles in busy, high pedestrian traffic areas of the community, at recreational facilities, and at community events.

✓ Cover litter receptacles and clean out frequently to prevent leaking/spillage or overflow.

OPTIONAL:

• Post "No Littering" signs.

5. Fountain Maintenance

✓ Do not use copper-based algaecides. Control algae with chlorine or other alternatives, such as sodium bromide.

✓ Allow chlorine to dissipate for a few days and then recycle/reuse water by draining it gradually onto a landscaped area. Water must be tested prior to discharge to ensure that chlorine is not present (concentration must be less than 0.1 ppm).

✓ Contact local agency for approval to drain into sewer or storm drain.

✓ Avoid mixing excess amounts of fresh concrete or cement mortar on-site. Only mix what is needed for the job.

EQUIPMENT MAINTENANCE & REPAIR

Vehicle or equipment maintenance has the potential to be a significant source of stormwater pollution. Engine repair and service (parts cleaning, spilled fuel, oil, etc.), replacement of fluids, and outdoor equipment storage and parking (dripping engines) can all contaminate stormwater. Conducting the following activities in a controlled manner will reduce the potential for stormwater contamination:

1. **General Maintenance and Repair**
2. **Vehicle and Machine Repair**
3. **Waste Handling/Disposal**

Related vehicle maintenance activities are covered under the following program headings in this manual: "Vehicle and Equipment Cleaning", "Vehicle and Equipment Storage", and "Vehicle Fueling".

POLLUTION PREVENTION:

Pollution prevention measures have been considered and incorporated in the model procedures. Implementation of these measures may be more effective and reduce or eliminate the need to implement other more complicated or costly procedures. Possible pollution prevention measures for equipment maintenance and repair include:

- Review maintenance activities to verify that they minimize the amount of pollutants discharged to receiving waters. Keep accurate maintenance logs to evaluate materials removed and improvements made.
- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Minimize use of solvents. Clean parts without using solvents whenever possible. Recycle used motor oil, diesel oil, and other vehicle fluids and parts whenever possible.
- Once per year, educate HOA staff and tenants on pollution prevention measures.

EQUIPMENT MAINTENANCE & REPAIR

MODEL PROCEDURES:

1. General Maintenance and Repair

General Guidelines

➔ *Note: Permission must be obtained for any discharge of wash water to the sanitary sewer from the local sewering agency.*

- ✓ Review maintenance activities to verify that they minimize the amount of pollutants discharged to receiving waters. Keep accurate maintenance logs to evaluate materials removed and improvements made.
- ✓ Regularly inspect vehicles and equipment for leaks.
- ✓ Move activity indoors or cover repair area with a permanent roof if feasible.
- ✓ Minimize contact of stormwater with outside operations through berming the local sewering and drainage routing.
- ✓ Place curbs around the immediate boundaries of the process equipment.
- ✓ Clean yard storm drain inlets regularly and stencil them.

Good Housekeeping

- ✓ Avoid hosing down work areas. If work areas are washed and if discharge to the sanitary sewer is allowed, treat water with an appropriate treatment device (e.g. clarifier) before discharging. If discharge to the sanitary sewer is not permitted, pump water to a tank and dispose of properly.
- ✓ Collect leaking or dripping fluids in drip pans or container. Fluids are easier to recycle or dispose of properly if kept separate.
- ✓ Keep a drip pan under the vehicle while you unclip hoses, unscrew filters, any discharge of or remove other parts. Place a drip pan under any vehicle that might leak while you work on it to keep splatters or drips off the shop floor.
- ✓ Educate employees on proper handling and disposal of engine fluids.
- ✓ Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- ✓ Do not pour liquid waste to floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- ✓ Post signs at sinks and stencil outdoor storm drain inlets.

2. Vehicle Repair

General Guidelines

- ✓ Perform vehicle fluid removal or changing inside of a building or in a contained covered area, where feasible, to prevent the run-on of stormwater and the runoff of spills.
- ✓ Regularly inspect vehicles and equipment for leaks, and repair as needed.

EQUIPMENT MAINTENANCE & REPAIR

- ✓ Use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- ✓ Immediately drain all fluids from wrecked vehicles. Ensure that the drain pan or drip pan is large enough to contain drained fluids (e.g. larger pans are needed to contain antifreeze, which may gush from some vehicles).
- ✓ Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- ✓ Recycle used motor oil, diesel oil, and other vehicle fluids and parts whenever possible.
- ✓ Oil filters disposed of in trash cans or dumpsters can leak oil. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.
- ✓ Store cracked batteries in a non-leaking secondary container and dispose of properly at recycling facilities or at County hazardous waste disposal site.

Vehicle Leak and Spill Control

- ✓ Use absorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- ✓ Place a stockpile of spill cleanup materials where it will be readily accessible.
- ✓ Sweep floor using dry absorbent material.

3. Machine Repair

- ✓ Keep equipment clean; don't allow excessive build-up of oil or grease.
- ✓ Minimize use of solvents.
- ✓ Use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- ✓ Perform major equipment repairs at the corporation yard, when practical.
- ✓ Following good housekeeping measures in Vehicle Repair section.

4. Waste Handling/Disposal

Waste Reduction

- ✓ Prevent spills and drips of solvents and cleansers to the shop floor.
- ✓ Do liquid cleaning at a centralized station so the solvents and residues stay in one area. Recycle liquid cleaners when feasible.

✓ Locate drip pans, drain boards, and drying racks to direct drips back into a solvent sink or fluid holding tank for reuse.

OPTIONAL:

- If possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous material:

  -Use non-caustic detergents instead of caustic cleaning for parts cleaning.

  -Use a water-based cleaning service and have tank cleaned. Use detergent-based or water-based cleaning systems in place of organic solvent degreasers.

  -Replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check list of active ingredients to see whether it contains chlorinated solvents.

  -Choose cleaning agents that can be recycled.

Recycling

OPTIONAL:

- Separate wastes for easier recycling. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents separate from non-chlorinated solvents.

- Label and track the recycling of waste material (e.g. used oil, spent solvents, batteries).

- Purchase recycled products to support the market for recycled materials.

LIMITATIONS:

Space and time limitations may preclude all work being conducted indoors. It may not be possible to contain and clean up spills from vehicles/equipment brought on-site after working hours. Dry floor cleaning methods may not be sufficient for some spills – see spill prevention and control procedures sheet. Identification of engine leaks may require some use of solvents.

POOL MAINTENANCE

Pool chemicals and filter solids, when discharged to the City streets, gutters or storm drans, DO NOT GET TREATED before reaching the Santa Ana River. Chlorine, acid cleaning chemicals and metal-based algaecides used in pools can kill beneficial organisms in the food chain and pollute our drinking water.

When emptying your swimming pool, spa or fountain, please use one of the following best management practices to prevent water pollution:

- Reuse the water as landscape irrigation
- Empty the water into the sewer between midnight and 6:00 am
- Remove solids and floating debris and dispose of in the trash, de-chlorinate the water to a chlorine residual = 0, wait 24 hours, then discharge the water to the street or storm drain
- Try not to use metal-based algaecides (i.e. copper sulfate) in your pool or spa. If you have, empty your pool or spa into the sewer. *Prior to discharging pool water into the sanitary sewer system, contact your local agency.*
- If the pool contains algae and mosquito larvae, discharge the water to the sewer

When acid cleaning or other chemical cleaning:

- Neutralize the pool water to pH of 6.5 to 8.5, then discharge to the sewer

For swimming pool and spa filter backwash:

- Dispose of solids into trash bag, then wash filter into a landscape area
- Settle, dispose of solids in trash and discharge water to the sewer, never to the storm drain

» For Residents

The following is a preview of the information we have available to residents. For more fact sheets, visit ***sbcountystormwater.org***

Household Hazardous Waste Center Locations

TOO TOXIC TO TRASH

Dispose of your **HOUSEHOLD HAZARDOUS WASTE** (HHW) at a **FREE** HHW Center near you. Examples of items collected: pesticides, fertilizers, paints, cleaners, antifreeze, batteries, motor oil, oil filters, and electronic waste.

SERVICE AREA	LOCATION	DAYS OPEN	HOURS
Big Bear Lake (does not accept E-waste)	42040 Garstin Dr. (cross: Big Bear Blvd.)	Saturdays	9 a.m. - 2 p.m.
Chino	5050 Schaefer Ave. (cross: 4th St.)	2nd & 4th Sat.	8 a.m. - 1 p.m.
Fontana (Fontana residents only)	16454 Orange Way (cross: Cypress Ave.) Note: Provide a trash bill and a driver's license as proof of residency.	Saturdays	8 a.m. - 12 p.m.
Ontario	1430 S. Cucamonga Ave. (cross: Belmont St.)	Fri. & Sat.	9 a.m. - 2 p.m.
Rancho Cucamonga	8794 Lion Street. (Off 9th St, between Vineyard and Hellman)	Saturdays	8 a.m. - 12 p.m.
Redlands	500 Kansas St. (cross: Park Ave.)	Saturdays	9:30 a.m. - 12:30 p.m.
Rialto (does not accept E-waste)	246 Willow Ave. (cross: Rialto Ave.)	2nd & 4th Fri. & Sat.	8 a.m. - 12 p.m.
San Bernardino	2824 East 'W' St., 302 (cross: Victoria Ave.)	Mon. – Fri.	9 a.m. - 4 p.m.
Upland	1370 N. Benson Ave. (cross: 14th St.)	Saturdays	9 a.m. - 2 p.m.

San Bernardino County STORMWATER PROGRAM

To report illegal dumping, call (877) WASTE18
or visit sbcountystormwater.org

Artwork Courtesy of the City of Los Angeles Stormwater Program. Printed on recycled paper.

TAKE ONE



WE DID IT OURSELVES AND WE DID IT RIGHT

When painting your home, protect your family and community.

- **PAINTS** that are water-based are less toxic and should be used whenever possible.
- **BRUSHES** with water-based paint should be washed in the sink. Those with oil-based paint should be cleaned with paint thinner.
- **SAFELY** dispose of unwanted paint and paint thinner. The County of San Bernardino offers 9 HHW Centers that accept paint and other household hazardous waste from residents FREE of charge. For a list of acceptable materials, location information, and hours of operation call 1-800-OILY CAT.

VEHICLE MAINTENANCE

Oil, grease, anti-freeze and other toxic automotive fluids often make their way into the San Bernardino County storm drain system, and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.

Cleaning Auto Parts
Scrape parts with a wire brush or use a bake oven rather than liquid cleaners. Arrange drip pans, drying racks and drain boards so that fluids are directed back into the parts washer or the fluid holding tank. Do not wash parts or equipment in a sink, parking lot, driveway or street.

Storing Hazardous Waste
Keep your liquid waste segregated. Many fluids can be recycled via hazardous waste disposal companies if they are not mixed. Store all materials under cover with spill containment or inside to prevent contamination of rainwater runoff.

Preventing Leaks and Spills
Conduct all vehicle maintenance inside of a garage. Place drip pans underneath vehicle to capture fluids. Use absorbent materials instead of water to clean work areas.

Cleaning Spills
Use dry methods for spill cleanup (sweeping, absorbent materials). To report accidental spills into the street or storm drain call (877) WASTE18 or 911.

Proper Disposal of Hazardous Waste
Dispose of household hazardous waste by taking it to your nearest household hazardous waste center. For more information, call 1-800-OILY CAT or check out sbcountystormwater.org/Disposal.html

FREE

DOGGIE WASTE BAGS

Remember to pick up after your pet every time to keep San Bernardino County clean and healthy!



San Bernardino County STORMWATER PROGRAM

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Redlands • Rialto • San Bernadino • San Bernadino County • San Bernadino County Flood Control District • Upland • Yucaipa

» Get In Touch With Us Online!

» Website
sbcountystormwater.org

» eUpdates
sbcountystormwater.org/newsletter

» Facebook
facebook.com/sbcountystormwater

» YouTube
youtube.com/sbcountystormwater



» Report Pollution Violations
sbcountystormwater.org/report

» Email
info@sbcountystormwater.org

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SERVICE AREA	LOCATION	DAYS OPEN	HOURS
Big Bear Lake (does not accept E-waste)	42040 Garstin Dr. (cross: Big Bear Blvd.)	Saturdays	9 a.m. - 2 p.m.
Chino	5050 Schaefer Ave. (cross: 4th St.)	2nd & 4th Sat.	8 a.m. - 1 p.m.
Fontana (Fontana residents only)	16454 Orange Way (cross: Cypress Ave.) Note: Provide a trash bill and a driver's license as proof of residency.	Saturdays	8 a.m. - 12 p.m.
Ontario	1430 S. Cucamonga Ave. (cross: Belmont St.)	Fri. & Sat.	9 a.m. - 2 p.m.
Rancho Cucamonga	8794 Lion Street. (Off 9th St, between Vineyard and Hellman)	Saturdays	8 a.m. - 12 p.m.
Redlands	500 Kansas St. (cross: Park Ave.)	Saturdays	9:30 a.m. - 12:30 p.m.
Rialto (does not accept E-waste)	246 Willow Ave. (cross: Rialto Ave.)	2nd & 4th Fri. & Sat.	8 a.m. - 12 p.m.
San Bernardino	2824 East 'W' St., 302 (cross: Victoria Ave.)	Mon. – Fri.	9 a.m. - 4 p.m.
Upland	1370 N. Benson Ave. (cross: 14th St.)	Saturdays	9 a.m. - 2 p.m.

San Bernardino County STORMWATER PROGRAM

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or visit sbcountystormwater.org

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TAKE ONE

MUY TÓXICO PARA LA BASURA

Desháguese de sus **DESECHOS PELIGROSOS** gratuitamente en un centro de recolección cerca de usted. Ejemplos de artículos que se aceptan: pesticidas, fertilizantes, pinturas, limpiadores, anticongelante, baterías, aceite de motores y filtros, y aparatos electrónicos.

ÁREA DE SERVICIO	UBICACIÓN	ABIERTO	HORARIO
Big Bear Lake (no se acepta materiales electronicas)	42040 Garstin Dr. (Big Bear Blvd.)	Sábado	9 a.m. - 2 p.m.
Chino	5050 Schaefer Ave. (4th St.)	2nd & 4th Sábado	8 a.m. - 1 p.m.
Fontana (residentes de Fontana solamente)	16454 Orange Way (Cypress Ave.) Nota: Presentar un recibo de basura y licencia de conducir como prueba de residencia.	Sábado	8 a.m. - 12 p.m.
Ontario	1430 S. Cucamonga Ave. (Belmont St.)	Viernes & Sábado	9 a.m. - 2 p.m.
Rancho Cucamonga	8794 Lion Street (Off 9th St, between Vineyard & Hellman)	Sábado	8 a.m. - 12 p.m.
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San Bernardino	2824 East 'W' St., 302 (Victoria Ave.)	Lunes – Viernes	9 a.m. - 4 p.m.
Upland	1370 N. Benson Ave. (14th St.)	Sábado	9 a.m. - 2 p.m.

San Bernardino County STORMWATER PROGRAM

Para reportar actividades ilegales llamar al (877) WASTE18
o visite sbcountystormwater.org

Arte Cortesía del Programa de Agua Pluvial de la Ciudad de Los Angeles. Impreso en papel reciclado.

TOME UNO

A SAFE GARDEN:
A LOT DEPENDS ON IT.



Protect your family and community when using pesticides and fertilizers.

- **STRATEGICALLY** apply products on your lawn when rain is not expected. Rain can wash toxic chemicals from your lawn into local waterways.
- **SPOT-APPLY** products directly on the problem instead of the whole area. Use less chemicals, and conserve the supply of your product.
- **SAFELY** dispose of unwanted products. The County of San Bernardino offers 9 HHW Centers that accept pesticides, fertilizers and other toxic waste FREE of charge.

To report illegal dumping, call
(877) WASTE18 or visit
sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

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UN JARDÍN SANO:
MUCHO DEPENDE DE ÉL.



Proteja a su familia y a su comunidad cuando utilice pesticidas y fertilizantes.

- **ESTRATÉGICAMENTE** aplique productos en su césped solamente cuando no se espera lluvia. La lluvia puede llevarse químicos tóxicos de su césped hacia los canales pluviales en su área.
- **ESCASAMENTE** aplique los productos directamente en el área en donde exista el problema en lugar de distribuirlo en todo el jardín. Así, utilizará menos productos químicos y le rendirá más.
- **ELIMINE** productos tóxicos sanamente. El Condado de San Bernardino ofrece 9 centros de recolección que aceptan pesticidas, fertilizantes y otros desechos tóxicos GRATUITAMENTE.

Para reportar actividades ilegales llamar al
(877) WASTE18 o visite
sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

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Para reportar actividades ilegales llamar al
(877) WASTE18 o visite
sbcountystormwater.org

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STORMWATER PROGRAM

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SPOT-APPLY

pesticides directly on the problem rather than blanketing the whole area.



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A SAFE GARDEN:
A LOT DEPENDS ON IT.



San Bernardino County STORMWATER PROGRAM

(877) WASTE18

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ESCASAMENTE

aplique pesticidas directamente en el problema en lugar de distribuirlo en todo el jardín.



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UN J ARDÍN SANO:
MUCHO DEPENDE DE EL.



San Bernardino County
STORMWATER PROGRAM

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Arte Cortesía del Programa de Agua Pluvial de la Ciudad de Los Angeles. Impreso en papel reciclado.

GARDEN SMART:
Use Pesticides and Fertilizers Sparingly



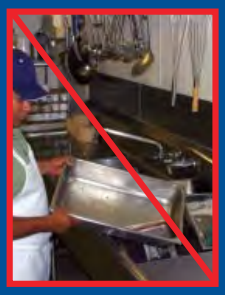
sbcounty.gov/stormwater

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Managing FATS, OIL and GREASE

"It's Easier than YOU Think!"

THE WRONG WAY
La Forma Incorrecta



1

Do not pour cooking residue directly into the drain.

No vierta residuos de cocinar directamente en el desague.



2

Do not dispose of food waste into the garbage disposal.

No ponga desperdicios de comida en el triturador de comida.



3

Do not pour waste oil directly into the drain.

No ponga desperdicio de aceite directamente en el desague.



4

Do not wash floor mats where water will run off directly into the storm drain.

No lave tapetes de piso en un lugar donde el agua corra hacia el desague.

THE RIGHT WAY
La Forma Correcta



1

Wipe pots, pans, and work areas prior to washing.

Limpie con una toallita las ollas, cazuelas, y areas de trabajo antes de lavarlos.



2

Dispose of food waste directly into the trash.

Deseche los desperdicios de comida en el bote de basura.



3

Collect waste oil and store for recycling.

Junte el desperdicio de aceite y guardelo para que sea reciclado.



4

Clean mats inside over a utility sink.

Limpie los tapetes de piso detro de un lavabo o fregador.

STORMWATER Pollution Prevention

ROADWORK AND PAVING

Asphalt, saw-cut slurry and excavated materials from road paving, surfacing and pavement removal often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



Preventing Erosion
Schedule excavation and grading work during dry weather. Develop and implement erosion and sediment control plans for excavated embankments. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.



During Construction
Cover catch basins and maintenance holes when applying seal coat, slurry seal or fog seal. Use check dams, ditches or berms around excavations, and avoid over applying water for dust control. Never wash excess materials from exposed aggregate or concrete into the street, gutter or a storm drain.



Maintaining Vehicles & Equipment
Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutter and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks, and prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, brake and radiator fluids.

Asphalt & Concrete Removal
Barricade storm drain openings during saw-cutting, and recycle broken up pavement at a crushing company. For recycling information, call (909) 386-8401.



Cleaning & Preventing Spills
Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. Sweep up dry spills, instead of hosing. Prevent spills from paver machines by using drip pans, or by placing absorbent materials like cloths or rags under the machines when not in use. To report serious spills, call 911.



To report illegal dumping call

(877) WASTE18

sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

Prevención de Contaminación del Desagüe

TRABAJO DE CARRETERAS & PAVIMENTO

Asfalto, mezcla y materiales de excavaciones del pavimento acaban por llegar a los drenajes del Condado de San Bernardino y terminando en el Rio de Santa Ana. Esto contamina el agua que tomamos, haciendola peligorsa para la gente y la vida salvaje. Sigue estas practicas para prevenir la contaminación y protejer la salud publica.



Previniendo Erosiones
Planea las excavaciones trabajo de jardineria durante el clima seco. Desarrolla e implementa planes de embancamientos de control de sedimento y excavaciones. Cubre montones de tierra, grava y otros materiales con un plastico para protejerlos de la llvia, aire y desagüe.



Durante Construcción
Cubre los lavados y da mantenimiento a los hoyos al aplicar selladura o mezcla. Revisa las areas de excavaciones, y evita pasarte de agua para preveenir polvadura. Nunca laves los materiales llenos de concreto en la calle, drenajes o en el desagüe.



Mantenimiento de Vehiculos & Herramientas
Has el mantenimiento y carga de vehiculos en el mismo lugar, lejos de la calle, las alcantarillas y los drenajes. Inspecciona los vehiculos y el equipo de cualquier goteadura y evita goteaduras de autos que no se usan vasiandoles la gasolina, aceite de transmision, frenos y liquidos del radiador.

Removiendo Asfalto & Concreto
Bloquea alrededor de los drenajes cuando estes usando las maquinas de sierra, tambien recicla todo el pavimento roto en la compañia demolidora. Para más información llama al (909) 386-8401.



Limpiando & Previniendo Derrames
Mantente siempre preparado para cualquier derrame, usa siempre las herramientas de seguridad al igual que materiales como, tierra para desechos de gato o aserrin Barre los derrames en ves de lavarlos con la manguera. Previene los derrames de las maquinas usando enbudos o colocanto garras para absorver cualquier liquido. Para reportar derrames llama al 911.



Para reportar actividades ilegales llamar al:

(877) WASTE18

sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

STORMWATER Pollution Prevention

HOME & GARDEN

Yard waste and household toxics like paints and pesticides often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these simple tips to prevent pollution and protect your health.



Recycle Household Hazardous Waste
Household products like paint, pesticides, solvents and cleaners are too dangerous to dump and too toxic to trash. Take them to be recycled at a convenient household hazardous waste collection facility. Call (800) CLEANUP for the facility in your area.



Disposing of Yard Waste
Recycle leaves, grass clippings and other yard waste, instead of blowing, sweeping or hosing into the street. Try grasscycling, leaving grass clippings on your lawn instead of using a grass catcher. The clippings act as a natural fertilizer, and because grass is mostly water, it also irrigates your lawn, conserving water.



Use Fertilizers & Pesticides Safely
Fertilizers and pesticides are often carried into the storm drain system by sprinkler runoff. Try using organic or non-toxic alternatives. If you use chemical fertilizers or pesticides, avoid applying near curbs and driveways and never apply before a rain.



Planting in the Yard
Produce less yard waste and save water by planting low maintenance, drought-tolerant trees and shrubs. Using drip irrigation, soaker hoses or micro-spray systems for flower beds and vegetation can also help reduce your water bill and prevent runoff.



Use Water Wisely
Cut your water costs and prevent runoff by controlling the amount of water and direction of sprinklers. The average lawn needs about an inch of water a week, including rainfall, or 10 to 20 minutes of watering. A half-inch per week is enough for fall and spring. Sprinklers should be on long enough to allow water to soak into the ground but not so long as to cause runoff.

To report illegal dumping call

(877) WASTE18

sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

Prevención de Contaminación del Desagüe

JARDIN

Basura del jardín y otros toxicos caseros como pintura, pesticidas y otros mas acaban por llegar a los drenajes del Condado de San Bernardino y terminando en el Rio de Santa Ana. Esto contamina el agua que tomamos, haciendola peligorsa para la gente y la vida salvaje. Sigue estas practicas para prevenir la contaminación y protejer la salud publica.



Disponiendo Desechos del Jardin
Recicla hojas, pasto y otras basuras del jardín en ves de soplarlas, barrerlas hacia la calle. El pasto sirve como fertilizante, y como el pasta es la mayoria agua tambien riega tu jardín, ahorrandote agua.



Reciclando Materiales del Hogar Peligrosos
Limpiadores del hogar como pintura, pesticidas, solventes y limpiadores son demasiado toxicos para tirarlos en la basura. Desechalos en unlugar de colección de desechos peligrosos. Llama al (800) CLEANUP para un lugar en tu area.



Usando Fertilizantes & Pesticidas Adecuadamente
Fertilizantes y pesticidas muchas veces terminan en los drenajes. Usa alternativas que no sean toxicas. Si tu usas fertilizantes y pesticidas con quimicos, no los uses cerca de las banquetas y cocheras y nunca los uses en tiempos de lluvia.



Cembrando en el Jardin
Reduce la basura del jardín y ahorra agua plantando arboles y plantas de bajo mantenimiento. Riega moderadamente con mangueras u otros metodos para las flores o vegetacion asi reduciras tu pago del mes y previenes el desagüe.



Usando el Agua Adecuadamente
Reduce el pago del agua y previene el desagüe controlando la cantidad y direccion de tus regaderas para el jardin. Solo necesitas regar de 10 a 20 minutos a la semana. Durante la primavera y otoño es la mitad. Las regaderas del jardin deverian estar ajustadas a que rieguen lo suficinete y evitar el desagüe.

Para reportar actividades ilegales llamar al:

(877) WASTE18
sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

STORMWATER Pollution Prevention

EXCAVATION AND GRADING

Sediment, cement wash, asphalt and vehicle fluids from soil excavation and grading often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



Recycling Waste

Recycle broken asphalt, concrete, wood, and cleared vegetation whenever possible. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. For recycling and disposal information, call (909) 386-8401.



Maintaining Vehicles & Equipment

Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutters and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks. Use gravel approaches where truck traffic is heavy to reduce soil compaction and limit the tracking of sediment into the street.



Cleaning & Preventing Spills

Use a drip pan and funnel when draining or pouring fluids. Sweep up dry spills, instead of hosing. Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. Prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, brake and radiator fluids. To report serious spills, call 911.



Storing Materials

Keep construction materials and debris away from the street, gutter and storm drains. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.



Preventing Erosion

Avoid excavation or grading during wet weather. Plant temporary vegetation on slopes where construction is not immediately planned, and permanent vegetation once excavation and grading are complete. Construct diversion dikes to channel runoff. Channels can be lined with grass or roughened pavement to reduce runoff velocity.

To report illegal dumping call

(877) WASTE18

sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

Prevención de Contaminación del Desagüe

EXCAVACIONES

Sedimento, cemento, asfalto y liquidos de auto, tierra y residuos peligrosos de lugares de construcción acaban por llegar a los drenajes del Condado de San Bernardino y terminando en el Rio de Santa Ana. Esto contamina el agua que tomamos, haciendola peligorsa para la gente y la vida salvaje. Sigue estas practicas para prevenir la contaminación y protejer la salud publica.



Reciclando Desechos
Recicla el aspfalto, concreto, madera y la vegetacion cuando sea posible. Materiales no reciclados se deverian llevar a lugares de desechos peligrosos. Para màs informacion llama al (909) 386-8401.



Manteniendo Vehiculos & Herramientas
Has el mantenimiento y carga de vehiculos en el mismo lugar, lejos de la calle, las alcantarillas y los drenajes. Inspecciona los vehiculos y el equipo de cualquier goteadura. Usa grava donde mayormente se consentra el trafico de camiones para y reducir el sedimento en las calles.



Limpiando & Previniendo Derrames
Usa siempre un enbudo al vaciar liquidos. Barre los derrames en ves de lavarlos con la manguera. Mantente siempre preparado para cualquier derrame, usa siempre las herramientas de seguridad al igual que materiales como, tierra para desechos de gato o aserrin. Preveen goteaduras de autos que no se usan vasiandoles la gasolina, aceite de transmision, frenos y liquidos del radiador. Para reportar derrames llama al 911.



Almacenando Materiales
Manten materiales de construccion y residuos lejos de las calles, coladeras y desagües. Manten tapados los bultos de arena, grava y erramientas para excavar cuviertos con algun plastico para protejerlos de la lluvia, el aire y el desagüe.



Previniendo Erosiones
Evita las excavaciones durante lluvia. Planta vegetacion temporal en colinas donde aun no hay planes de construcción y planta vegetacion permanente al terminar las excavaciones. Construye algunos canales para el desagüe. Estos pueden ser creados con pasto y cemento para reducir la velocidad del desagüe.

Para reportar actividades ilegales llamar al:

(877) WASTE18
sbcountystormwater.org

San Bernardino County
STORMWATER PROGRAM

STORMWATER Pollution Prevention

CONSTRUCTION

Cement wash, sediment, vehicle fluids, dust and hazardous debris from construction sites often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



Store Materials Safely
Keep construction materials and debris away from the street, gutter and storm drains. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.



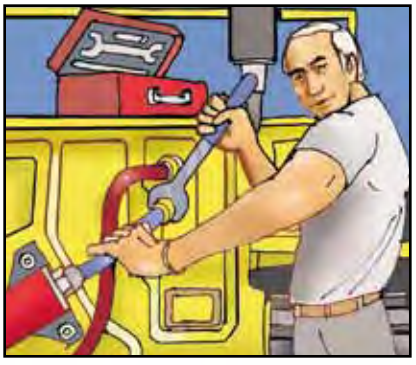
Ordering Materials & Recycling Waste
Reduce waste by ordering only the amounts of materials needed for the job. Use recycled or recyclable materials whenever possible. You can recycle broken asphalt, concrete, wood, and cleared vegetation. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. For recycling and disposal information, call (909) 386-8401.



Cleaning & Preventing Spills
Use a drip pan and funnel when draining or pouring fluids. Sweep up dry spills, instead of hosing. Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. To report serious spills, call 911.



Preventing Erosion
Avoid excavation or grading during wet weather. Plant temporary vegetation or add hydromulch on slopes where construction is not immediately planned, and permanent vegetation once excavation and grading are complete. Construct diversion dikes to channel runoff to a detention basin and around the construction site. Channels can be lined with grass or roughened pavement to reduce runoff velocity.



Maintaining Vehicles & Equipment
Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutter and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks, and prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, brake and radiator fluids.



To report illegal dumping call

(877) WASTE18

sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

Prevención de Contaminación del Desagüe

CONSTRUCCIÓN

Cemento, sedimentos, liquidos de auto, polvos y residuos peligrosos acaban por llegar a los drenajes del Condado de San Bernardino y terminando en el Rio de Santa Ana. Esto contamina el agua que tomamos, haciendola peligorsa para la gente y la vida salvaje. Sigue estas practicas para prevenir la contaminación y protejer la salud publica.



Almacenando Materiales Cuidadosamente

Manten materiales de construcción y residuos lejos de las calles, coladeras y desagües. Manten tapados los bultos de arena, grava y herramientas para excavar cuviertos con algun plastico para protejerlos de la lluvia, el aire y el desagüe.



Ordenando Materiales & Reciclando Desechos

Reduce la cantidad al ordenar el material, solo ordena lo necesario. Usa materiales que se puedan reciclar cuando sea posible. Se puede reciclar el aspfalto, concreto, madera y la vegetacion. Materiales no reciclados se deven llevar a lugares de desechos peligrosos. Para mas información llama al (909) 386-8401.



Limpiando & Previniendo Derrames

Usa siempre un enbudo al vaciar liquidos. Barre los derrames en ves de lavarlos con la manguera. Mantente siempre preparado para cualquier derrame, usa siempre las herramientas de seguridad al igual que materiales como, tierra para desechos de gato o aserrin. Para reportar derrames llama al 911.



Previniendo Erosiones

Evita las excavaciones durante lluvia. Planta vegetacion temporal en colinas donde aun no hay planes de construccion y planta vegetacion permanente al terminar las excavaciones. Construye algunos canales para el desagüe. Estos pueden ser creados con pasto y cemento para reducir la velocidad del desagüe.



Mantenimiento de Vehiculos & Herramientas

Has el mantenimiento y carga de vehiculos en el mismo lugar, lejos de la calle, las alcantarillas y los drenajes. Inspecciona los vehiculos y el equipo de cualquier goteadura y preveen goteaduras de autos que no se usan vasiandoles la gasolina, aceite de transmision, frenos y liquidos del radiador.



Para reportar actividades ilegales llamar al:

(877) WASTE18

sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

STORMWATER Pollution Prevention

FRESH CONCRETE & MORTAR APPLICATION

Cement wash, sediment, vehicle fluids, dust and hazardous debris from construction sites often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



Storing Materials
Keep construction materials and debris away from the street, gutter and storm drains. Secure open bags of cement and cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.



Ordering Materials & Recycling Waste
Reduce waste by ordering only the amounts of materials needed for the job. Use recycled or recyclable materials whenever possible. When breaking up paving, recycle the pieces at a crushing company. You can also recycle broken asphalt, concrete, wood, and cleared vegetation. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. Call (909) 386-8401 for recycling and disposal information.



During Construction
Schedule excavation and grading during dry weather. Prevent mortar and cement from entering the street and storm drains by placing erosion controls. Setup small mixers on tarps or drop cloths, for easy cleanup of debris. Never bury waste material. Recycle or dispose of it as hazardous waste.



Cleaning Up
Wash concrete dust onto designated dirt areas, not down driveways or into the street or storm drains. Wash out concrete mixers and equipment in specified washout areas, where water can flow into a containment pond. Cement washwater can be recycled by pumping it back into cement mixers for reuse. Never dispose of cement washout into driveways, streets, gutters, storm drains or drainage ditches.



To report illegal dumping call
(877) WASTE18
sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

Prevención de Contaminación del Desagüe

APLICANDO CONCRETO FRESCO

Cemento, grava, asfalto y liquidos de auto, tierra y residuos peligrosos de lugares de concreto fresco por llegar a los drenajes del Condado de San Bernardino y terminando en el Rio de Santa Ana. Esto contamina el agua que tomamos, haciendola peligorsa para la gente y la vida salvaje. Sigue estas practicas para prevenir la contaminación y protejer la salud publica.



Almacenando Materiales
Manten materiales de construcción y residuos lejos de las calles, coladeras y desagües. Manten tapados los bultos de arena, grava y herramientas para excavar cuviertos con algun plastico para protejerlos de la lluvia, el aire y el desagüe.



Ordenando Materiales & Reciclando
Reduce la cantidad al ordenar el material, solo ordena lo necesario. Usa materiales recicables cuando sea posible. Cuando estes rompiendo el pavimento, recicla los pedasos en la compañia demolidora. Se puede reciclar el aspfalto, concreto, madera y la vegetacion. Materiales no reciclados se deverian llevar a lugares de desechos peligrosos. llama al (909) 386-8401 para más información.



Durante Construcción
Planea las excavaciones durante clima seco. No dejes que el cemento o la cal lleguen hasta las calles o drenajes, evita esto con plantas temporales para detener el desagüe. Cubre las maquinas de mesclar con alguna garra para que se facilite la limpieza de residuos. Nunca entierres los desechos. Recicla todos los desechos peligrosos.



Limpiando
Lava la cal en un area designada, no la eches hacia la cochera o en la calle. Lava las mescladoras y las herramientas en un lugar especifico, donde el agua llegue a un contenedor. El agua de cemento se puede reciclar volviendola a usar en las mescladoras. Nunca dejes el agua de cemento que corra hacia las calles, alcantarillas o drenajes.



Para reportar actividades ilegales llamar al:

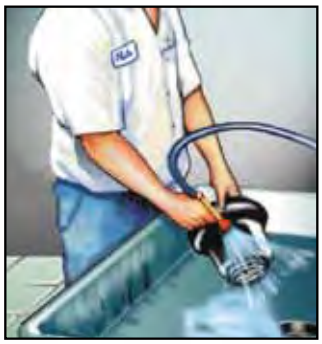
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San Bernardino County
STORMWATER PROGRAM

STORMWATER Pollution Prevention

AUTO MAINTENANCE

Oil, grease, anti-freeze and other toxic automotive fluids often make their way into the San Bernardino County storm drain system, and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



Cleaning Auto Parts
Scrape parts with a wire brush or use a bake oven rather than liquid cleaners. Arrange drip pans, drying racks and drain boards so that fluids are directed back into the parts washer or the fluid holding tank. Do not wash parts or equipment in a shop sink, parking lot, driveway or street.



Storing Hazardous Waste
Keep your liquid waste segregated. Many fluids can be recycled via hazardous waste disposal companies if they are not mixed. Store all materials under cover with spill containment or inside to prevent contamination of rainwater runoff.



Metal Grinding and Polishing
Keep a bin under your lathe or grinder to capture metal filings. Send uncontaminated filings to a scrap metal recycler for reclamation. Store metal filings in a covered container or indoors.



Preventing Leaks and Spills
Place drip pans underneath to capture fluids. Use absorbent cleaning agents instead of water to clean work areas.



Cleaning Spills
Use dry methods for spill cleanup (sweeping, absorbent materials). Follow your hazardous materials response plan, as filed with your local fire department or other hazardous materials authority. Be sure that all employees are aware of the plan and are capable of implementing each phase. To report serious toxic spills, call 911.



Proper Disposal of Hazardous Waste
Recycle used motor oil and oil filters, anti-freeze and other hazardous automotive fluids, batteries, tires and metal filings collected from grinding or polishing auto parts. Contact a licensed hazardous waste hauler. For more recycling information, call (909) 386-8401.

To report illegal dumping call

(877) WASTE18

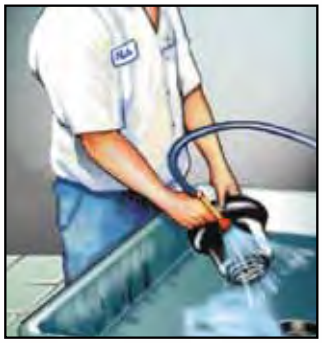
sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

Prevención de Contaminación del Desagüe

MANTENIMIENTO DE AUTO

Aceite, grasa, anti-congelantes y otros liquidos toxicos para el auto acaban por llegar a los drenajes del Condado de San Bernardino y terminando en el Rio de Santa Ana. Esto contamina el agua que tomamos, haciendola peligorsa para la gente y la vida salvaje. Sigue estas practicas para prevenir la contaminación y protejer la salud publica.



Limpiar Partes De Autos
Limpia las partes de auto con un cepillo de alambres o usa un limpiador de hornos en vez de usar limpiadores líquidos. Arregla las graseras, perchas para secar y tablas de escurrir para que los líquidos sean dirigidos al lavadero o recipientes para guardar líquidos. No laves las partes de auto o herramientas en el estacionamiento, la cochera o la calle.



Almacenando Desechos Peligrosos
Manten los desechos líquidos separados. Varios líquidos pueden ser reciclados por compañias que se especializan en desechos tóxicos si aun no estan mezclados. Guarda y cubre todos los materiales dentro de un lugar para prevenir la contaminación del desagüe.



Desechos de Metal & Pulidos
Manten un recipiente debajo de las maquinas de tornos o amoladoras para colectar desechos de metal. Manda los desechos de metal a un centro de reciclaje de metales. Guarda los desechos de metal en un recipiente cuvierto o dentro del local.



Prevenir Goteaduras & Derrames
Utilisa caserolas para el goteo de líquidos. Use limpiadores absorbentes en lugar de agua para limpiar el área de trabajo.



Limpiando Derrames
Sigue tu plan de como actuar sobre los materiales tóxicos, como esta indicado en el departamento de bomberos local u otras autoridades de materiales tóxicos. Asegurate que todos los empleados estén informados y capaz de aplicar cada fase del plan. Usa métodos secos para limpiar derramamientos (barriendo, materiales absorbentes, etc.).



Manera Correcta de Depositar los Desechos Peligrosos
Recicla el aceite de motor y filtros de aceite usados, anti-congelante, baterias, lubricantes, y desechos de metal y partes de auto pulidas. Llama a un colector de desechos tóxicos para disponer de absorbentes saturados. Mas iformación sobre reciclaje, llama al (909) 386-8401.

Para reportar actividades ilegales llamar al:

(877) WASTE18
sbcountystormwater.org

San Bernardino County
STORMWATER PROGRAM

SAN BERNARDINO COUNTY
STORMWATER POLLUTION PREVENTION

Construction & development:

Soil, cement wash, asphalt, oil and other hazardous debris from construction sites often make their way into the San Bernardino County storm drain system, and flow untreated into local waterways. Follow these best management practices to prevent pollution, protect public health and avoid fines or legal action.



- **Store Materials Safely:** Keep construction materials and debris away from the street, gutter and storm drains. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.
- **Preventing Erosion:** Avoid excavation or grading during wet weather. Plant temporary vegetation or add hydro mulch on slopes where construction is not immediately planned, and permanent vegetation once excavation and grading are complete. Construct diversion dikes to channel runoff to a detention basin and around the construction site. Use gravel approaches where truck traffic is frequent to reduce soil compaction and limit the tracking of sediment into the streets. For more information on erosion control, call (909) 799-7407.



- **Cleaning & Preventing Spills:** Use a drip pan and funnel when draining or pouring fluids. Sweep up dry spills, instead of hosing. Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. To report serious spills, call 911.
- **Maintaining Vehicles & Equipment:** Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutter and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks, and prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, and brake and radiator fluids.
- **Ordering Materials & Recycling Waste:** Reduce waste by ordering only the amounts of materials needed for the job. Use recycled or recyclable materials whenever possible. You can recycle broken asphalt, concrete, wood, and cleared vegetation. Dispose of hazardous materials through a hazardous waste hauler or other means in accordance with the construction permit. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. For recycling and disposal information, call (909) 386-8401.
- **Concrete and mortar application:** Never dispose of cement washout into driveways, streets, gutters or drainage ditches. Wash concrete mixers and equipment only in specified washout areas, where the water flows into lined containment ponds. Cement wash water can be recycled by pumping it back into cement mixers for reuse.

For more information about how you can prevent stormwater pollution:

www.sbcountystormwater.org

NOTICE

DISCHARGE INTO OUR WATERWAYS, ACCIDENTAL OR NOT, CAN LEAD TO ENFORCEMENT ACTIONS, WHICH CAN INCLUDE FINES.

WHEN WORKING WITH CONCRETE USE THE 3Cs

CONTROL



Locate the nearest storm drain and ensure nothing can enter or be discharged into it. Use plastic covers and sandbags when working within 50' of a storm drain or catch basin.

CONTAIN



Isolate area and secure bags of cement after they are open. Keep cement, sand and aggregate (wet/dry) and slurries from saw cutting, from flowing into the streets, gutter and storm drains or being blown away. Cover bags of cement in case of rain.

CAPTURE



Sweep dry residue or vacuum wet concrete residue and dispose of properly. Create a designated washout area for equipment and tools and place away from driveways and storm drains. Dispose of concrete/plaster waste and rinsewater by hauling off to an approved disposal site.

To report illegal dumping, call **(877) WASTE18** or visit **sbcountystormwater.org**

SAN BERNARDINO COUNTY STORMWATER POLLUTION PREVENTION

Big Bear • Chino • Chino Hills • Colton • Fontana • Grand Terrace • Highland • Loma Linda • Montclair • Ontario • Rancho Cucamonga
Redlands • Rialto • San Bernardino • San Bernardino County • San Bernardino County Flood Control District • Upland • Yucaipa

AVISO

LA DESCARGA EN NUESTRAS VÍAS FLUVIALES, DE FORMA ACCIDENTAL O NO, PUEDE LLEVAR A TOMAR MEDIDAS PARA CUMPLIR CON LA LEY QUE PUEDEN INCLUIR MULTAS.

CUANDO TRABAJE CON CONCRETO APLIQUE LAS 3 C

CONTROL



Ubique el desagüe pluvial más cercano y asegúrese de que nada pueda entrar en él o que pueda descargarse allí. Use cubiertas de plástico y bolsas de arena cuando trabaje a una distancia de 50' de un desagüe pluvial o sumidero.

CONTENCIÓN



Aísle el área y asegure las bolsas de cemento una vez que las haya abierto. Impida que el cemento, la arena y los componentes del concreto (secos y húmedos) y los residuos acuosos resultantes después de cortar con sierra, fluyan hacia la calle, la alcantarilla y los desagües o que se vuelen con el viento.
Cubra las bolsas de cemento en caso de lluvia.

CAPTURA



Barra los residuos secos o limpie con una aspiradora los residuos de concreto húmedo y elimínelos en forma apropiada. Cree un área específica para enjuagar equipos y herramientas, y colóquela lejos de las entradas de automóviles y de los desagües pluviales.
Desheche los residuos de concreto o yeso y el agua de enjuague, llevándolos a un sitio aprobado para su eliminación.

Para informar sobre el vaciado ilegal de residuos, llame al **(877) WASTE18** o visite el sitio: **sbcountystormwater.org**

PREVENCIÓN DE CONTAMINACIÓN DE AGUAS PLUVIALES EN EL CONDADO DE SAN BERNARDINO

Big Bear • Chino • Chino Hills • Colton • Fontana • Grand Terrace • Highland • Loma Linda • Montclair • Ontario • Rancho Cucamonga • Redlands
Rialto • San Bernardino • Condado de San Bernardino • Distrito de Control de Inundaciones del Condado de San Bernardino • Upland • Yucaipa

SAN BERNARDINO COUNTY
STORMWATER POLLUTION PREVENTION

Commercial landscape maintenance:

Yard waste, sediments and toxic lawn and garden chemicals used in commercial landscape maintenance often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates local waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution, protect public health and avoid fines or legal action.

- **Recycle Yard Waste:** Recycle leaves, grass clippings and other yard waste. Do not blow, sweep, rake or hose yard waste into the street. Let your customers know about grass cycling --the natural recycling of grass by leaving clippings on the lawn when mowing instead of using a grass catcher. Grass clippings will quickly decompose, returning valuable nutrients to the soil. You can get more information at www.ciwmb.ca.gov/Organics.
- **Use Fertilizers, Herbicides & Pesticides Safely:** Fertilizers, herbicides and pesticides are often carried into the storm drain system by sprinkler runoff. Use natural, non-toxic alternatives to traditional garden chemicals. If you must use chemical fertilizers, herbicides, or pesticides spot apply rather than blanketing entire areas, avoid applying near curbs and driveways and never apply before a rain.
- **Recycle Hazardous Waste:** Pesticides, fertilizers, herbicides and motor oil contaminate landfills and should be disposed of through a Hazardous Waste Facility. For information on proper disposal, call (909) 386-8401.
- **Use Water Wisely:** Conserve water and prevent runoff by controlling the amount of water and direction of sprinklers. Sprinklers should be on long enough to allow water to soak into the ground but not so long as to cause runoff. Periodically inspect, fix leaks and realign sprinkler heads.
- **Planting:** Plant native vegetation to reduce the need of water, fertilizers, herbicides and pesticides.
- **Prevent Erosion:** Erosion washes sediments, debris and toxic runoff into the storm drain system, polluting waterways. Prevent erosion and sediment runoff by using ground cover, berms and vegetation down-slope to capture runoff. Avoid excavation or grading during wet weather.
- **Store Materials Safely:** Keep landscaping materials and debris away from the street, gutter and storm drains. On-site stockpiles of materials should be covered with plastic sheeting to protect from rain, wind and runoff.





For more information about how you can prevent stormwater pollution:

www.sbcountystormwater.org

Carpet cleaning:

Toxic chemicals and discharged waste water from carpet, drapery, furniture and window cleaning often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates local waterways, making them unsafe for people and wildlife. Following these best management practices will prevent pollution, comply with regulations and protect public health.

These guidelines apply even if the cleaning products are labeled "nontoxic" or "biodegradable". Although these products may be less harmful to the environment, they can still have harmful effects if they enter the storm drain untreated.

- **Dispose of wastewater properly:** Wastewater from cleaning equipment must be discharged into a sink, toilet, or other drain connected to the sanitary sewer system within sanitary sewer discharge limits, or hauled off and disposed of properly. Wastewater should never be discharged into a street, gutter, parking lot or storm drain.
- **Filter wastewater:** Carpet cleaning wastewater should be filtered before discharging it to the sanitary sewer since fibers and other debris in the wastewater can clog pipes. The filtered material can be disposed of in the garbage, as long as the waste is not contaminated with hazardous pollutants.

San Bernardino County Stormwater Program
825 East Third Street · Room 127
San Bernardino, CA 94215-0835

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STORMWATER

Pollution Prevention

LANDSCAPE MAINTENANCE

Stormwater Pollution Prevention

Stormwater Management Practices for Commercial Landscape Maintenance

Yard waste, sediments, and toxic lawn/garden chemicals used in commercial landscape maintenance often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates local waterways, making them unsafe for people and wildlife. Following these best management practices will prevent pollution, comply with regulations and protect public health.

Recycle Yard Waste

Recycle leaves, grass clippings and other yard waste. Do not blow, sweep, rake or hose yard waste into the street. Try grasscycling - the natural recycling of grass by leaving clippings on the lawn when mowing. Grass clippings will quickly decompose, returning valuable nutrients to the soil. Further information can be obtained at www.ciwmb.ca.gov/Organics.

Use Fertilizers, Herbicides and Pesticides Safely

Fertilizers, herbicides and pesticides are often carried into the storm drain system by sprinkler runoff. Use of natural, non-toxic alternatives to the traditional fertilizers, herbicides and pesticides is highly recommended. If you must use chemical fertilizers, herbicides, or pesticides:



- Spot apply pesticides and herbicides, rather than blanketing entire areas.
- Avoid applying near curbs and driveways, and never apply before a rain.
- Apply fertilizers as needed, when plants can best use it, and when the potential for it being carried away by runoff is low.

Recycle Hazardous Waste

Pesticides, fertilizers, herbicides and motor oil contaminate landfills and should be disposed of through a Hazardous Waste Facility, which accepts these types of materials. For information on proper disposal call, (909) 386-8401.

Use Water Wisely

Conserve water and prevent runoff by controlling the amount of water and direction of sprinklers. Sprinklers should be on long enough to allow water to soak into the ground but not so long as to cause runoff. Periodically inspect, fix leaks and realign sprinkler heads. Plant native vegetation to reduce the need of water, fertilizers, herbicides, and pesticides.

Prevent Erosion

Erosion washes sediments, debris and toxic runoff into the storm drain system, polluting waterways.

- Prevent erosion and sediment runoff by using ground cover, berms and vegetation down-slope to capture runoff.
- Avoid excavation or grading during wet weather.

Store Materials Safely

Keep landscaping materials and debris away from the street, gutter and storm drains. On-site stockpiles of materials must be covered with plastic sheeting to protect from rain, wind and runoff.

San Bernardino County STORMWATER PROGRAM

To report illegal dumping call

(877) WASTE18

or visit our website:

sbcountystormwater.org