Water Quality Management Plan

For:

McDonald Learning Center

APN NO. 0315-421-02, PROJECT NO. P201800235

Prepared for:

Lisa Burtner

P.O. Box 150

Big Bear Lake, CA 92315

(909) 709-4041

Prepared by:

Transtech Engineers, Inc.

413 Mackay Drive

San Bernardino, CA 92408

(909)384-7464

Plan Development Date Approval: TBD

Case No. TBD

Revisions Date: 6/10/19

Approval Date:_____

Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for Lisa Burtner by Transtech Engineers, 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."

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Project Data			
Permit/Application Number(s):	P201800235	Grading Permit Number(s):	TBD
Tract/Parcel Map Number(s):	TBD	Building Permit Number(s):	TBD
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN 0315-421-02

Owner's Signature			
Owner Name: Lisa Burtner			
Title	Property Owner		
Company	McDonald Learning Center		
Address	P.O. Box 150, Big Bear Lake, CA 92315		
Email	BANDLBURTNER@YAHOO.COM		
Telephone #	(909) 709-4041		
Signature		Date	

Preparer's Certification

Project Data			
Permit/Application Number(s):	P201800235	Grading Permit Number(s):	TBD
Tract/Parcel Map Number(s):	TBD	Building Permit Number(s):	TBD
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"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: David Ragland		PE Stamp Below
Title	Project Engineer	
Company	Transtech Engineers, Inc.	
Address	413 Mackay Drive, San Bernardino, CA 92408	
Email	david.ragland@transtech.org	
Telephone #	(909)384-7464 x 149	
Signature	David Ragland	
Date	5/30/19	

Preparer's Certification

Project Data			
Permit/Application Number(s):	P201800235	Grading Permit Number(s):	TBD
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Telephone #	(909)384-7464 x 149	
Signature		
Date		

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Forms

Section 1 Discretionary Permit(s)

Form 1-1 Project Information

Project Name	McDonald Learning Center				
Project Owner Contact Name:	Lisa Burtner				
Mailing Address:	P.O. Box 150 Big Bear Lake, CA 92315	E-mail Address:	BANDLBURTNER@YAHOO.COM	Telephone:	(909) 709-4041
Permit/Application Number(s):	P201800235		Tract/Parcel Map Number(s):	N/A	
Additional Information/ Comments:					
Description of Project:	The proposed project is the development of a child care center and on-site improvements. The proposed development is the construction of 13,254 square feet of building and paving improvements on a 8.95-acre site with access to Erwin Ranch Road. Site features include the new structure (child care center) which is 2,930 square feet and a parking lot which is 10,324 square feet. The total square footage of the improvements is 25,125 feet. The building will be a one story, 24'8" tall, 2,930 sq.ft. building with typical 24" eaves.The number of parking spaces was calculated by using 1 space per 5 childrenthe facility was designed for; 70 total children. 14 spaces were calculated and new construction of 17 spaces exceeds the requirement. There will also be 1 van accessable space provided (17x19') and wheel stops at the head of each parking stall. Parking stalls will be striped and signed in accordance with ADA standards. The property is generally rectangular in shape fith a flared southwest portion of the property. The natural topography of the site is relatively level, descending gradually from southwest to northeast at a slope of approximately 3-5 percent. The highest point on the site is approximately 6,810 feet above mean sea level (MSL) at the southwest corner, and the lowest point is approximately 6,805 feet MSL at the northeast corner of the site. The project site is currently vacant and undeveloped. The site now contains approximately 25 pine trees between the sizes of 8" and 36" diameters which are to be removed within the construction envelope. The lot is moderatly forested and hundreds of trees are to remain preserved. Directly south of the proposed project there is an existing structure and parking lot. Directly west, north and east of the proposed project there is open forest. California Highway 38 is a paved road with no curb and gutter. Erwin Ranch Roadis currently a partially paved road with no curb and gutter. A new trash enclosure will be provided as required. There will be 3 - 50W LED flood lights attached mounted on the building. There is no landscaping proposed except for landcaping to be installed with the infiltration basin. Sewer services will be attached to the adjacent public sewer lines. The proposed project will use one infiltration basin to infiltrat the Design Capture Volume*+-				

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

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

2 Project Area (ft2):	25,125	**3** Number of Dwelling Units:	1	**4** SIC Code:	8351

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

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

2.2 Property Ownership/Management

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

Form 2.2-1 Property Ownership/Management

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

The property is currently owned by Lisa Burtner. The owner will be resposible for the funding and inplemetation of all required BMPs. Upon completion of construction, the owner will commence with the opening of the business. The owner will contine to manage the child care center. To assure long term maintenance of the water quality facilities, a Covenant and Agreement Regarding Water Quality Management Plan and Stormwater Best Management Practices Transfer, Access and Maintenance will be recorded. This document will be recored and run with the property and will be subject to any future owners of the property.

Owner Information:

Lisa Burtner

P.O. Box 150

Big Bear Lake, CA 92315

bandlburtner@yahoo.com

mcdonaldlearningcenter@yahoo.com

(909) 709-4041

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 ☐	The proliferation of bacteria and viruses is generally caused by the transport of animal or fecal waste within stormwater runoff from a project site.
Nutrients - Phosphorous	E ☒	N ☐	Primary source of nutrients and phosphorous are typically caused by excessive and careless use of fertilizers and eroded soils.
Nutrients - Nitrogen	E ☒	N ☐	Primary source of nutrients and nitrogen are typically caused by excessive and careless use of fertilizers and eroded soils.
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 ☐	Sediments are generally caused by eroded soils, transport of sediment not properly contained and poorly maintained landscape and pavements.
Metals	E ☒	N ☐	Brake pads
Oil and Grease	E ☒	N ☐	Primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids.
Trash/Debris	E ☒	N ☐	Trash and other debris including paper, plastic, foam, aluminum, leaves, cut grass and food wastes, should be controlled with regular maintanence, inspection and cleanup.
Pesticides / Herbicides	E ☒	N ☐	Pesticides and hebicides are commonly used for landscaping and pest control around multi family projects. Care should be taken to minimize their use as much as possible and apply according to the manufacture's specifications.
Organic Compounds	E ☒	N ☐	Sources of organic compounds include waste handling areas and vehicle and landscape maintanence areas. Care should be taken to ensure that when cleaning and rinsing dirt, grease and grime from vehicles and equipment, cleaning fluids and rinse water is not discharged into storm drains.
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	

Other:	E ☐	N ☐	

2.4 Water Quality Credits

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

Form 2.4-1 Water Quality Credits

1 Project Types that Qualify for Water Quality Credits: *Select all that apply*

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

2 Total Credit % *(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

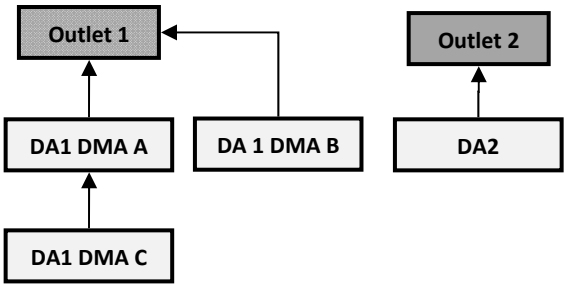
Describe the project site conditions that will facilitate the selection of BMP through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and 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 34.247061° North	Longitude 116.810681° West	Thomas Bros Map page 4742

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*



Example only – modify for project specific WQMP using additional form

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

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1

For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA A	DMA B	DMA C	DMA D
1 DMA drainage area (ft^2)	25,125			
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*	2			
4 Hydrologic soil group *Refer to Watershed Mapping Tool – http://sbcounty.permitrack.com/WAP*	C			
5 Longest flowpath length (ft)	193			
6 Longest flowpath slope (ft/ft)	3.1			
7 Current land cover type(s) *Select from Fig C-3 of Hydrology Manual*	Pine woodlands and meadows			
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*	Fair			

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

Form 3-3 Watershed Description for Drainage Area

Receiving waters *Refer to Watershed Mapping Tool -* *http://sbcounty.permitrack.com/WAP* *See 'Drainage Facilities" link at this website*	Baldwin Lake - Runoff in this area flows to Baldwin Lake. Baldwain Lake is in a depressed area and there is no outflow.
Applicable TMDLs *Refer to Local Implementation Plan*	Bladwin Lake does not have applicable TMDLs.
303(d) listed impairments *Refer to Local Implementation Plan and Watershed Mapping Tool –* *http://sbcounty.permitrack.com/WAP and State Water Resources Control Board website – http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml*	None
Environmentally Sensitive Areas (ESA) *Refer to Watershed Mapping Tool –* *http://sbcounty.permitrack.com/WAP*	N/A
Unlined Downstream Water Bodies *Refer to Watershed Mapping Tool –* *http://sbcounty.permitrack.com/WAP*	Baldwin Lake
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 property owner will be the operator of the day care facility. The property owner will execute the BMP Covenant and will be made aware of the resposibilites and maintenance obligations and activity restrictions that will be required.
N2	Activity Restrictions	☒	☐	The project is a day care facility and acivities will be subject to the Conditional Use Permit issued by the County. Non complianceactivities on the site are enforceable by the County. In addistion, pesticide application must be performed by a licensed applicator.
N3	Landscape Management BMPs	☒	☐	Onsite landscaping will be maintained by the property owner.
N4	BMP Maintenance	☒	☐	BMP maintenance will be provided by the property owner. The BMP maintenance responsibilities are outlined in the Operation and Maintenance Plan.
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	The project is not expected to produce hazardous waste.
N6	Local Water Quality Ordinances	☒	☐	The project will comply with local water quality ordiances. Volume based BMPs will be implemented along with non-structural BMPs, education of owner and activity restrictions.
N7	Spill Contingency Plan	☐	☒	This is a learning center project and spills of hazardous matertials are not anticipated with the project.
N8	Underground Storage Tank Compliance	☐	☒	There are no underground storage tank proposed for this project.
N9	Hazardous Materials Disclosure Compliance	☐	☒	The project is not anticipated to generate or produce hazardous materials.

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 is a development learning center project and should not and is not anticipated to be handling hazardous material subject to Articale 80. The listed project activities do not include hazardous materials storage, therefore Article 80 of the Uniform Fire Code would not be applicable. The project is subject to the Uniform Fire Code and will be designed in accordance with the Code.
N11	Litter/Debris Control Program	☒	☐	The owner of the project will implement a trash management progam that will be enforced by the manager/operator of the learning center. A program shall be implemented to pick up litter and sweep and clean the trash enclosure on a daily basis. Litter and debris will be picked up by staff maintenance personel or landscape contractor on at least a weekly basis. Onsite manager/employees are to be instructed to be visually aware of improperly disposed or dumping of litter and debris and be cleaned up. Trash enclosures are designed to divert all flows around the enclosure. All dumpsters will have lids installed and will be inspected to ensure that the dumpsters remain covered and leak-proof. The owner shall contract with a refuse company to have the dumpsters emptied on a bi-weekly basis, at a minimum.
N12	Employee Training	☒	☐	Employee training will be provided. Owner/property manager shall utilize the attached County brochures for employee training on stormwater best management practices. Employee training and orientation should occur upon initial hire and bi-annually. The following should be implemented as part of employee training. • Discuss good housekeeping practices in training programs and meetings. • Publicize pollution prevention concepts through posters or signs. • Post bulletin boards with updated good housekeeping procedures, tips and remindersAs part of the tenant education program, employee training will also be provided.

N13	Housekeeping of Loading Docks	☐	☒	The project does not include loading docks.
N14	Catch Basin Inspection Program	☐	☒	This project has no catch basins.
N15	Vacuum Sweeping of Private Streets and Parking Lots	☒	☐	Onsite private streets and parking areas will be vacuumed and or swept as part of the BMP Maintenance Plan.
N16	Other Non-structural Measures for Public Agency Projects	☐	☒	This is not a public agency project.
N17	Comply with all other applicable NPDES permits	☒	☐	The project will comply with all applicable NPDES permits.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S1	Provide storm drain system stencilling and signage (CASQA New Development BMP Handbook SD-13)	☐	☒	This project has no catch basins.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	☐	☒	There are not any outdoor material storage areas proposed for the project.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	☒	☐	The trash enclosers located outside will be constructed per County Standards and all will be covered with closeable lids and permanent awning.
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)	☒	☐	Landscaping and irrigation will be designed by a licensed landscape architeict and will incorporate the State and Local requirements for landscaping.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	☒	☐	All impervious areas distrubed by grading will be re-vegetated. These areas will be graded 1-2 inched below impervious areas. A note to this effect will be included on the landscape plans.
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	☒	☐	Open channels and outlets will be for minimal flow velocities and energy dissipation and scour protection will be provided.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	☐	☒	The project does not include dock areas.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	☐	☒	The project does not included maintence facilities or bays.
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	The washing of vehicles is not permited.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	☐	☒	The project does not include outdoor processing areas.

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)	☐	☒	The project does not include equipment wash areas.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	☐	☒	The fueling of vehicles is not permited.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	☐	☒	This is not a hillside development project.
S14	Wash water control for food preparation areas	☐	☒	There is no food preparation area.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	☐	☒	The project does not propose a community car wash rack.

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: The project has been designed to utilize the minimum number of parking spaces required for this type of land use.
Maximize natural infiltration capacity: Yes ☒ No ☐ Explanation: The site has good infiltration characteristics an no special measures are need to increas infiltration rates.
Preserve existing drainage patterns and time of concentration: Yes ☒ No ☐ Explanation: The design of the project maintains the existing drainage patterns. The increase in time of concentration as noted in the HCOC section of the WQMP is mitigated by the use of the infiltration basin.
Disconnect impervious areas: Yes ☒ No ☐ Explanation: Where possible, roof drains and flows from other impervious surfaces such as sidewalks and parking areas will be discharged to landscaped areas and than directed to the infiltration basins by drainage swales.
Protect existing vegetation and sensitive areas: Yes ☒ No ☐ Explanation: Expect for areas of the site that will be utilized for the building, parking and walkways areas and infiltration, the remaindre of the site will not be disturbed. There is no sensitieve vegetation on the site.
Re-vegetate disturbed areas: Yes ☒ No ☐ Explanation: All disturbed areas not covered by buildings, sidewalks, parking and other impervious surfaces will be re-vegetated.
Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes ☒ No ☐ Explanation: Speical care will be taken during construction of the infiltration basin so that the bottom of the basin will not be compacted. The basin will be staked off and the contractor will be informed not to distub any of the infiltration area.
Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes ☒ No ☐ Explanation: Drainage swales are primarily being utilized to convey flows to BMP (infiltration basin)
Stake off areas that will be used for landscaping to minimize compaction during construction : Yes ☐ No ☒ Explanation: It will not be practical to stake off the landscaped areas. However, prior to landscape installaiion, landscaped areas will be scarified and soil amendments provided to assist in plan establishement and growth and minimize compaction.

4.2 Project Performance Criteria

The purpose of this section of the Project WQMP is to establish targets for post-development hydrology based on performance criteria specified in the MS4 Permit. These targets include runoff volume for water quality control (referred to as LID design capture volume), and runoff volume, time of concentration, and peak runoff for protection of any downstream waterbody segments with a HCOC. ***If the project has more than one outlet for stormwater runoff, then complete additional versions of these forms for each DA / outlet.***

Methods applied in the following forms include:

- For LID BMP Design Capture Volume (DCV), the San Bernardino County Stormwater Program requires use of the P_6 method (MS4 Permit Section XI.D.6a.ii) – Form 4.2-1
- For HCOC pre- and post-development hydrologic calculation, the San Bernardino County Stormwater Program requires the use of the Rational Method (San Bernardino County Hydrology Manual Section D). Forms 4.2-2 through Form 4.2-5 calculate hydrologic variables including runoff volume, time of concentration, and peak runoff from the project site pre- and post-development using the Hydrology Manual Rational Method approach. For projects greater than 640 acres (1.0 mi^2), the Rational Method and these forms should not be used. For such projects, the Unit Hydrograph Method (San Bernardino County Hydrology Manual Section E) shall be applied for hydrologic calculations for HCOC performance criteria.

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

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 1)

1 Project area DA 1 (ft^2): 25,125	**2** Imperviousness after applying preventative site design practices (Imp%): 56	**3** Runoff Coefficient (Rc): _.3795 *$R_c = 0.858(Imp\%)^{\wedge 3}-0.78(Imp\%)^{\wedge 2}+0.774(Imp\%)+0.04$*
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): .702 *http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*		
5 Compute P_6, Mean 6-hr Precipitation (inches): 1.34 *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): 2,033 *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://sbcounty.permitrack.com/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** 2,124 *Form 4.2-3 Item 12*	**2** 11.9 *Form 4.2-4 Item 13*	**3** .70 *Form 4.2-5 Item 10*
Post-developed	**4** 4,328 *Form 4.2-3 Item 13*	**5** 8.0 *Form 4.2-4 Item 14*	**6** 1.16 *Form 4.2-5 Item 14*
Difference	**7** *2,204* *Item 4 – Item 1*	**8** *3.9* *Item 2 – Item 5*	**9** *.46* *Item 6 – Item 3*
Difference (as % of pre-developed)	**10** *104%* *Item 7 / Item 1*	**11** *33%* *Item 8 / Item 2*	**12** *66%* *Item 9 / Item 3*

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

Weighted Curve Number Determination for: Pre-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1a Land Cover type	FOREST							
2a Hydrologic Soil Group (HSG)	C							
3a DMA Area, ft^2 *sum of areas of DMA should equal area of DA*	25,125							
4a Curve Number (CN) *use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	73							
Weighted Curve Number Determination for: Post-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1b Land Cover type	SCHOOL							
2b Hydrologic Soil Group (HSG)	C							
3b DMA Area, ft^2 *sum of areas of DMA should equal area of DA*	25,125							
4b Curve Number (CN) *use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	86							

5 Pre-Developed area-weighted CN: 73	**7** Pre-developed soil storage capacity, S (in): 3.70 *S = (1000 / Item 5) - 10*	**9** Initial abstraction, I_a (in): .74 *I_a = 0.2 * Item 7*
6 Post-Developed area-weighted CN: 83	**8** Post-developed soil storage capacity, S (in): 1.63 *S = (1000 / Item 6) - 10*	**10** Initial abstraction, I_a (in): .33 *I_a = 0.2 * Item 8*

11 Precipitation for 2 yr, 24 hr storm (in): 3.47
Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

12 Pre-developed Volume (ft^3): 2,124
*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): 4,328
*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): 1,988
*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*	193				278			
2 Change in elevation (ft)	6				6			
3 Slope (ft/ft), S_o *= Item 2 / Item 1*	.031				.022			
4 Land cover	FOREST				SCHOOL			
5 Initial DMA Time of Concentration (min) *Appendix C-1 of the TGD for WQMP*	11.9				8.0			
6 Length of conveyance from DMA outlet to project site outlet (ft) *May be zero if DMA outlet is at project site outlet*								
7 Cross-sectional area of channel (ft^2)								
8 Wetted perimeter of channel (ft)								
9 Manning's roughness of channel (n)								
10 Channel flow velocity (ft/sec) V_{fps} *= (1.49 / Item 9) * (Item 7/Item 8)^0.67 * (Item 3)^0.5*								
11 Travel time to outlet (min) T_t *= Item 6 / (Item 10 * 60)*								
12 Total time of concentration (min) T_c *= Item 5 + Item 11*								

13 Pre-developed time of concentration (min): 11.9 *Minimum of Item 12 pre-developed DMA*

14 Post-developed time of concentration (min): 8.0 *Minimum of Item 12 post-developed DMA*

15 Additional time of concentration needed to meet HCOC requirement (min): 3.3 $T_{C\text{-}HCOC}$ *= (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)*		1.85			2.35		
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)*		.58			.58		
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)*		1.0				.48	
4 Pervious area infiltration rate (in/hr) *Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP*		.50				.27	
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)*		.50				.13	
6 Peak Flow from DMA (cfs) *Q_p =Item 2 * 0.9 * (Item 1 - Item 5)*		.70				1.16	
7 Time of concentration adjustment factor for other DMA to site discharge point *Form 4.2-4 Item 12 DMA / Other DMA upstream of site discharge point (If ratio is greater than 1.0, then use maximum value of 1.0)*	DMA A	*n/a*			*n/a*		
	DMA B		*n/a*			*n/a*	
	DMA C			*n/a*			*n/a*

8 Pre-developed Q_p at T_c for DMA A: *Q_p = Item 6_{DMAA} + [Item 6_{DMAB} * (Item 1_{DMAA} - Item 5_{DMAB})/(Item 1_{DMAB} - Item 5_{DMAB})* Item $7_{DMAA/2}$] + [Item 6_{DMAC} * (Item 1_{DMAA} - Item 5_{DMAC})/(Item 1_{DMAC} - Item 5_{DMAC})* Item $7_{DMAA/3}$]*	**9** Pre-developed Q_p at T_c for DMA B: *Q_p = Item 6_{DMAB} + [Item 6_{DMAA} * (Item 1_{DMAB} - Item 5_{DMAA})/(Item 1_{DMAA} - Item 5_{DMAA})* Item $7_{DMAB/1}$] + [Item 6_{DMAC} * (Item 1_{DMAB} - Item 5_{DMAC})/(Item 1_{DMAC} - Item 5_{DMAC})* Item $7_{DMAB/3}$]*	**10** Pre-developed Q_p at T_c for DMA C: *Q_p = Item 6_{DMAC} + [Item 6_{DMAA} * (Item 1_{DMAC} - Item 5_{DMAA})/(Item 1_{DMAA} - Item 5_{DMAA})* Item $7_{DMAC/1}$] + [Item 6_{DMAB} * (Item 1_{DMAC} - Item 5_{DMAB})/(Item 1_{DMAB} - Item 5_{DMAB})* Item $7_{DMAC/2}$]*

10 Peak runoff from pre-developed condition confluence analysis (cfs): .70 *Maximum of Item 8, 9, and 10 (including additional forms as needed)*

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

14 Peak runoff from post-developed condition confluence analysis (cfs): 1.16 *Maximum of Item 11, 12, and 13 (including additional forms as needed)*

15 Peak runoff reduction needed to meet HCOC Requirement (cfs): .40 $Q_{p\text{-}HCOC}$ = *(Item 14 * 0.95) – Item 10*

4.3 Project Conformance Analysis

Complete the following forms for each project site DA to document that the proposed LID BMPs conform to the project DCV developed to meet performance criteria specified in the MS4 Permit (WQMP Template Section 4.2). For the LID DCV, the forms are ordered according to hierarchy of BMP selection as required by the MS4 Permit (see Section 5.3.1 in the TGD for WQMP). The forms compute the following for on-site LID BMP:

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

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

The first step in the analysis, using Section 5.3.2.1 of the TGD for WQMP, is to complete Forms 4.3-1 and 4.3-3) to determine if retention and infiltration BMPs are infeasible for the project. For each feasibility criterion in Form 4.3-1, if the answer is "Yes," provide all study findings that includes relevant calculations, maps, data sources, etc. used to make the determination of infeasibility.

Next, complete Forms 4.3-2 and 4.3-4 to determine the feasibility of applicable HSC and harvest and use BMPs, and, if their implementation is feasible, the extent of mitigation of the DCV.

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

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

Form 4.3-1 Infiltration BMP Feasibility (DA 1)

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

1 Would infiltration BMP pose significant risk for groundwater related concerns? Yes ☐ No ☒

Refer to Section 5.3.2.1 of the TGD for WQMP

If Yes, Provide basis: (attach)

2 Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? Yes ☐ No ☒

(Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert):

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

If Yes, Provide basis: (attach)

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

If Yes, Provide basis: (attach)

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

If Yes, Provide basis: (attach)

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

If Yes, Provide basis: (attach)

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

See Section 3.5 of the TGD for WQMP and WAP

If Yes, Provide basis: (attach)

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

If yes, infiltration of any volume is not feasible onsite. Proceed to Form 4.3-4, Harvest and Use BMP. If no, then proceed to Item 8 below.

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

If yes, infiltration is permissible but is not required to be considered. Proceed to Form 4.3-2, Hydrologic Source Control BMP.
If no, then proceed to Item 9, below.

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

Infiltration of the full DCV is potentially feasible, LID infiltration BMP must be designed to infiltrate the full DCV to the MEP.
Proceed to Form 4.3-2, Hydrologic Source Control BMP.

4.3.1 Site Design Hydrologic Source Control BMP

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

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

1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes ☐ No ☒ *If yes, complete Items 2-5; If no, proceed to Item 6*	DA 1 DMA A BMP Type I	DA 2 DMA B BMP Type	DA 3 DMA BMP Type *(Use additional forms for more BMPs)*
2 Total impervious area draining to pervious area (ft^2)			
3 Ratio of pervious area receiving runoff to impervious area			
4 Retention volume achieved from impervious area dispersion (ft^3) *V = Item2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff*			
5 Sum of retention volume achieved from impervious area dispersion (ft^3): *$V_{retention}$ =Sum of Item 4 for all BMPs*			
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes ☐ No ☒ *If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14*	DA 1 DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
7 Ponding surface area (ft^2)			
8 Ponding depth (ft)			
9 Surface area of amended soil/gravel (ft^2)			
10 Average depth of amended soil/gravel (ft)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft^3) *$V_{retention}$ = (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)*			
13 Runoff volume retention from on-lot infiltration (ft^3): 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 DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
15 Rooftop area planned for ET BMP (ft^2)			
16 Average wet season ET demand (in/day) *Use local values, typical ~ 0.1*			
17 Daily ET demand (ft^3/day) *Item 15 * (Item 16 / 12)*			
18 Drawdown time (hrs) *Copy Item 6 in Form 4.2-1*			
19 Retention Volume (ft^3) $V_{retention}$ *= Item 17 * (Item 18 / 24)*			
20 Runoff volume retention from evapotranspiration BMPs (ft^3): 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 DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
22 Number of Street Trees			
23 Average canopy cover over impervious area (ft^2)			
24 Runoff volume retention from street trees (ft^3) $V_{retention}$ *= Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches*			
25 Runoff volume retention from street tree BMPs (ft^3): 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 DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
27 Number of rain barrels/cisterns			
28 Runoff volume retention from rain barrels/cisterns (ft^3) $V_{retention}$ *= Item 27 * 3*			
29 Runoff volume retention from residential rain barrels/Cisterns (ft3): $V_{retention}$ *=Sum of Item 28 for all BMPs*			
30 Total Retention Volume from Site Design Hydrologic Source Control BMPs: 0 *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): 2,033 *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 DMA A BMP Type Infiltration Basin	DA DMA BMP Type Infiltration Basin	DA DMA BMP Type Infiltration Basin *(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*	1.46		
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*	2.25		
4 Design percolation rate (in/hr) *P_{design} = Item 2 / Item 3*	.65		
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*	2.6		
7 Ponding Depth (ft) *d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6*	2.0		
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*	830		
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	NA		
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*	NA		
12 Gravel porosity	NA		
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))]*	2,700		
15 Underground Retention Volume (ft^3) *Volume determined using manufacturer's specifications and calculations*	0		

16 Total Retention Volume from LID Infiltration BMPs: 2,700 *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*

17 Fraction of DCV achieved with infiltration BMP: 100% *Retention% = Item 16 / Form 4.2-1 Item 7*

18 Is full LID DCV retained on-site with combination of hydrologic source control and LID retention and infiltration BMPs? Yes ☒ No ☐

If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the

applicable category of development and repeat all above calculations.

4.3.3 Harvest and Use BMP

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

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

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

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

4.3.4 Biotreatment BMP

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

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

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

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

1 Remaining LID DCV not met by site design HSC, infiltration, or harvest and use BMP for potential biotreatment (ft^3): *Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16- Form 4.3-4 Item 9*	List pollutants of concern *Copy from Form 2.3-1.*	
2 Biotreatment BMP Selected *(Select biotreatment BMP(s) necessary to ensure all pollutants of concern are addressed through Unit Operations and Processes, described in Table 5-5 of the TGD for WQMP)*	Volume-based biotreatment *Use Forms 4.3-6 and 4.3-7 to compute treated volume*	Flow-based biotreatment *Use Form 4.3-8 to compute treated volume*
	☐ Bioretention with underdrain ☐ 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: 0% *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	DA 1 DMA B BMP Type	DA 1 DMA C BMP Type *(Use additional forms for more BMPs)*
1 Pollutants addressed with BMP *List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP*			
2 Amended soil infiltration rate *Typical ~ 5.0*			
3 Amended soil infiltration safety factor *Typical ~ 2.0*			
4 Amended soil design percolation rate (in/hr) P_{design} *= Item 2 / Item 3*			
5 Ponded water drawdown time (hr) *Copy Item 6 from Form 4.2-1*			
6 Maximum ponding depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
7 Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 4 * Item 5) or Item 6*			
8 Amended soil surface area (ft^2)			
9 Amended soil depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
10 Amended soil porosity, *n*			
11 Gravel depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
12 Gravel porosity, *n*			
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*			
14 Biotreated Volume (ft^3) $V_{biotreated}$ *= Item 8 * [(Item 7/2) + (Item 9 * Item 10) +(Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*			
15 Total biotreated volume from bioretention and/or planter box with underdrains BMP: *Sum of Item 14 for all volume-based BMPs included in this form*			

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

Biotreatment BMP Type *Constructed wetlands, extended wet detention, extended dry detention, or other comparable proprietary BMP. If BMP includes multiple modules (e.g. forebay and main basin), provide separate estimates for storage and pollutants treated in each module.*	DA DMA BMP Type		DA DMA BMP Type *(Use additional forms for more BMPs)*	
	Forebay	Basin	Forebay	Basin
1 Pollutants addressed with BMP forebay and basin *List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP*				
2 Bottom width (ft)				
3 Bottom length (ft)				
4 Bottom area (ft^2) A_{bottom} = *Item 2 * Item 3*				
5 Side slope (ft/ft)				
6 Depth of storage (ft)				
7 Water surface area (ft^2) $A_{surface}$ =*(Item 2 + (2 * Item 5 * Item 6)) * (Item 3 + (2 * Item 5 * Item 6))*				
8 Storage volume (ft^3) *For BMP with a forebay, ensure fraction of total storage is within ranges specified in BMP specific fact sheets, see Table 5-6 of the TGD for WQMP for reference to BMP design details* V =*Item 6 / 3 * [Item 4 + Item 7 + (Item 4 * Item 7)^0.5]*				
9 Drawdown Time (hrs) *Copy Item 6 from Form 2.1*				
10 Outflow rate (cfs) Q_{BMP} = *(Item* $8_{forebay}$ *+ Item* 8_{basin}*) / (Item 9 * 3600)*				
11 Duration of design storm event (hrs)				
12 Biotreated Volume (ft^3) $V_{biotreated}$ = *(Item* $8_{forebay}$ *+ Item* 8_{basin}*) +(Item 10 * Item 11 * 3600)*				
13 Total biotreated volume from constructed wetlands, extended dry detention, or extended wet detention : *(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 DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
1 Pollutants addressed with BMP *List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in TGD Table 5-5*			
2 Flow depth for water quality treatment (ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
3 Bed slope (ft/ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
4 Manning's roughness coefficient			
5 Bottom width (ft) b_w *= (Form 4.3-5 Item 6 * Item 4) / (1.49 * Item 2^1.67 * Item 3^0.5)*			
6 Side Slope (ft/ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
7 Cross sectional area (ft^2) *A = (Item 5 * Item 2) + (Item 6 * Item 2^2)*			
8 Water quality flow velocity (ft/sec) *V = Form 4.3-5 Item 6 / Item 7*			
9 Hydraulic residence time (min) *Pollutant specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
10 Length of flow based BMP (ft) *L = Item 8 * Item 9 * 60*			
11 Water surface area at water quality flow depth (ft^2) SA_{top} *= (Item 5 + (2 * Item 2 * Item 6)) * Item 10*			

4.3.5 Conformance Summary

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

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

1 Total LID DCV for the Project DA-1 (ft^3): 2,033 *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): 2,806 *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): 1,988 *(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): 2,806 *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
Education of Property Owners	Property Owner	Property owner will be the operator of the learning center facility. The property owner will execute the BMP Covenant and made aware of the BMP maintenance and education requirements of employees.	Upon execution of the covenant
Activity Restrictio ns	Property Owner	Property owner as operator, holder of the Conditional Use Permit and responsible party will be aware of any use or activity restrictions.	Upon permit issuance
Street Sweeping Private Streets and Parking Lots	Property Owner	All paved areas within the site shall be vacuum swept twice annually and/or as needed by a qualified firm specializing in this task. The owner shall be responsible for this task.	Upon issuance of Certificate of Occupancy (CO and then at least twice annually, prior to the storm season* in the late summer or early fall and as needed.
Common Areas Catch Basin Inspection	Property Owner	There are no catch basins on the site. However, drainage spillways should bee inspected if assure rip rap dissipators have not be damanged or destoryed and remain functional for their intended purpose. The new culvert at the driveway approch should be inspected to be sure it is not blocked and remains functional.	Upon issuance of CO, at least twice annually and at the beginning of the rainy season* and each storm there after

Landscape Planning (SD-10)	Property Owner	The owner shall replace all dead vegetation with living and maintain or improve on the ground cover	Monthly after planting with replacement as needed
Roof Runoff Controls (SD-11)	Property Owner	The owner will ensure that roof drains are unobstructed and free of any debris.	Upon issuance of CO and at the beginning of the rainy season* and each storm there after
Efficient Irrigation (SD-13)	Property Owner	The owner will replace or repair any damaged or broken components of the irrigation system.	Upon issuance of CO and monthly thereafter
Employee Training and Education Program	Property Owner	Employees shall be trained in the proper care of the drainage facilities and their maintenance by a qualified and certified instructor in water quality management. Training shall occur within 6 months of employment and annually thereafter. Employees shall be provided with a copy of all applicable BMP details for their use	Within 6 months of hiring and yearly thereafter

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

Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

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

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

BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
Education of Property Owners	Property Owner	Property owners/tenants shall receive an educational packet with information on "good housekeeping", BMP maintenance and listing those activities that are allowed and those that are not.	Upon execution of the covenant
Activity Restrictions	Property Owner	Property owner as operator, holder of the Conditional Use Permit and responsible party will be aware of any use or activity restrictions.	Upon permit issuance
Street Sweeping Private Streets and Parking Lots (SC-43)	Property Owner	All paved areas within the site shall be vacuum swept twice annually and/or as needed by a qualified firm specializing in this task. The owner shall be responsible for this task.	Upon issuance of Certificate of Occupancy (CO and then at least twice annually, prior to the storm season* in the late summer or early fall and as needed.
Landscape Planning (SD-10)	Property Owner	The owner shall replace all dead vegetation with living and maintain or improve on the ground cover	Monthly after planting with replacement as needed

Roof Runoff Controls (SD-11)	Property Owner	The owner will ensure that roof drains are unobstructed and free of any debris.	Upon issuance of CO and at the beginning of the rainy season* and each storm there after
Efficient Irrigation (SD-13)	Property Owner	The owner will replace or repair any damaged or broken components of the irrigation system.	Upon issuance of CO and monthly thereafter
Employee Training and Education Program	Property Owner	Employees shall be trained in the proper care of the drainage facilities and their maintenance by a qualified and certified instructor in water quality management. Training shall occur within 6 months of employment and annually thereafter. Employees shall be provided with a copy of all applicable BMP details for their use	Within 6 months of hiring and yearly thereafter
Basin Maintained (TC – 11)	Property Owner	Landscape crews shall inspect the irrigation system and shall report all drainage problems to the owner. Inspect irrigation system to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed. Inspect pesticide/fertilizer equipment and transportation vehicles. All routine landscaping maintenance shall be done in conformance with City and County Ordinances	Inspected during each weekly landscape service
Trash Storage Areas (SD – 32)	Property Owner	The owner of the project will implement a trash management progam that will be enforced by the managers of Learning Center. A program shall be implemented to pick up litter and sweep and clean the trash enclosure on a daily basis. Litter and debris will be picked up by the maintenance/landscape contractor on at least a weekly basis. Onsite manager/employees are to be instructed to be visually aware of improperly disposed or dumping of litter and debris and be cleaned up. Trash enclosures are designed to divert all flows around the enclosure. All dumpsters will have lids installed and will be inspected to ensure that the dumpsters remain covered and leak-proof. The owner shall contract with a refuse company to have the dumpsters emptied on a weekly basis, at a minimum.	Inspected weekly

Vegetated Swales		Inspect and correct erosion problems, damage to vegetation, and sediment and debris accumulation (address when greater than 3 inches of accumulating at any spot or covering vegetation). Inspect vegetation on side slopes for erosion and formation of rills or gullies, correct as needed. Mow and trim vegetation to ensure safety, aesthetics, proper swale operation, or to suppress weeds and invasive vegetation; dispose of cuttings in a local composting facility; mow only when swale is dry to avoid rutting	As needed basis
Erosion Control Devices	Property Owner	Installation and maintenance of the BMPs list on the Erosion Control Plan should be maintained by the owner/manager as needed. Installation and maintenance of the silt fence, gravel bags, construction entrance, washout, and portably sanitary unit will be maintained as needed.	As needed basis

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

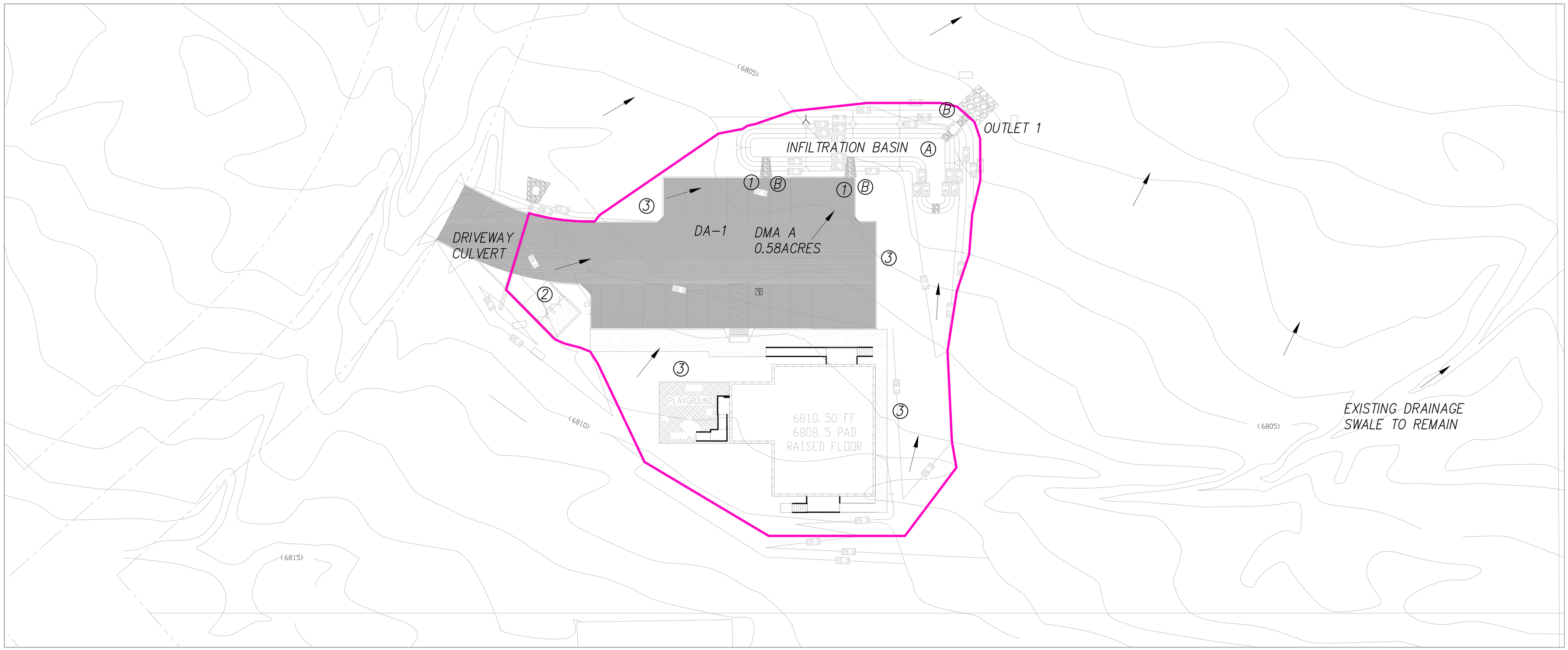
Minimum requirements include submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open. If the local jurisdiction requires specialized electronic document formats (as described in their local Local Implementation Plan), this section will describe the contents (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



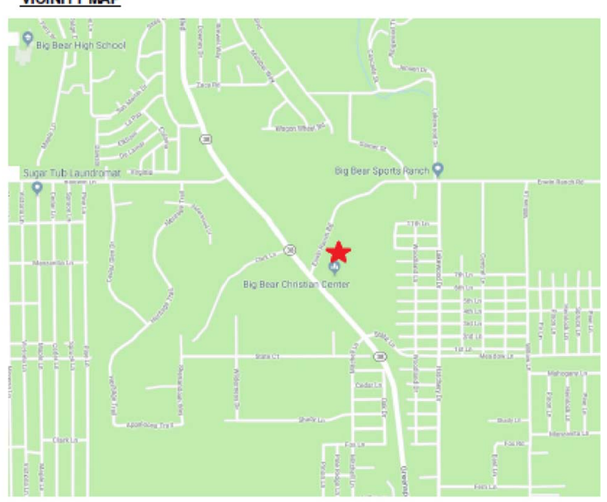
LEGEND:

- DMA BOUNDARY
- PLAY GROUND SURFACE
- CONCRETE SURFACE
- ASPHALT PAVEMENT

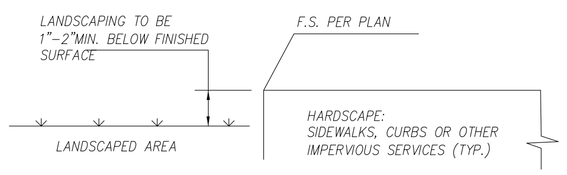
NORTH
SCALE: 1"= 20'

20 0 20 40 60
GRAPHIC SCALE: 1" = 20'

VICINITY MAP



ASSESSOR'S PARCEL NUMBER:
0315-421-02



DETAIL-DEPRESSED LANDSCAPED AREAS
NTS

WATER QUALITY NOTES:

SUITABILITY/FEASIBILITY CONSTRAINTS: THERE ARE NO WATER QUALITY FEASIBILITY CONSTRAINTS ON THE SITE.

STRUCTURAL SOURCE CONTROL BMPS

① STORM DRAIN SIGNAGE/STENCILING
② TRASH ENCLOSURE (SEE LANDSCAPE ARCHITECT'S PLAN FOR DETAILS)

③ FINISHED GRADE OF LANDSCAPED AREAS SHALL BE A MINIMUM OF 1-2 INCHES BELOW TOP OF CURB, SIDEWALK OR PAVEMENT.

SLOPES, CHANNELS AND STORM DRAIN OUTLETS WILL BE PROTECTED WITH LANDSCAPING AND ENERGY DISSIPATION SUCH AS RIP RAP.

SEE LANDSCAPE AND IRRIGATION PLANS FOR SPECIFICS ON PLANTING AND WATER EFFICIENT IRRIGATION CONTROLLERS.

HYDROLOGIC CONTROLS

Ⓐ INFILTRATION/DETENTION BASIN

Ⓑ SPILLWAY AND MAINTENANCE

REVISIONS		
DATE	NOTES	APP.

REGISTERED PROFESSIONAL ENGINEER
DAVID B. RAGLAND
REG. NO. 35985
EXP. 6/30/20
CIVIL
STATE OF CALIFORNIA

DAVID B. RAGLAND R.C.E. 35985 DATE

TRANSTECH
413 MACKAY DRIVE.
SAN BERNARDINO, CA. 92408
(909) 384-7464

COUNTY OF SAN BERNARDINO

McDONALDS LEARNING CENTER DRAINAGE AREA AND BMP SITE PLAN

DRAWN BY:	DATE:	SCALE:	SHEET:	JOB NO.
G.D.A.	03/11/2019	1"= 20'	1 OF 1	15155

Appendix A

Time of Concentration Nomograph

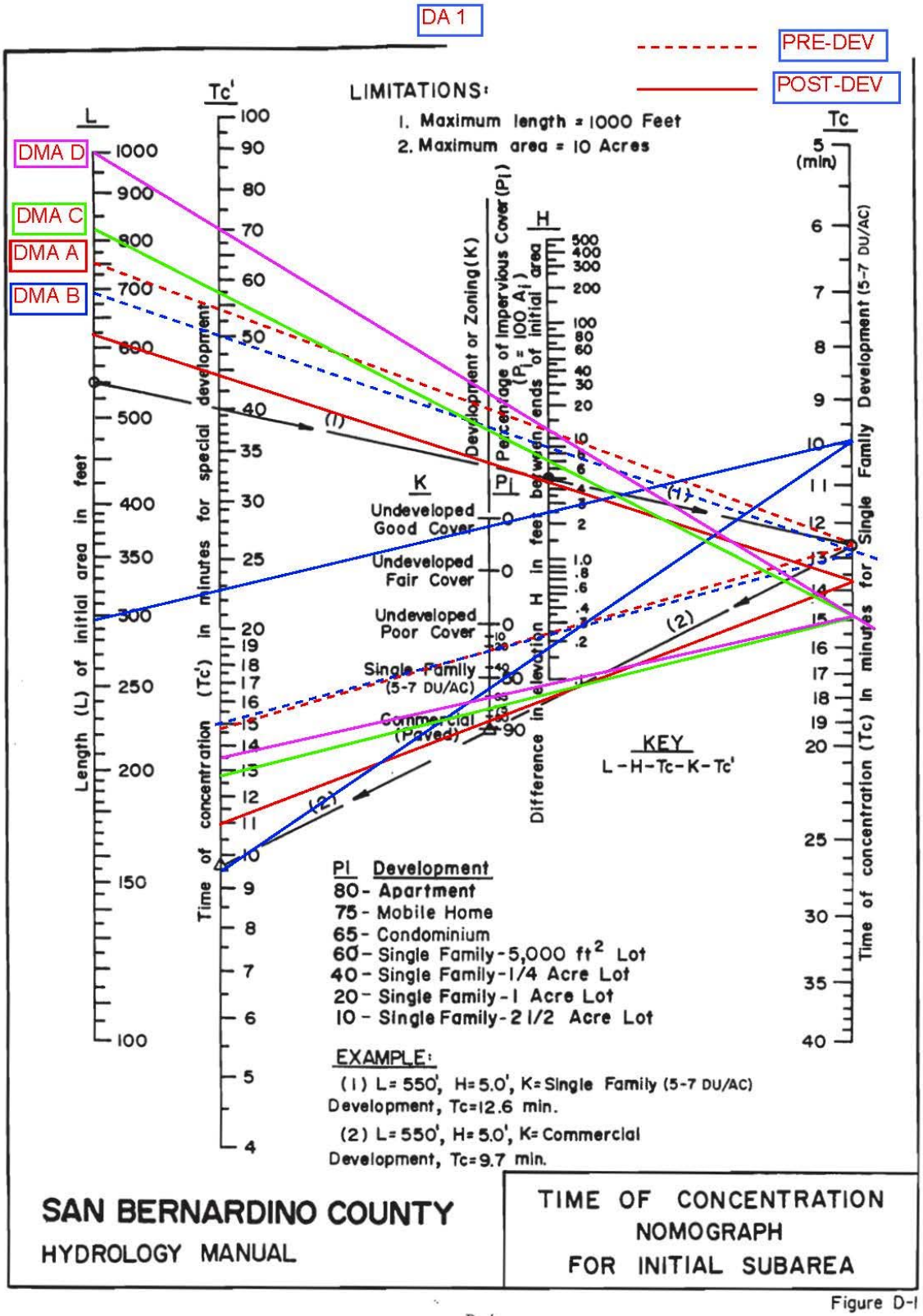

DA 1
PRE-DEV
POST-DEV
DMA D
DMA C
DMA A
DMA B
LIMITATIONS:
1. Maximum length = 1000 Feet
2. Maximum area = 10 Acres
L
Tc'
Tc
K
PI
H
Length (L) of initial area in feet
Time of concentration (Tc') in minutes for special development
Development or Zoning (K)
Percentage of Impervious Cover (PI)
Difference in elevation H in feet between ends of initial area (PI = 100 Ai)
Time of concentration (Tc) in minutes for Single Family Development (5-7 DU/AC)
Undeveloped Good Cover
Undeveloped Fair Cover
Undeveloped Poor Cover
Single-Family (5-7 DU/AC)
Commercial (Paved)
KEY
L-H-Tc-K-Tc'
PI Development
80- Apartment
75- Mobile Home
65- Condominium
60- Single Family-5,000 ft2 Lot
40- Single Family-1/4 Acre Lot
20- Single Family-1 Acre Lot
10- Single Family-2 1/2 Acre Lot
EXAMPLE:
(1) L= 550', H= 5.0', K= Single Family (5-7 DU/AC) Development, Tc=12.6 min.
(2) L= 550', H= 5.0', K= Commercial Development, Tc=9.7 min.
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

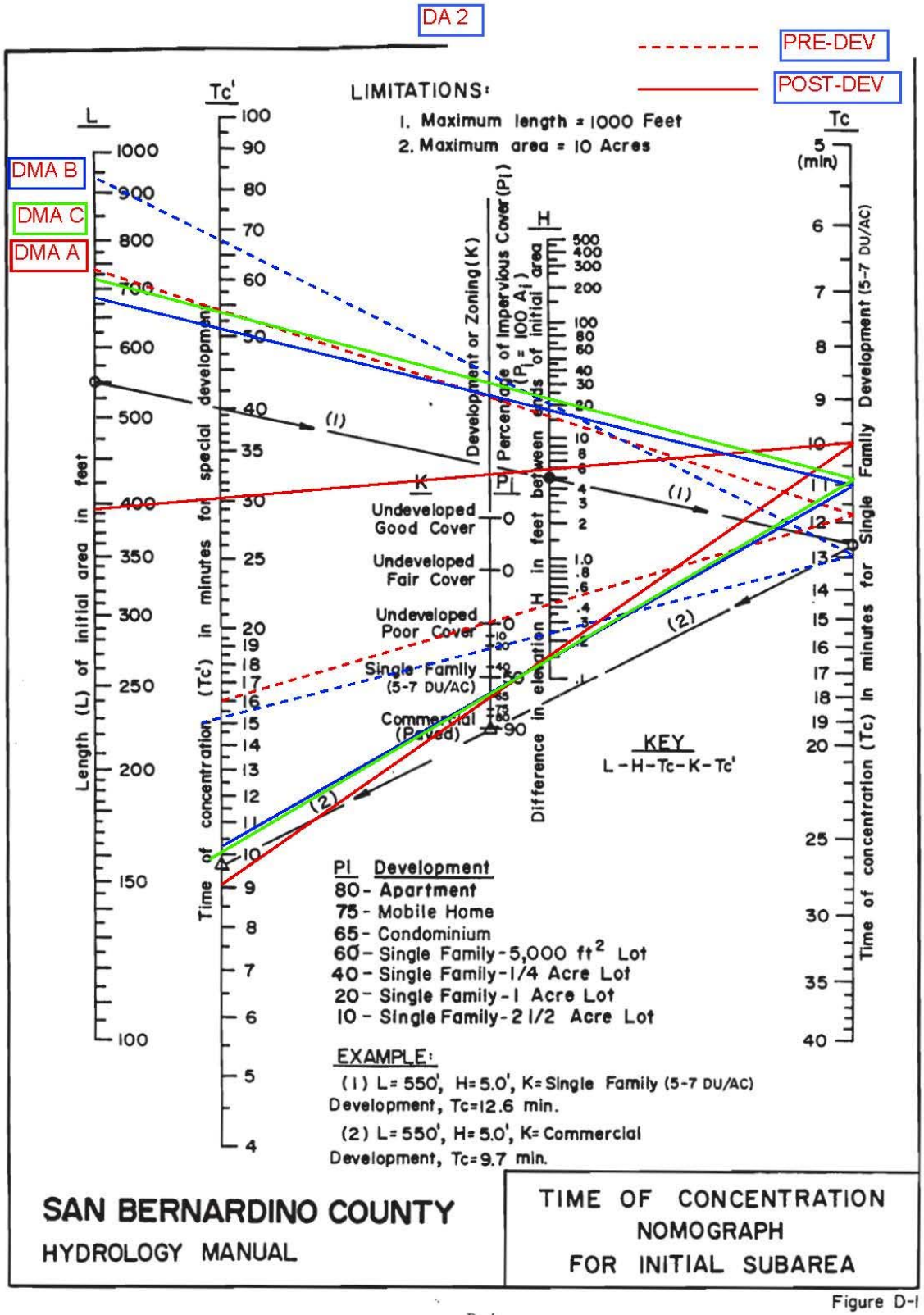

DA 2
PRE-DEV
POST-DEV
DMA B
DMA C
DMA A
LIMITATIONS:
1. Maximum length = 1000 Feet
2. Maximum area = 10 Acres
L
Tc'
Tc
H
K
PI
Length (L) of initial area in feet
Time of concentration (Tc') in minutes for special development
Development or Zoning (K)
Percentage of Impervious Cover (PI)
Difference in elevation H in feet between ends of initial area (PI = 100 AI)
Time of concentration (Tc) in minutes for Single Family Development (5-7 DU/AC)
Undeveloped Good Cover
Undeveloped Fair Cover
Undeveloped Poor Cover
Single Family (5-7 DU/AC)
Commercial (Paved)
KEY
L-H-Tc-K-Tc'
PI Development
80- Apartment
75- Mobile Home
65- Condominium
60- Single Family-5,000 ft2 Lot
40- Single Family-1/4 Acre Lot
20- Single Family-1 Acre Lot
10- Single Family-2 1/2 Acre Lot
EXAMPLE:
(1) L= 550', H= 5.0', K= Single Family (5-7 DU/AC) Development, Tc=12.6 min.
(2) L= 550', H= 5.0', K= Commercial Development, Tc=9.7 min.
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

Appendix B

Point Precipitation

NOAA Atlas 14, Volume 6, Version 2
Location name: Big Bear City, California, USA*
Latitude: 34.247°, Longitude: -116.8115°
Elevation: 6804.71 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.146 (0.121-0.178)	0.199 (0.164-0.243)	0.274 (0.226-0.336)	0.340 (0.278-0.420)	0.437 (0.346-0.558)	0.518 (0.402-0.676)	0.607 (0.459-0.811)	0.706 (0.519-0.970)	0.852 (0.601-1.22)	0.980 (0.668-1.45)
10-min	0.210 (0.173-0.256)	0.285 (0.236-0.348)	0.393 (0.324-0.481)	0.487 (0.398-0.602)	0.626 (0.495-0.800)	0.743 (0.576-0.969)	0.871 (0.658-1.16)	1.01 (0.744-1.39)	1.22 (0.862-1.75)	1.41 (0.957-2.08)
15-min	0.253 (0.210-0.309)	0.345 (0.285-0.421)	0.475 (0.391-0.582)	0.589 (0.481-0.727)	0.757 (0.599-0.967)	0.898 (0.696-1.17)	1.05 (0.796-1.41)	1.22 (0.900-1.68)	1.48 (1.04-2.12)	1.70 (1.16-2.52)
30-min	0.365 (0.302-0.445)	0.496 (0.410-0.606)	0.683 (0.563-0.837)	0.847 (0.693-1.05)	1.09 (0.862-1.39)	1.29 (1.00-1.69)	1.52 (1.15-2.02)	1.76 (1.30-2.42)	2.13 (1.50-3.05)	2.44 (1.67-3.62)
60-min	0.516 (0.427-0.630)	0.702 (0.580-0.858)	0.967 (0.797-1.19)	1.20 (0.981-1.48)	1.54 (1.22-1.97)	1.83 (1.42-2.39)	2.14 (1.62-2.87)	2.49 (1.83-3.43)	3.01 (2.12-4.31)	3.46 (2.36-5.13)
2-hr	0.730 (0.604-0.891)	0.983 (0.813-1.20)	1.34 (1.10-1.64)	1.64 (1.34-2.03)	2.08 (1.64-2.65)	2.44 (1.89-3.18)	2.82 (2.13-3.77)	3.24 (2.38-4.44)	3.83 (2.70-5.49)	4.32 (2.95-6.41)
3-hr	0.902 (0.746-1.10)	1.21 (0.997-1.47)	1.63 (1.34-2.00)	1.99 (1.63-2.46)	2.51 (1.99-3.21)	2.94 (2.28-3.83)	3.39 (2.56-4.53)	3.87 (2.85-5.32)	4.57 (3.22-6.54)	5.13 (3.50-7.60)
6-hr	1.31 (1.08-1.59)	1.74 (1.44-2.13)	2.34 (1.93-2.87)	2.85 (2.33-3.53)	3.59 (2.84-4.59)	4.19 (3.25-5.46)	4.82 (3.65-6.45)	5.51 (4.05-7.57)	6.48 (4.57-9.28)	7.28 (4.96-10.8)
12-hr	1.79 (1.48-2.19)	2.42 (2.00-2.96)	3.31 (2.73-4.05)	4.07 (3.33-5.03)	5.19 (4.10-6.62)	6.10 (4.73-7.96)	7.09 (5.36-9.47)	8.16 (6.00-11.2)	9.72 (6.85-13.9)	11.0 (7.50-16.3)
24-hr	2.52 (2.23-2.90)	3.47 (3.07-4.00)	4.83 (4.26-5.58)	6.03 (5.28-7.03)	7.81 (6.62-9.41)	9.32 (7.73-11.4)	11.0 (8.89-13.8)	12.8 (10.1-16.6)	15.5 (11.8-21.0)	17.9 (13.1-24.9)
2-day	3.15 (2.79-3.62)	4.35 (3.85-5.02)	6.12 (5.40-7.07)	7.69 (6.74-8.97)	10.1 (8.55-12.1)	12.1 (10.1-14.9)	14.4 (11.7-18.2)	17.0 (13.4-22.0)	21.0 (15.9-28.2)	24.4 (17.8-34.0)
3-day	3.45 (3.06-3.97)	4.78 (4.24-5.52)	6.75 (5.96-7.81)	8.53 (7.47-9.94)	11.2 (9.53-13.5)	13.6 (11.3-16.7)	16.2 (13.2-20.4)	19.3 (15.2-24.9)	23.9 (18.1-32.2)	28.0 (20.5-39.0)
4-day	3.70 (3.28-4.26)	5.15 (4.56-5.94)	7.29 (6.44-8.43)	9.23 (8.09-10.8)	12.2 (10.3-14.7)	14.8 (12.3-18.2)	17.7 (14.3-22.3)	21.0 (16.6-27.2)	26.1 (19.8-35.2)	30.6 (22.4-42.7)
7-day	4.21 (3.73-4.85)	5.90 (5.22-6.80)	8.41 (7.42-9.72)	10.7 (9.35-12.4)	14.1 (12.0-17.0)	17.1 (14.2-21.1)	20.5 (16.6-25.8)	24.3 (19.2-31.5)	30.2 (22.8-40.7)	35.3 (25.8-49.2)
10-day	4.54 (4.02-5.22)	6.40 (5.66-7.37)	9.14 (8.07-10.6)	11.6 (10.2-13.5)	15.4 (13.0-18.5)	18.6 (15.5-22.9)	22.3 (18.1-28.0)	26.4 (20.8-34.2)	32.7 (24.7-44.1)	38.1 (27.9-53.2)
20-day	5.47 (4.85-6.30)	7.77 (6.88-8.96)	11.2 (9.85-12.9)	14.2 (12.4-16.5)	18.8 (15.9-22.6)	22.7 (18.8-27.9)	27.1 (21.9-34.1)	32.0 (25.2-41.4)	39.4 (29.8-53.1)	45.7 (33.4-63.8)
30-day	6.39 (5.67-7.36)	9.09 (8.05-10.5)	13.0 (11.5-15.1)	16.6 (14.5-19.3)	21.9 (18.5-26.3)	26.4 (21.9-32.4)	31.4 (25.4-39.5)	36.9 (29.1-47.8)	45.3 (34.3-61.0)	52.4 (38.3-73.1)
45-day	7.67 (6.80-8.83)	10.9 (9.61-12.5)	15.5 (13.7-17.9)	19.6 (17.2-22.8)	25.8 (21.8-31.0)	31.0 (25.7-38.1)	36.7 (29.7-46.2)	43.1 (34.0-55.7)	52.5 (39.7-70.8)	60.5 (44.3-84.4)
60-day	8.91 (7.89-10.3)	12.5 (11.1-14.4)	17.7 (15.6-20.5)	22.3 (19.6-26.0)	29.2 (24.8-35.2)	35.0 (29.1-43.0)	41.4 (33.5-52.1)	48.4 (38.1-62.6)	58.7 (44.4-79.1)	67.4 (49.3-94.0)

Appendix C

Infiltration Report

Worksheet H: Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	2	.5
		Predominant soil texture	0.25	2	.5
		Site soil variability	0.25	1	.25
		Depth to groundwater / impervious layer	0.25	1	.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.5
B	Design	Tributary area size	0.25	1	.25
		Level of pretreatment/ expected sediment loads	0.25	2	.5
		Redundancy	0.25	2	.5
		Compaction during construction	0.25	1	.25
		Design Safety Factor, $S_B = \Sigma p$			1.5
Combined Safety Factor, $S_{TOT} = S_A \times S_B$					2.25
Measured Infiltration Rate, inch/hr, K_M (corrected for test-specific bias)					1.46
Design Infiltration Rate, in/hr, $K_{DESIGN} = S_{TOT} \times K_M$					.65

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

See Attached Infiltration Testing and Report

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

Appendix D

Site Photos

APPENDIX E

Restricted Activities List

APPENDIX F

BMP FACT SHEETS

Fact Sheets will be inserted for the Final WQMP

SC-10	Non-Stormwater Discharges
SC-11	Spill Prevention, Control & Cleanup
SC-41	Building & Grounds Maintenance
SC-42	Building Repair & construction
SC-43	Parking Area Maintenance
SC-44	Drainage System Maintenance
SC-60	Housekeeping Practices
SC-73	Landscape Maintenance
SD-10	Site Design & Landscape Planning
SD-11	Roof Runoff Controls
SD-12	Efficient Irrigation
SD-13	Storm Drain Signage
SD-21	Alternative Buildings
SD-32	Trash Storage Areas
SD-33	Vehicle Wash Areas
SD-34	Outdoor Material Storage Areas
TC-11	Infiltration Basin
MP-52	Drain Inserts

APPENDIX G

EDUCATIONAL MATERIALS

APPENDIX H
Operation and Maintenance Plan

Responsible Party Information:
Lisa Burtner
P.O. Box 150
Big Bear Lake, CA 92315
(909) 709-4041

BMP	Responsible Party	Description of O & M Activities	Implementation Date and Frequency
Education of Property Owners	Property Owner	Along with the lease agreement, property owners/tenants shall receive an educational packet with information on "good housekeeping", BMP maintenance and listing those activities that are allowed and those that are not. See sample included in Appendix G	Upon occupancy of property and once per year there after
Activity Restrictions	Property Owner	Property owners/tenants shall receive a packet listing those activities that are allowed and those that are not. See list in Appendix E	Upon occupancy of property and once per year there after
Employee Training/Education Program	Property Owner	Employees shall be trained in the proper care of the drainage facilities and their maintenance by a qualified and certified instructor in water quality management. Training shall occur within 3 months of employ ent and annually thereafter. Employees shall be provided with a copy of all applicable BMP details for their use	Within 3 months of hiring and yearly thereafter
Street Sweeping Private Street and Parking Lots	Property Owner	Parking lots shall be swept monthly to prevent sediment, garden waste, and trash, or other pollutants from entering onsite drains and public storm channels. Sweeping will be done by a landscape contractor or other contractor provided by the owner.	Street sweeping will begin with the issuance of the first certificate of occupancy. Swept Monthly thereafter.
Common Areas Catch Basin Inspection	Property Owner	The on-site catch basins shall be inspected monthly during the rainy season (October-May) and before and after each storm to ensure proper operation. The owner shall contract with a qualified landscape contractor to inspect and clean out accumulation of trash, litter and sediment and check for evidence of illegal dumping of waste materials into on-site drains. Catch basins will be inspected visually for sediment build up or trash and cleaned of trash when seen and cleaned for sediment when sediment levels reach 2" or more. Remove grates and inspect and clean skimmer trays and remove and replace hydrocarbon booms and drain inserts on catch basins that have these features.	Upon completion of installation, monthly during rainy season (October-May) and before and after each storm.

Water Quality Infiltration and Detention Basin	Property Owner	Inspections and maintenance are necessary to ensure that water infiltrates into the subsurface completely (recommended infiltration rate of 48 hours or less) and that vegetation is carefully managed to prevent creating mosquito and other vector habitats. Inspect inlet and outlet pipes and rip rap. Conduct routine inspections for trash or other debris that may be blocking the inlet tor outlet pipes. Inspect side slopes, berms and spillways for erosion. Check for dewatering, noticeable odors, presence of algae or aquatic vegetation. Vegetation maintained in good condition. 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. If erosion is occurring within the basin, repair or replace rip rap, revegetate immediately and stabilize with an erosion control mulch or mat until vegetation cover is established.	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.
Landscape Maintenance (SC-73)	Property Owner	Landscape crews shall inspect the irrigation system and shall report all drainage problems to the owner. Inspect irrigation system to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed. Inspect pesticide/fertilizer equipment and transportation vehicles. All routine landscaping maintenance shall be done in conformance with City and County Ordinances	Inspected during each weekly landscape service
Litter and Debris Control Program (SD-32) Trash Storage Areas	Property Owner	A program shall be implemented to pick up litter, pet and potential wild animal fecal matter and sweep and clean the trash enclosure on a daily basis. All dumpsters will have lids installed and will be inspected weekly to ensure that the dumpsters remain covered and leak-proof. The owner shall contract with a refuse company to have the dumpsters emptied on a weekly basis, at a minimum.	Trash enclosure should be kept clean from litter and be swept on a daily basis. Lids to be inspected weekly. Trash to be removed by refuse company weekly.
Roof Runoff Controls (SD-11)	Property Owner	The owner will ensure that roof drain outlets are unobstructed and free of any debris. Inspect connections to storm drain system if connected and verify tight connections and no leakage. If not connected to the storm drain system, verify the splash block of other energy dissipator is in place and functional. Check landscape plantings are not	Upon issuance of first Certificate of Occupancy and at the beginning of October each year and after each storm there after

		damaged and there is no erosion. Repair/replace if necessary.	
Efficient Irrigation (SD-12)	Property Owner	The owner will replace or repair any damaged or broken components of the irrigation system. Check and re-calibrate as necessary moisture sensors, rain shut off valves and segment timing to minimize runoff of excess irrigation.	Upon issuance of first Certificate of Occupancy and weekly thereafter
Storm Drain Stenciling and Signage (SD-13)	Property Owner	The painted message or disk shall be inspected annually & repainted/replaced as necessary.	Shall be inspected annually and repainted/replaced.
Vehicle Wash Area (SD-33)	Property Owner	The vehicle wash area is to be self-contained or covered with a roof or overhang. Wash waters from this area are directed to the catch basin that contain pretreatment devices prior to entering the sewer system. Catch basin(s) accepting flow from the wash area will have to be inspected and maintained on a more regular basis.	Upon issuance of the CO and weekly thereafter. Include as a part of the weekly landscape maintenance iservice
Spill Prevention and Cleanup	Property Owner	Tenants will be provided with information within the rental agreement regarding spill responses and prevention procedures in case of an accidental spill or leak occurring from vehicles or boats parked or stored on the project site. A supply of dry absorbent materials such as Oil-Dri, Speedi-Dry or cat litter will be made available. These materials can be stored in the rental or managers office area for access and use by the employee, tenants and landscape/maintenance contractors. See Appendix H-1 Spill Prevention and Cleanup Guide	Spill Prevention is a continuous ongoing activity. Any spill that does occur, shall include notification of the property manager and cleanup performed as soon as practical.
Jensen Precast Sand-Oil Interceptor	Property Owner	The Interceptor should be inspected monthly and cleaned or pumped out as necessary as outlined in the Manufacture's Operation and Maintenance Manual.	Monthly upon completion of installation, connection to sewer commencement of operation.
Uniform Fire Code	Property Owner and Contractors	All fire code requirements will be implemented. This project is a residental apartment project and should not and is not anticipated to be handling hazardous material subject to Articale 80. The listed project activities do not include hazardous materials storage, therefore Article 80 of the Uniform Fire Code would not be applicable. However, pool maintenance contractor's and other personnel or contractors that work with cholrine, compressed gases or other hazardous materials will be required to comply with Article 80 of the Uniform Fire Code and Part V "Hazardous Materials" of the California Fire Code.	Upon occupancy, annually thereafter and as necessary to comply with Article 80.
Other NPDES Permits	Property Owner	NPDES General Construction Activities Permit to be complied with by filing a "Noticce of Intent" and SWPPP with the State Water Quality Control Board and obtaining a WDID Discharge Permit Number prior to commencement of construction activites covered under this permit.	SWPPP needs to be kept on-site. Temporaty construction BMPs to be inspected weekly and repaired within 72 hours.

Pet/Wild Animal Waste Management and Homeless	Property Owner and Tenants	Apply good housekeeping and properly dispose of all pet waste. Double-bag animal excrement and tie securely before throwing away. Or, seal it in a leakproof container before throwing away. Control where pets relieve themselves. Dog park areas solely for the pets' needs are included within the project and made available for pet use. On walks, carry a scoop and a plastic bag, or a bucket with a lid and handle. To prevent plumbing problems, don't flush debris or cat litter. Cat feces may be flushed but used litter should be put in a securely closed bag in the trash. Fecal matter from wild animals may be encounter from time to time. Generally, this waste material can be collected and disposed of as part of the ongoing landscape and site maintenance operation. However, should wild animal activity become a nuisance, the project owner or management company should contact the City of Redlands Animal Control Office at (909) 798-7644 Should public nuisance, debris and fecal matter from the homeless become an issue regarding health and safety, the Redlands Police Department should be contacted at (909) 798-7681	Upon occupancy and continuously as necessary

RECORD OF BMP IMPLEMENTATION, MAINTENANCE AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance and Inspection Activity Performed

APPENDIX H-1

Spill Prevention and Cleanup Plan Guide for The McDonald Learning Center

Purpose

The purpose of this document is to present a simple guide for developing a spill prevention and cleanup plan for The McDonald Learning Center. This guide takes into consideration the requirements of the City's Water Quality Management Ordinance. The purpose of this ordinance is to protect our local water quality. As a Landlord, you are responsible for actions, incidents, or conditions which occur on your property and for complying with the ordinance.

Spill Prevention and Cleanup Plans

Effective spill prevention and cleanup plan consist of the following components:

- List of potential sources of pollutants
- Best management practices to prevent stormwater pollution and accidental spills/discharges
- Emergency contact information, notification procedures, and procedures for cleanup of spills and discharges of pollutants
- Employee training
- Tenant notification to manager of any leaks, spills or discharges.

Potential Sources of Pollutants

The following are typical sources of pollutants that occur on residential rental properties:

- Sewage spills resulting from pipe failures, grease and rag blockages, pump failures, and improper connections.
- Automotive fluid spills (used motor oil, antifreeze, lubricants, & solvents) from leaky vehicles and activities associated with auto repair/maintenance (oil changes, engine work, etc.).
- Wash water discharges from vehicle washing activities.
- Heating oil discharges from leaking above ground storage tanks**.**
- Improper disposal of yard wastes (leaves and grass clippings) to the drainage system.

Best Management Practices (BMPs) to Prevent Stormwater Pollution and Accidental Spills/Discharges

Some of the practices that will help prevent spills and discharges are:

- Frequently maintain and inspect the property's sewer collection system.
- Educate tenants regarding proper cooking grease disposal.
- Routinely inspect parking lots and other outdoor areas for automotive fluid spills
- Establish a written policy that either prohibits vehicle maintenance activities onsite or limits

the activity to a specific area where potential discharges can be contained (such as an enclosed bay).

- Acquire a spill cleanup kit that addresses automotive fluid discharges and discharges of other types of chemicals that are stored and/or used onsite will be kept onsite for access by residents, employees and contract maintenance personnel. (See typical absorbent material attached)
- Educate maintenance crew regarding proper disposal and/or recycling of yard wastes (leaves and grass clippings).
- Immediately cleanup up any spills upon discovery and properly dispose of wastes.
- Prohibit car washing in apartment complexes. Prohibit mobile car washers that do not contain waste water.

Emergency Contact Information

Develop and routinely update an emergency contact list. For each contact make sure to include:

- Primary and secondary contact person's name
- Name and address of company or organization represented
- Primary office number and after-hours emergency contact number(s)

To address potential sewage discharges, The McDonald Learning Center should keep the following contacts:

- 2 plumbing contractors
- 2 environmental cleanup contractors
- Local plumbing supply store(s)

To address potential automotive fluid and other pollutant discharges, The McDonald Learning Center should keep the following contacts:

- 2 environmental cleanup contractors
- Local vendors of containment and cleanup products
- Contractor for proper disposal of these wastes.

Cleanup Procedures for Spills/Discharges

Cleanup procedures should address each potential source of pollution on your property.

- Check for unsafe conditions. Do not attempt cleanup if there is a safety risk. Instead, call a professional cleanup company.
- If deemed safe, clean spills up immediately and completely.
- Used absorbent materials should be picked up and properly disposed of as soon as possible. (Never wash and/or dispose of used absorbents down floor drains or into the storm drainage system.)
- Obtain emergency spill containment and cleanup kits that are appropriate for the type and quantities of chemical or goods stored at the facility.
- Do not use emulsifiers or dispersants for cleaning up chemical spills.

Employee Training

Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment. Train employees and contractors in proper techniques for spill containment and cleanup. Use a training log or similar method to document training.

All employees in the operation should have a general understanding of this document. The rationale is simple: the more people trained in spotting problems, the more prepared the operation can be to either prevent or respond to them. Maintenance/landscape contractors should have a thorough understanding of this document. It is important to maintain records of which employees have been trained. These records should be kept on file by the owner/manager.

Typical Absorbent Material for Spill Cleanup

PIG® Lite-Dri® Loose Absorbent

PLP201 Absorbs Oils, Coolants, Solvents, Water – Universal, General Absorbent, Absorbs up to 8 gal.

Silica-free loose absorbent pulls most common industrial liquids from your floor — it's easier to lift, lighter to carry, and 3X more absorbent than clay!

- Unlike clay, which is simply coated with liquid, fast-wicking recycled cellulose actually soaks up the spill the moment it touches
- Three times more absorbent means you'll use less material on the spill, reducing your labor and disposal costs
- Silica-free composition is non-abrasive and does not pose the health hazards associated with breathing in clay dust
- Non-abrasive composition won't harm finished floors or damage expensive machinery
- Light-weight absorbent is easier than clay to carry and use without injury
- Absorbs and retains oils, coolants, solvents and water
- Bag features a built-in handle for easy portability, handling and dispersal
- Recycled cellulose is ideal when green products are desired or required
- Can be incinerated after use to reduce waste or for fuels blending

pig EXCLUSIVE · Recycled Content · Autoship Eligible

Specifications

Fluid Absorbed	Oils, Coolants, Solvents, Water – Universal
Color	Gray
Recycled Content	100% Mixture of Pre- and Post-Consumer Recycled Cellulose
Absorbency	Up to 8 gal. per bag
Unit Weight	22 lb.
Sold as	1 bag
Weight	22 lbs.
NSN (National Stock Number)	4235-01-436-8317
# per Pallet	54
Composition	Cellulose
Application	General Absorbent

Kit

UNSPSC	47131902
Pigalog® Page Number	Page 43

Metric Equivalent

Absorbency	Up to 30.3 L per bag
Weight	10 kg

Technical Information

Technical Documents

PIG® LITE-DRI® Loose Absorbent

29 CFR 1910.22(a)(2)

Disclaimers

Corrosive Liquids Notice

Not recommended for acids, bases or other corrosive liquids.

New Pig
World's best stuff for leaks, drips and spills.

One Pork Avenue • Tipton, PA 16684-0304
1-855-493-4647 • Fax: 1-800-621-7447• newpig.com • hothogs@newpig.com


Premium Absorbent
Absorbs Oil, Grease, Hydraulic Fluid, Water & Other Liquid Spills
Air Swept Technology and Thermal Processing Deliver:
Superior Absorption
Strong Granules
Less Dust
"Don't Be The Fall Guy, Get Oil-Dri."
40 lb (18.15 kg)
OIL-DRI
Concentrated Formula
Quick-Sorb
40x
GREAT FOR MANY USES!

APPENDIX I

STORMWATER TREATMENT DEVICE AND CONTROL MEASURE ACCESS AND MAINTENANCE AGREEMENT

To be provided with Final WQMP Document

APPENDIX J

WQMP Site Plan and Existing Condition BMP Map

APPENDIX K

GRADING PLANS

To be provided with Final WQMP Document

APPENDIX L

LANDSCAPE PLANS

To be provided with Final WQMP Document

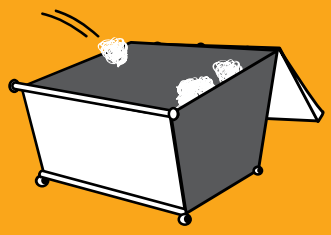
COMMERCIAL TRASH ENCLOSURES

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.**

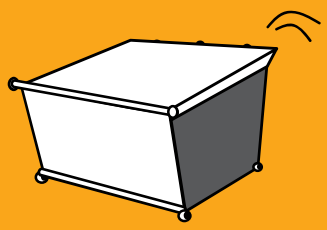
PROTECT WATER QUALITY BY FOLLOWING THESE SIMPLE STEPS

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

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CONTENEDORES COMERCIALES PARA LA BASURA

SIGA ESTOS **PASOS** PARA MANTENER **LIMPIAS NUESTRAS VÍAS FLUVIALES**

Los contenedores de basura, tales como aquellos que se encuentran en las unidades comerciales y departamentos, generalmente contienen materiales que están destinados a los rellenos sanitarios o en algún establecimiento de reciclaje.
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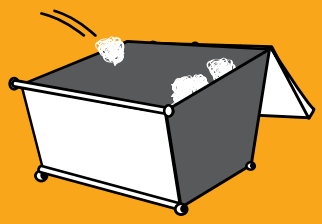
SIGA ESTOS PASOS PARA PROTEGER LA CALIDAD DEL AGUA

COLOQUE LA BASURA ADENTRO



Coloque la basura adentro del contenedor (preferentemente en bolsas selladas)

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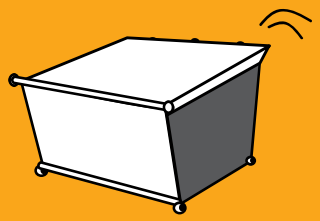

Evite que la lluvia ingrese al contenedor para evitar un escape de escorrentía contaminada

MANTENGA LOS PRODUCTOS TÓXICOS AFUERA

- Pintura
- Lubricante, grasas y aceites usados
- Baterías, componentes electrónicos y luces fluorescentes

ALGUNAS GUÍAS ADICIONALES, LAS CUALES INCLUYEN

✓ BARRER CON FRECUENCIA

Barra con frecuencia las áreas de los recintos para la basura, en lugar de lavarlas con una manguera, para evitar que el agua contaminada se vierta en las calles y los desagües de lluvia.

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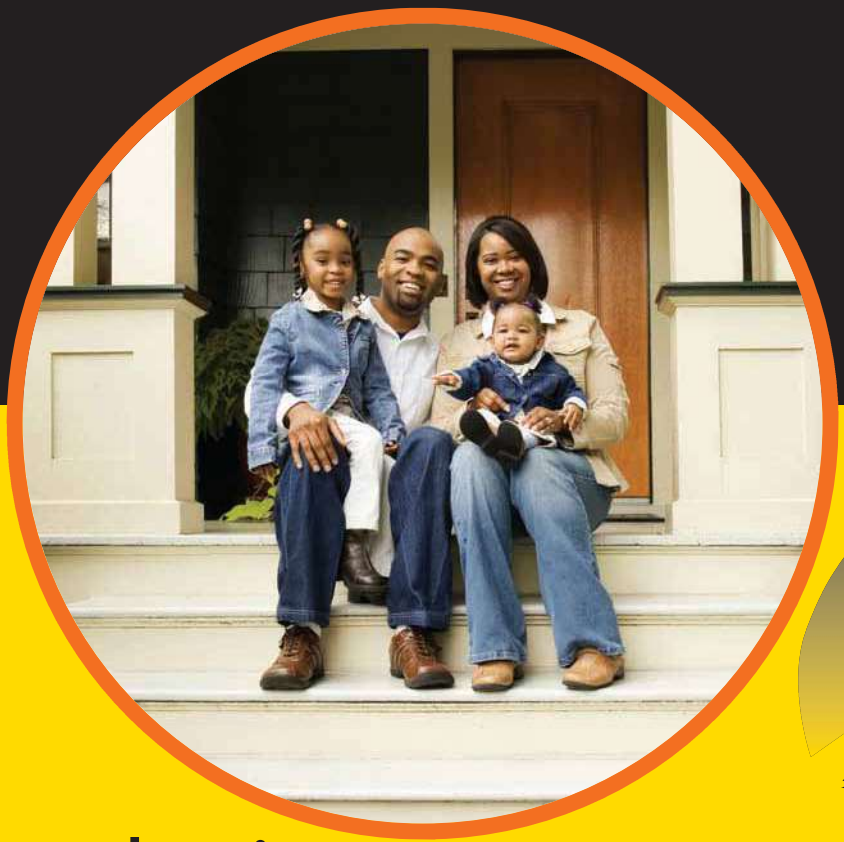

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Arte Cortesía del Programa de Agua Pluvial de la Ciudad de Los Angeles. Impreso en papel reciclado.

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Rancho Cucamonga	12158 Baseline Rd. (cross: Rochester Ave.)	Saturdays	8 a.m. - 12 p.m.
Redlands	500 Kansas St. (cross: Park Ave.)	Saturdays	9:30 a.m. - 12:30 p.m.
Rialto	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 (does not accept E-Waste)	1370 N. Benson Ave. (cross: 14th St.)	Saturdays	9 a.m. - 2 p.m.

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TAKE ONE

MUY TÓXICO PARA LA BASURA

Deshágase 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
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Fontana	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.
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TOME UNO

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

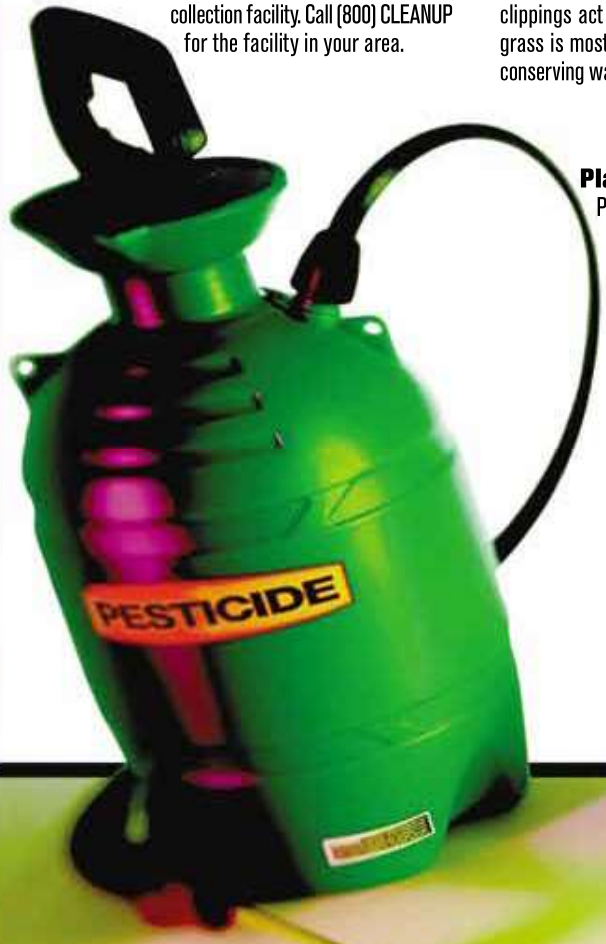
Household products like paint, pesticides, solvents and cleaners are too dangerous to dump and too toxic to trash. Take them to be recycled at a convenient household hazardous waste collection facility. Call (800) CLEANUP for the facility in your area.

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

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sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

Prevención de Contaminación del Desagüe

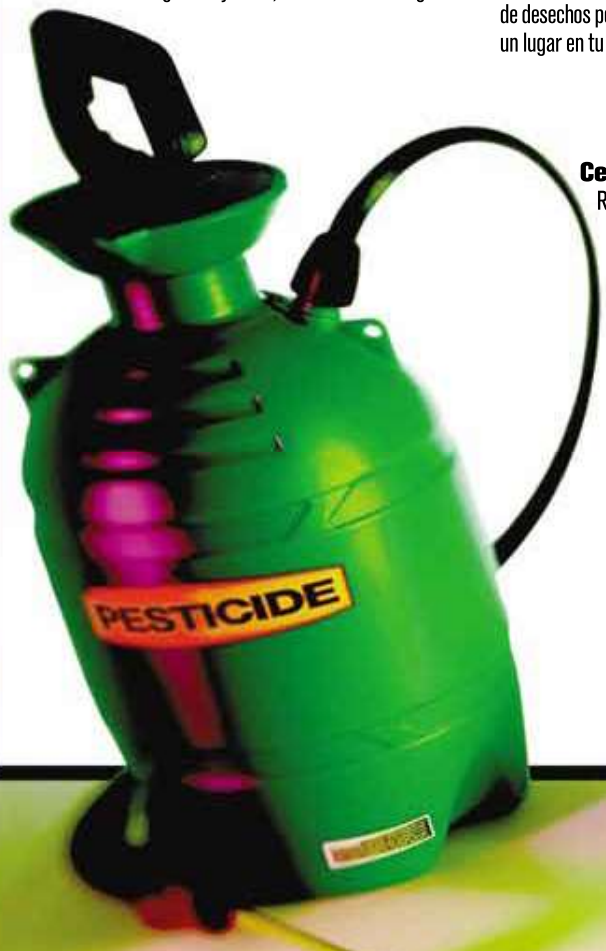
JARDIN

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.

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San Bernardino County
STORMWATER PROGRAM

Restricted Activities List

Residents of these dwelling shall not engage in these activities on this property:

1. Automobile repair
2. Automobile washing, exterior surfaces. Interiors may be “dry” cleaned.
3. Automobile maintenance
4. Automobile storage
5. Outdoor work, including hobby based activities
6. Outdoor storage of any hazardous materials
7. Outdoor use of pesticides

Residents of these dwelling shall keep motor vehicles “leak" free or provide “drip pans” under any parked vehicle.

IT TAKES EACH OF US TO KEEP OUR WATERS CLEAN

IT TAKES EACH OF US TO KEEP OUR WATERS CLEAN

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STATE WATER RESOURCES CONTROL BOARD • REGIONAL WATER QUALITY CONTROL BOARDS

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

Did You Know...

California's beaches are among the most visited in the world and our beach waters are closely monitored. This monitoring sometimes reveals the presence of organisms that can pose a threat to our health. When this happens, a warning is posted or the beach is closed to swimming. Where do these organisms come from? Most come from urban runoff in storm drains and the rest are primarily caused by sewage spills.

So, let's keep our beaches safe for swimming by following these simple guidelines:

- Pick up after your dog; don't throw animal waste down storm drains
- Don't gutter flood! That water picks up pollutants, sending them directly to the beach
- Stop runoff from horses, cows and other animals from leaving your property
- Keep irrigation wash water out of the storm drain system
- Encourage your community to install natural treatment systems between pollution sources and sensitive receiving waters, like beaches!
- Support your sewer district in its efforts to have a well-maintained sewer system.
- Support your sewer district in having a contingency plan to quickly contain any sewage spill
- Report any vandalism to sewer/equipment
- Make sure trash cans and dumpsters are covered and can't drain pollutants into the storm drain

For further information on California's water protection programs, visit our web site at www.swrcb.ca.gov

Designed by: Sharon Perrin-Norton
Printed on Recycle Paper

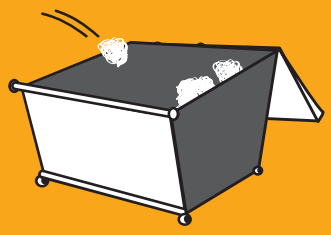
COMMERCIAL TRASH ENCLOSURES

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.**

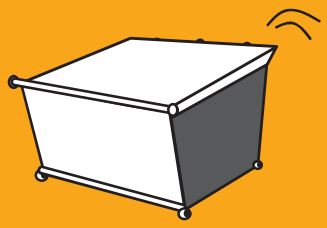
PROTECT WATER QUALITY BY FOLLOWING THESE SIMPLE STEPS

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

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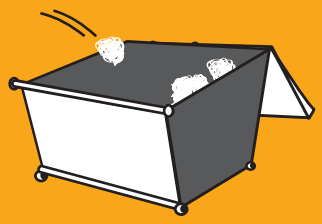

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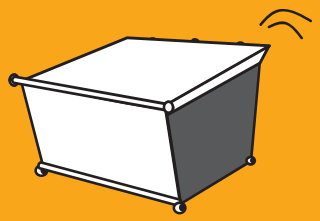

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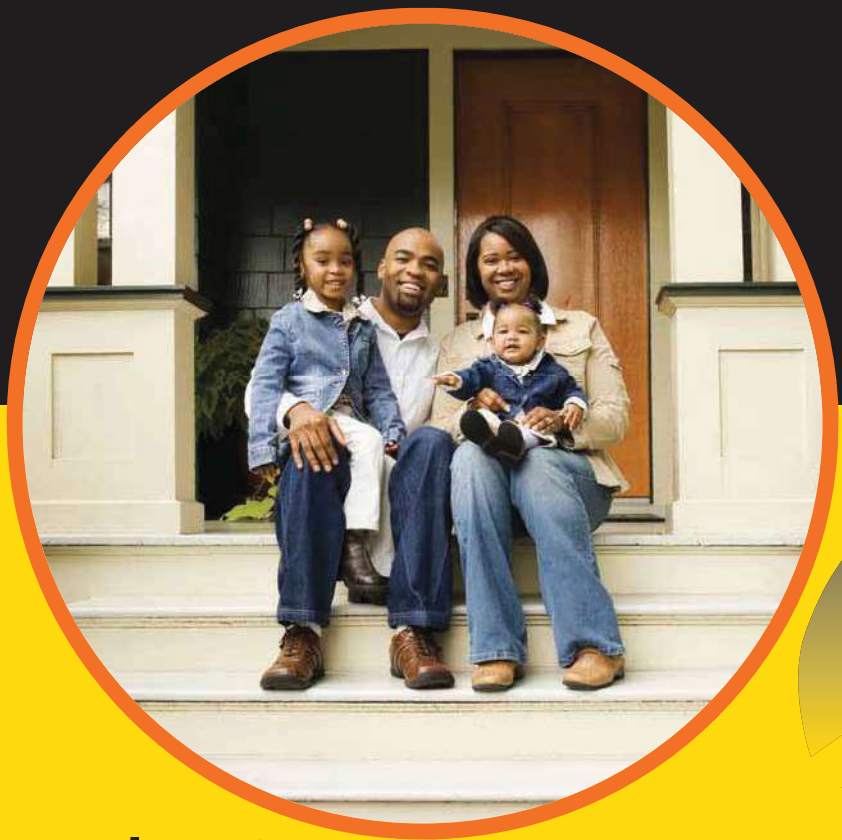

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Fontana (Fontana residents only)	16454 Orange Way (cross: Cypress Ave.) Note: Provide a trash bill and a driver's license as proof of residency.	Saturdays	8 a.m. - 12 p.m.
Ontario	1430 S. Cucamonga Ave. (cross: Belmont St.)	Fri. & Sat.	9 a.m. - 2 p.m.
Rancho Cucamonga	12158 Baseline Rd. (cross: Rochester Ave.)	Saturdays	8 a.m. - 12 p.m.
Redlands	500 Kansas St. (cross: Park Ave.)	Saturdays	9:30 a.m. - 12:30 p.m.
Rialto	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 (does not accept E-Waste)	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

MUY TÓXICO PARA LA BASURA

Deshágase 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	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	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	12158 Baseline Rd. (Rochester Ave.)	Sábado	8 a.m. - 12 p.m.
Redlands	500 Kansas St. (Park Ave.)	Sábado	9:30 a.m. - 12:30 p.m.
Rialto	246 Willow Ave. (Rialto Ave.)	2nd & 4th Virnes & Sábado	8 a.m. - 12 p.m.
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

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

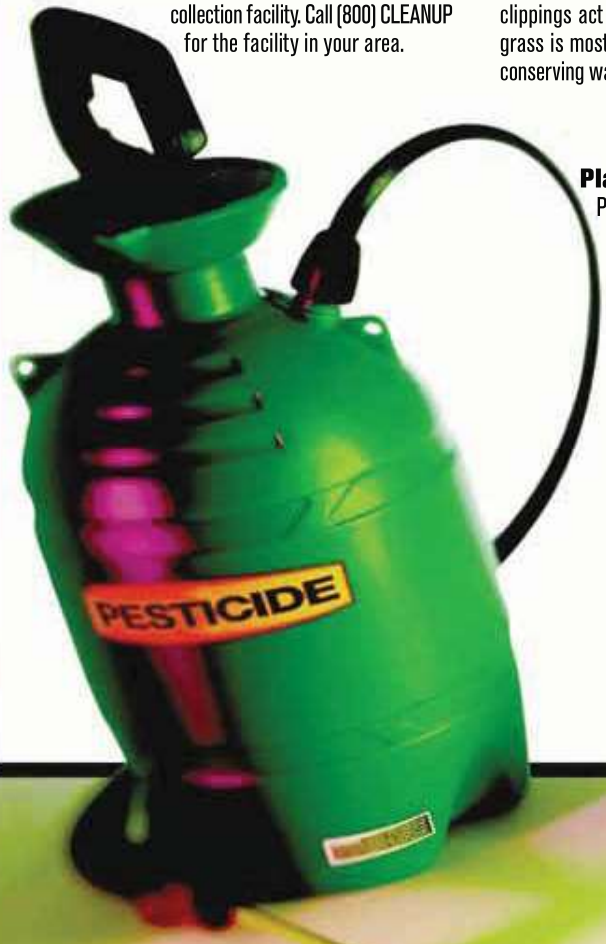
Household products like paint, pesticides, solvents and cleaners are too dangerous to dump and too toxic to trash. Take them to be recycled at a convenient household hazardous waste collection facility. Call (800) CLEANUP for the facility in your area.

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

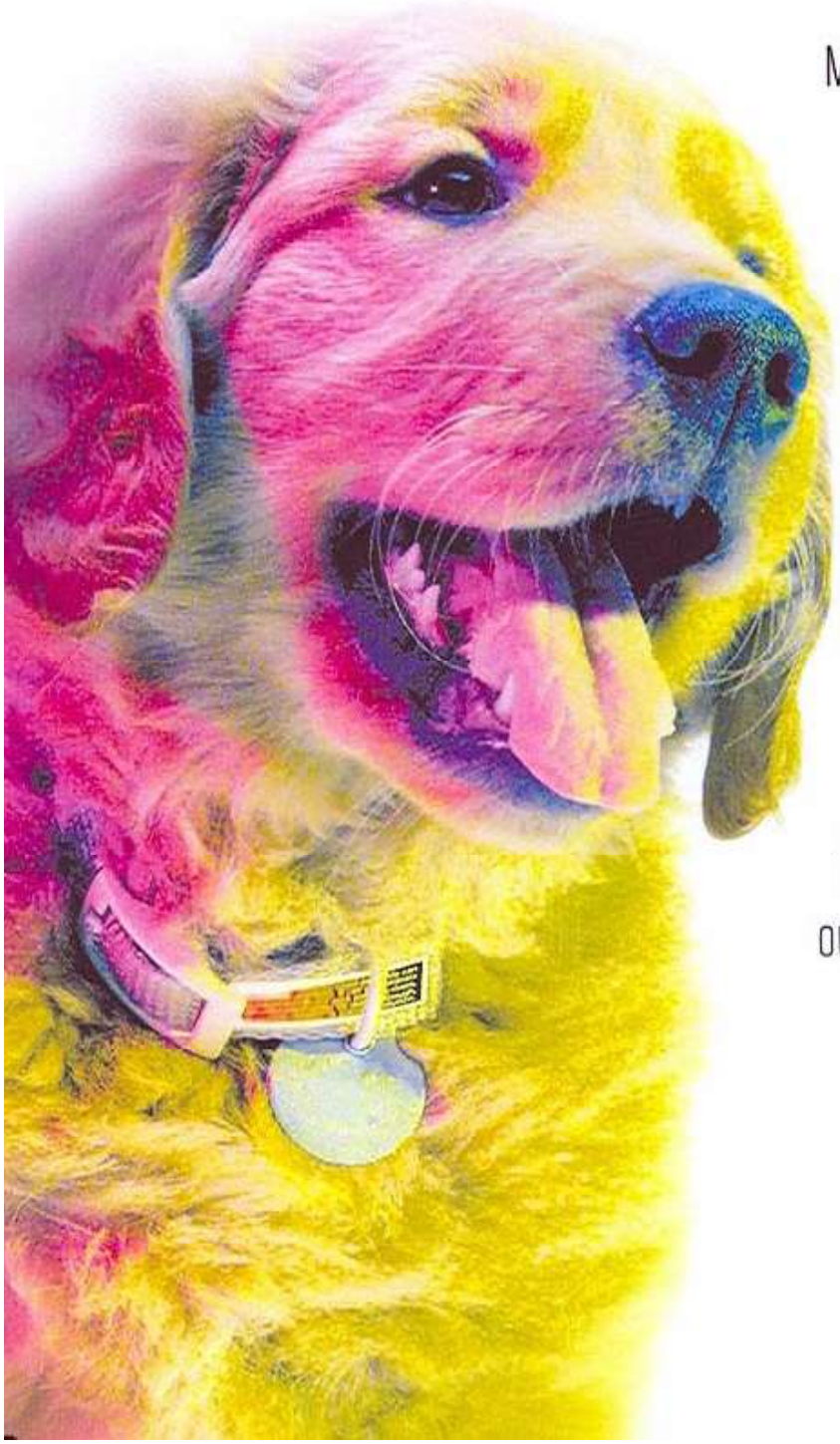
Restricted Activities List

Residents of these dwelling shall not engage in these activities on this property:

1. Automobile repair
2. Automobile washing, exterior surfaces. Interiors may be “dry” cleaned.
3. Automobile maintenance
4. Automobile storage
5. Outdoor work, including hobby based activities
6. Outdoor storage of any hazardous materials
7. Outdoor use of pesticides

Residents of these dwelling shall keep motor vehicles “leak" free or provide “drip pans” under any parked vehicle.

Pick up after your pooch to curb pollution.



Maybe you weren't aware, but dog waste left on the ground gets into storm drains, polluting rivers, lakes and beaches.

The bacteria and risk of disease threatens the health of our kids and communities. Wherever you live in San Bernardino County, this pollution is a problem. The answer? Pick up after your dog, to help prevent pollution and protect our health. It's in your hands.

PUBLIC SERVICES
CITY OF FONTANA

San Bernardino County
STORMWATER PROGRAM

♻ Printed on recycled paper

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**

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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¡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**

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

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R G S Engineering Geology

1225 Chestnut Street
Upland, California 91784
(951) 315-3517

June 4, 2019

Lisa and Bill Burtner
2040 10th Lane
Big Bear City, California 92315

SUBJECT: **INFILTRATION TESTING AND REPORT**
McDonald Daycare Center
Irwin Ranch Road (APN 0315-421-02)
Irwin Ranch, San Bernardino County, California
Project No. 1705-02

Mr. & Mrs. Burtner:

In accordance with your authorization, we have conducted infiltration testing for low impact development (LID) design associated with the proposed site improvements. Our test procedures and content of this report conform to the San Bernardino County Technical Guidance Document for Water Quality Management Plans and Low Impact Development Best Management Practices.

Our findings, conclusions, and recommendations related to site infiltration are presented herein. We greatly appreciate this opportunity to be of service. Should you have any questions, or require additional services, please call our office.

Sincerely,
RGS Engineering Geology

Christopher Krall, CEG 1816
Engineering Geologist

Distribution: (1) Addressee, Electronic Copy

INTRODUCTION

Accompanying Map, Illustrations, And Appendices

Figure 1	-	Site Location Map
Figure 2	-	Infiltration Test Location Plan
Appendix A	-	References
Appendix B	-	Exploratory Trench Logs
Appendix C	-	Infiltration Test Data

Scope of Work

For the purpose of this study RGS conducted the following scope or work in accordance with written authorization:

- Review related geologic and soils information available in our files.
- Excavate, log, and backfill two deep exploratory trenches on-site to evaluate the underlying soil condition to a maximum depth of 15 feet.
- Excavate a total of two shallow test pits to a depth near the bottom of the proposed basin for infiltration testing.
- Prepare each test pit for infiltration testing.
- Conduct two field infiltration tests to determine the representative rate to be used for storm water mitigation design. Testing utilized the percolation test method in conformance with the San Bernardino County Technical Guidance Documents for Water Quality Management.
- Preparation of this report presenting our findings, conclusions, and geologic recommendations for storm water basin design.

Purpose and Objective

The purpose and objective of testing is to determine the rate of storm water infiltration for native sediments exposed along the bottom of proposed retention basins associated with site improvements at the proposed daycare facility in the Irwin Lake area of San Bernardino County, California. Best management practices utilize drawdown time based on infiltration rate combined with the interaction of chemical, physical, and biological processes between soil, organic matter, and water to filter out sediments and constituents from surface run-off and storm water. Accordingly, best management practices require a maximum drawdown time to provide proper filtration and avoid nuisance issues. Since

drawdown time is contingent on the infiltration rate of the underlying soil, tests are used to help establish the vertical infiltration rate of the soil below a proposed infiltration facility. The test methods attempt to simulate the physical processes and seasonal variance that will occur when the facility is in operation.

The established infiltration rate combined with calculated storm water flow is then used by the project engineer to design the low impact development best management practice for water quality suited to the project.

Site Conditions and Location

The property is located along the southeast side of Irwin Ranch Road, just east of State Highway 38, in the Irwin Ranch area of San Bernardino County, California. The geographical relationship of the site and vicinity are shown on our Site Location Map, Figure 1.

Access to the property is provided along Irwin Ranch Road which exists as a maintained road. The property is currently undeveloped and exists in a natural condition. Topographically, the site is relatively flat with a uniform slope of less than 3% toward the northeast. Total relief across the property is less than 3 or 4 feet. Drainage is directed as sheet flow across the site to the northeast (Figure 1).

Vegetation on-site includes mature conifers and a sparse undergrowth of bushes and seasonal weeds and grasses. Properties to the north, east, and west are undeveloped. The property to the south currently supports a Christian Center. No other improvements, including grading or earthwork, were noted during our field reconnaissance and geologic mapping.

Proposed Development

For this study, RGS was provided a preliminary site plan showing the proposed building, parking, and driveway, which was used as a base for our Infiltration Test Location Plan, Figure 2.

Based on our review of the plans and recent conversations, we understand the site development will include one building with associated parking and driveway. Considering the flat nature of the site, no earthwork is necessary or proposed. Although foundation plans are not available at this time, the building will likely be supported on continuous spread footings with concrete stem walls and isolated piers and a raised wood floor foundation system following the natural grade.

SITE EVALUATION AND TESTING

Subsurface Evaluation

To evaluate the subsurface conditions below the proposed retention basin, previous exploratory trench excavations performed for the project (RGS, 2018) were considered. These exploratory excavations were conducted using a rubber-tired backhoe equipped with a 24-inch wide bucket to a depth of at least 10 feet below the proposed basin. The number of exploratory excavations was dictated by Table 1 of Appendix A of the design handbook. Each excavation was carefully monitored by our state licensed Engineering Geologist, Christopher Krall, who prepared a log of the soil column, encountered and collected representative soil samples for field classification as warranted. Geologic conditions related to infiltration such as soil texture, density, and moisture content was recorded. Soil color and mottling or staining and groundwater occurrence were also noted. A copy of the exploratory trench logs is provided in Append B of this report for review. The exploratory trenches were backfilled immediately following field recordation for safety.

Infiltration Test Method

Our field test method for infiltration was conducted in conformance with Appendix A of the Riverside County Design Handbook for Low Impact Development Best Management Practices. Our test method followed the San Bernardino County Technical Guidance Document for Water Quality Management Plans and Low Impact Development Best Management Practices.

This test measures the length of time required for a quantity of water to infiltrate into the soil and is often called a “percolation rate”. It should be noted that the percolation rate is related to, but not equal to, the infiltration rate. While an infiltration rate is a measure of the speed at which water progresses downward into the soil, the percolation rate measures not only the downward progression but the lateral progression through the soil as well. This reflects the fact that the surface area for infiltration testing would include only the horizontal surface while the percolation test includes both the bottom surface area and the sidewalls of the test hole. However, there is a relationship between the values obtained by a percolation test and infiltration rate expressed by the following equation known as the Porchet Method of converting percolation rate to infiltration rate.

$$I_t = \frac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$$

Where:

I_t = tested infiltration rate (inches/hour)
ΔH = change in head over the time interval, inches

Δt = time interval, minutes
r = effective radius of test hole
H_{avg} = average head over the time interval, inches

Test Preparation and Procedure

Test pits were excavated at the location of the proposed infiltration basin to a depth of approximately three feet below the exiting ground surface to replicate the bottom of the infiltration facility. The number of test pits was dictated by Table 1 of Appendix A of the design handbook. Along the bottom of each test pit a test hole was excavated to a depth of 22 to 24 inches with a diameter of approximately 8 inches. A six-inch diameter perforated plastic pipe and 2 inches of gravel was placed in each test hole to prevent scouring or erosion.

A water container was inverted over each test hole and 5 gallons of clean water was allowed to soak into the soil prior to testing. Pre-soaking of the test holes was performed to emulate possible saturated conditions during seasonal storms. Where pre-soaking of the test holes was complete in a timely manner, testing was conducted immediately following the pre-soak. Where pre-soaking was slower, testing was conducted the following day. Under no circumstance was presoaking allowed to continue for more than 26 hours.

Following the presoak, test holes were filled with clear water to a height of 20 inches (5 times the test-hole radius) and the time required for the water to seep into the soil was recorded. All measurements were taken from a fixed reference point using a ruler placed within the test hole and are accurate to 0.25 inches.

When 2 consecutive measurements indicated that 6 inches of water seeps into the soil in less than 25 minutes, the strata were classified as “sandy soil” and testing continued for an additional hour with measurements taken every 10 minutes. The drop that occurs during the final 10 minutes was used to calculate the field percolation rate. In non-sandy material at least twelve measurements were recorded over a period of at least six hours at approximately 30 minutes intervals. The final reading was used to calculate the field percolation rate. The test pits were backfilled immediately following field recordation for safety. At the completion of testing, a 3-feet long surveyor’s stake (lath), flagged with highly visible banner tape was placed in the location of the test indicating date, test hole number, and the company performing the test. The approximate location of each test pit is shown on our Infiltration Test Location Plan, Figure 2.

SUMMARY OF FINDINGS AND TEST RESULTS

Earth Material

The earth material underlying the infiltration areas is summarized below. Detailed descriptions of the soil characteristics are provided on our exploratory trench logs,

Appendix B.

In summary the subsurface conditions below each proposed infiltration areas are similar and expose gravelly silty sand (Unified Soil Classification – GW) with clay that is dark reddish brown (5YR 4/3 – Munsell Soil Color), fine to coarse grained, damp to moist, well graded, with cobbles.

Groundwater Occurrence

Groundwater was encountered in both of our exploratory trench excavation at a depth of approximately 13 feet below the ground surface corresponding to a depth of more than 10 feet below the proposed infiltration invert.

In general, groundwater does not occur in this area within 50 to 100 feet of the ground surface and groundwater is not expected to impact this development.

Test Results

Our field test data is presented in Appendix C for review and summarized in Table I below. The percolation rate of the earth material underlying the infiltration areas yields good to moderate percolation rates ranging from 5.2 to 6.0 minutes per inch or 1.38 to 1.53 inches per hour. These values were converted to infiltration rate following the Porchet Method equation as explained in the previous section of this report.

TABLE 1
Tabulated Percolation/Infiltration Test Results

Test No.	Location	Interval Tested (inches)	Earth Materials	Perc. Rate (min/inch)	Infilt. Rate (inch/hour)
P-1	See Plan	40”-60”	Gravelly Sand (GW) with clay	5.22	1.53
P-2	See Plan	38”-58”	Gravelly Sand (GW) with clay	6.0	1.38

CONCLUSION AND RECOMMENDATIONS

Conclusions

- Based on our investigation, the areas of proposed infiltration are underlain by silty sand (SM) that is considered permeable with moderate to good percolation rates to a depth of 15 feet below the ground surface.

- Groundwater was not encountered in each exploratory trench at a depth of approximately 15 feet below the ground surface. Groundwater is not expected to impact the development or infiltration process.

- A field infiltration rate of 1.45 inches per hour is considered representative of the underlying native soil and should be considered the standard for design of the low impact development system.

- Considering the location and geologic setting of the site, installation of the proposed LID BMP will not create adverse effects to slope stability, soil erosion, off-site impacts.

Recommendations

- The low impact development system should be designed by the project engineer considering the geologic information and field infiltration rate contained in this report.

- All required setbacks as set forth in the design handbook should be adhered to during site planning, design, and construction.

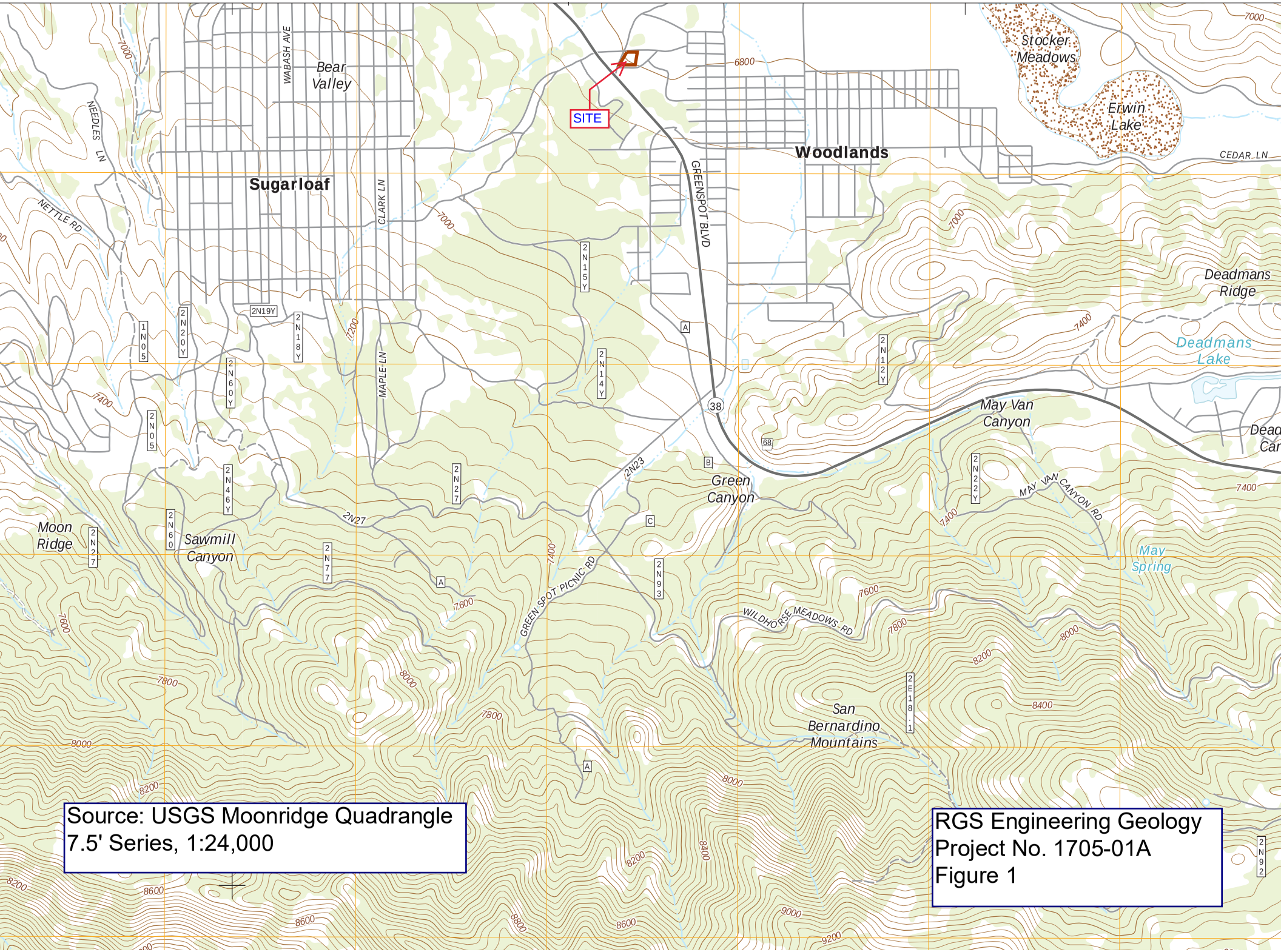
- To account for long term performance variables of full-scale working infiltration facilities due to accumulation of fine particles, post construction compaction of native soil, non-homogeneous soil strata, and site variations, a safety factor can be applied to the infiltration rate for design purposes if considered necessary.

- Future building expansion or other improvements in the area of the infiltration system, including hardscape, flatwork sidewalks or paving, and water wells, should be reviewed by this firm and approved by the local governing agency.

CLOSURE

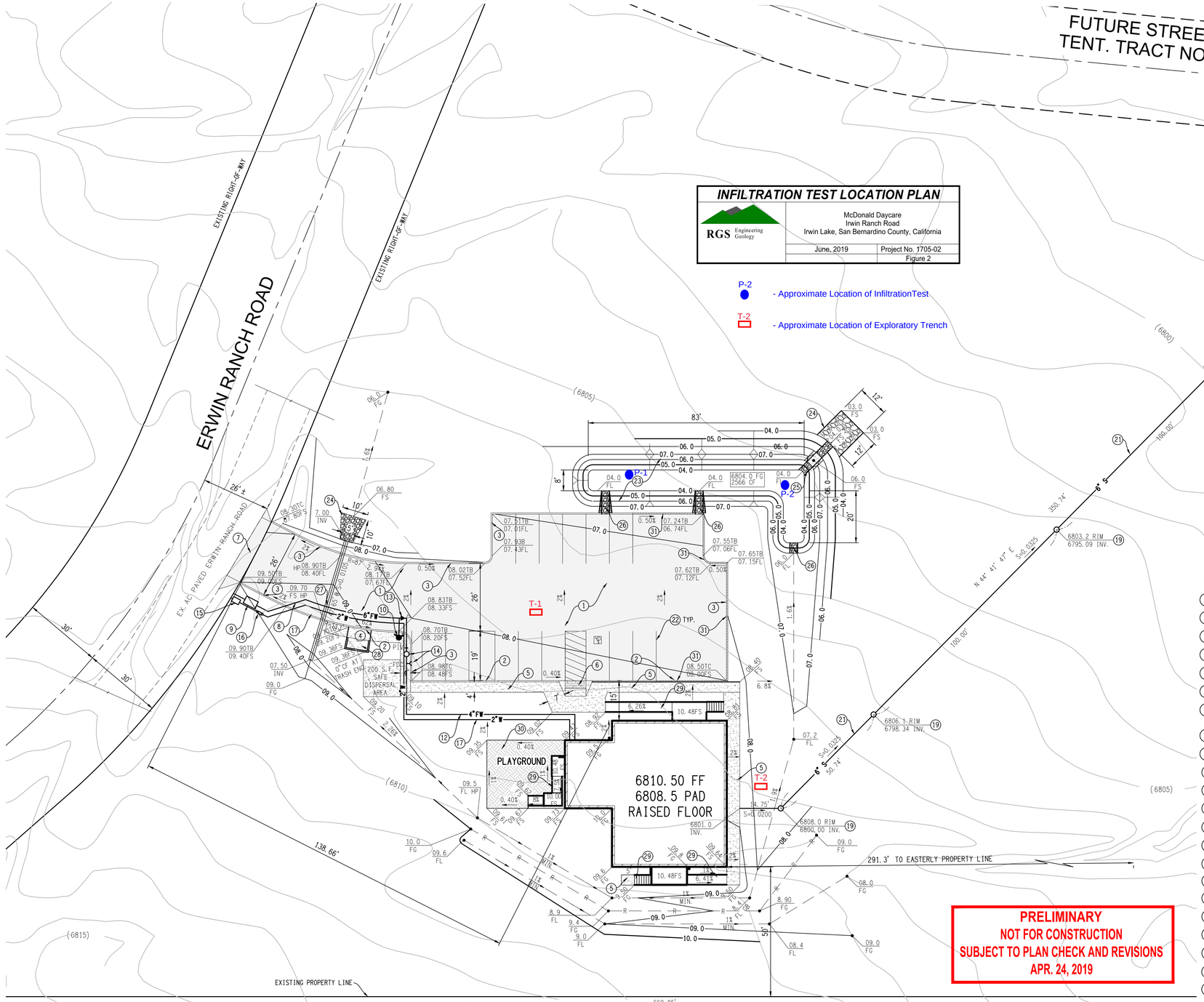
It is the owner's responsibility to ensure that proper design and construction methods of the infiltration LID system are employed. Improper placement or construction of the system can cause premature failure regardless of the soil conditions.

It is also the owner's responsibility to adequately maintain this infiltration system to extend its longevity and performance. Please understand that this investigation was limited to the evaluation and feasibility of soil infiltration rates and has not included a comprehensive analysis of the stability of the proposed development from a geotechnical standpoint.



Source: USGS Moonridge Quadrangle
7.5' Series, 1:24,000

RGS Engineering Geology
Project No. 1705-01A
Figure 1



INFILTRATION TEST LOCATION PLAN

RGS Engineering Geology

McDonald Daycare
Irwin Ranch Road
Irwin Lake, San Bernardino County, California

June, 2019	Project No. 1705-02
	Figure 2

P-2 - Approximate Location of InfiltrationTest

T-2 - Approximate Location of Exploratory Trench

PRELIMINARY
NOT FOR CONSTRUCTION
SUBJECT TO PLAN CHECK AND REVISIONS
APR. 24, 2019

CONSTRUCTION NOTES:

1. CONSTRUCT 3" A.C. OVER 4" C.M.B. ON COMPACTED NATIVE.
2. CONSTRUCT 6" CURB A1-6 PER STANDARD PLAN FOR PUBLIC WORKS CONSTRUCTION STD. 120-2.
3. CONSTRUCT 6" A.C. BERM D1-6 PER STANDARD PLAN FOR PUBLIC WORKS CONSTRUCTION STD. 120-2.
4. CONSTRUCT 6" THICK CONCRETE PAD WITH #6 10X10 W.W.M.
5. CONSTRUCT 4" THICK P.C.C. SIDEWALK STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION STD. 112-2.
6. CONSTRUCT ADA RAMP, SIGNS, LEGEND AND STRIPING PER ARCHITECT'S PLAN HC-1.
7. CONSTRUCT COMMERCIAL DRIVEWAY APPROACH WITHOUT CURB PER SAN BERNARDINO COUNTY STD. NO. 129a.
8. CONSTRUCT 8" PVC CL900 FIRE SERVICE MAIN.
9. CONSTRUCT 8" DOUBLE DETECTOR CHECK PER BIG BEAR COMMUNITY SERVICES DISTRICT STD. W-22.
10. CONSTRUCT 6" FIRE HYDRANT ASSEMBLY PER BIG BEAR COMMUNITY SERVICES DISTRICT STD. W-8.
12. CONSTRUCT 4" PVC CL900 FIRE SERVICE MAIN.
13. CONSTRUCT 8" X 4" PVC REDUCER.
14. CONSTRUCT 4" FIRE DEPARTMENT CONNECTION AND POST INDICATOR VALVE.
15. CONSTRUCT 1-1/2" WATER METER AND SERVICE PER BIG BEAR COMMUNITY SERVICES DISTRICT STD. W17b.
16. CONSTRUCT 2" BACK FLOW PREVENTER PER BIG BEAR COMMUNITY SERVICES DISTRICT STD. W-21.
17. CONSTRUCT 2" PVC CL900 WATER MAIN.
18. CONSTRUCT 8" PVC SDR35 SEWER MAIN.
19. CONSTRUCT SEWER CLEANOUT PER BIG BEAR COMMUNITY SERVICES DISTRICT STD. S-9.
20. CONSTRUCT 8" PVC CAP.
21. CONSTRUCT 6" PVC SDR35 SEWER LATERAL.
22. PAINT 4" WIDE WHITE STRIPE PARKING STALL.
23. CONSTRUCT BIO-RETENTION BASIN (SEE BIO-RETENTION BASIN NOTE HEREON).
24. CONSTRUCT NO. 2 BACKING CLASS RIP-RAP 1.25 FEET THICK.
25. CONSTRUCT NO. 2 BACKING CLASS RIP-RAP 1.5 FEET THICK OVERFLOW.
26. CONSTRUCT NO. 2 BACKING CLASS RIP-RAP 1.5 FEET THICK SPILLWAY.
27. CONSTRUCT 28" X 20" C.M.P. PIPE ARCH STORM DRAIN.
28. CONSTRUCT 4' x 8' TRASH ENCLOSURE PER ARCHITECT'S PLAN.
29. CONSTRUCT ADA RAMP AND STEPS PER ARCHITECT'S PLAN HC-1.
30. PLAYGROUND SURFACE PER ARCHITECT'S PLAN.
31. PAINT A.C. BERM/CURB RED "NO PARKING".

BIO-RETENTION BASIN NOTE:

BIO-RETENTION BASIN LOCATION IS APPROXIMATE. THE CONTRACTOR SHALL CONSTRUCT BASIN TAKING IN TO CONSIDERATION EXISTING TREES. MEANDER BASIN TO AVOID EXISTING TREES WHERE POSSIBLE.

RIP RAP ROCK GRADATION:

ROCK SIZE	NO.2 BACKING CLASS PERCENT LARGER THAN
75 LB	0-5
25 LB	25-75
5 LB	90-100

BENCH MARK:

BOAT SPIKE IN PP #6009 WEST SIDE GREENSPOT ROAD OPPOSITE ZACCA.

ELEV. = 6825.93

NOTE

NO PUBLIC TRANSPORTATION ON IRWIN RANCH ROAD

IMPORTANT NOTICE

DIGALERT Underground Service Alert

Section 4216/4217 of the Government Code requires a DIG ALERT Identification Number be issued before a "Permit to Excavate" will be valid. For your Dig Alert I.D. Number Call Underground Service Alert TOLL FREE 811 Two working days before you dig

NORTH
SCALE: 1" = 20'

20' 0' 20' 40' 60'
GRAPHIC SCALE: 1" = 20'

REVISIONS

NO.	DES.	DATE

CONSULTANT:

DAVID B. RAGLAND REGISTERED PROFESSIONAL ENGINEER REG. NO. 35985 EXP. 6-30-20 CIVIL STATE OF CALIFORNIA

PREPARED BY:
577 BONANZA TRAIL #B
BIG BEAR LAKE, CA. 92315
(909) 866-8400
TRANSTECH

PREPARED FOR:
McDONALD LEARNING CENTER EAST
BIG BEAR LAKE, CA. 92315
(909)-866-5831

DR. BY:
APPRD.:
SCALE:
JOB NO.: 18155

SHEET DESCRIPTION:
PRECISE GRADING

SHEET NO.
C2

APPENDIX A

References

REFERENCES

Franks, Alvin, l., 1972, “Geology for Individual Sewage Disposal Systems,” in *California Geology*, Volume 25, Number 9, September 1972, pp. 195-203

Heath, Ralph C., 1987, “Basic Groundwater Hydrology”, United States Geological Survey Water- Supply Paper 2220, Fourth Printing;

Kaplan, Benjamin O., 1988, “Septic Systems Handbook”, Lewis Publishers, Second Printing 1988, 283 pp.

RGS Engineering Geology, 2018, Engineering Geologic Investigation and Report, McDonald Daycare Center, Irwin Ranch Road (APN 0315-421-02), Irwin Ranch, San Bernardino County, California, Project No. 1705-01A, September 2, 2018.

Riverside County Flood Control District, 2001, Design Handbook for
Low Impact Development Best Management Practices, Revised September 2011.

San Bernardino County Technical Guidance Document for Water Quality Management Plans and Low Impact Development Best Management Practices.

APPENDIX B

Exploratory Trench Logs

EXPLORATORY TRENCH LOG

PROJECT NAME McDonald ELEVATION ___NA_____ TRENCH NO. _T-1_____

PROJECT No. _____ EQUIPMENT _JD 410_____

DEPTH (FEET)	TYPE OF TEST*	SAMPLE DEPTH	DRY DENSITY (PCF)	MOISTURE CONTENT %	(USCS) SOIL CLASSIFICATION	EARTH MATERIAL	GEOTECHNICAL DESCRIPTION
							LOGGED BY ___CK_____ DATE 5-14-18 _____ **SAMPLED BY ___CK_____**
	NG		115.2	5.5	GW	Qoa	**OLDER ALLUVIUM (Qoa)**
	BULK						*Gravelly Silty Sand* (GW)
	NG		110.8	7.5			Dark Reddish Brown (5YR 4/3), fine to coarse grained
5							Damp to Moist, well graded, cobbles to 20%
							Gravel & cobbles are sub-angular, dense, roots in
							Upper 12 inches to 2" diameter, matrix is moderately
							Indurated.
10							
							Total Depth 10 ft.
							No Groundwater or Seepage
							Difficult Excavation
							Trench Backfilled
15							

GRAPHIC LOG Trend: Scale: 1" = 5'

*TEST SYMBOLS

B - BULK SAMPLE
R - RING SAMPLE
SC - SANDCONE
MD - MAXIMUM DENSITY
GS - GRAIN SIZE
SE - SAND EQUIVALENT
NG - NUCLEAR GAUGE
(90) - RELATIVE COMPACTION

RGS Engineering Geology

EXPLORATORY TRENCH LOG

PROJECT NAME McDonald ELEVATION ___NA_____ TRENCH NO. _T-2_____

PROJECT No. _____ EQUIPMENT _JD 410_____

DEPTH (FEET)	TYPE OF TEST*	SAMPLE DEPTH	DRY DENSITY (PCF)	MOISTURE CONTENT %	(USCS) SOIL CLASSIFICATION	EARTH MATERIAL	GEOTECHNICAL DESCRIPTION
							LOGGED BY ___CK_____ DATE 5-14-18 _____ **SAMPLED BY ___CK_____**
	NG		109.4	6.7	GW	Qoa	**OLDER ALLUVIUM (Qoa)**
	BULK						*Gravelly Silty Sand* (GW)
	NG		112.7	8.2			Dark Reddish Brown (5YR 4/3), fine to coarse grained
5							Damp to Moist, well graded, cobbles to 10%
							Gravel & cobbles are sub-angular, dense, roots in
							Upper 12 inches to 2" diameter, matrix is moderately
							Indurated.
10							
							Total Depth 10 ft.
							No Groundwater or Seepage
							Difficult Excavation
							Trench Backfilled
15							

GRAPHIC LOG Trend: Scale: 1" = 5'

*TEST SYMBOLS

B - BULK SAMPLE
R - RING SAMPLE
SC - SANDCONE
MD - MAXIMUM DENSITY
GS - GRAIN SIZE
SE - SAND EQUIVALENT
NG - NUCLEAR GAUGE
(90) - RELATIVE COMPACTION

RGS Engineering Geology

APPENDIX C

Infiltration Test Data

PERCOLATION TEST DATA SHEET

Project:	McDonald	Project No:	1705-01B	Date:	5/27/2019
Test Hole No:	P-1	Tested By:	Christopher Krall		
Depth of Test (D_T):	40"-52"	USCS Soil Classification:	Gravelly Sand (GW) with clay		
Test Hole Radius (inches):	4	Depth of Test Hole (in.)	20		

SANDY SOIL CRITERIA TEST*

Trial No.	Start (t)	Stop (t)	Time Interval (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Water Level Change (in.)	Greater than or Equal to 6" (y/n)
1						0	n
2						0	n

*If two consecutive measurments demonstrate that 6 inches of water seeps into soil in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, test holes were pre-soaked overnight and at least twleve measurements were recorded over a 6 hour period (approximately 30 minute intervals).

Reading No.	Start (t)	Stop (t)	(Δt) Time Interval (min.)	(D_o) Initial Depth to Water (in.)	($D_{F)}$ Final Depth to Water (in.)	(ΔH) Water Head Level Change (in.)	Percolation Rate (min./in.)	Infiltration Rate (in./hr.)
1	9:03	9:33	30	10	6.50	7.50	4.00	2.18
2	9:34	10:04	30	10	6.50	7.50	4.00	2.18
3	10:05	10:35	30	10	6.50	7.00	4.29	2.04
4	10:36	11:06	30	10	6.50	7.00	4.29	2.04
5	11:06	11:36	30	10	7.00	6.50	4.62	1.93
6	11:36	12:06	30	10	7.00	6.50	4.62	1.93
7	12:06	12:36	30	10	7.00	6.50	4.62	1.93
8	12:06:00	1:06	30	10	7.50	6.00	5.00	1.81
9	1:06	1:36	30	10	7.50	6.00	5.00	1.81
10	1:36	2:06	30	10	8.00	6.00	5.00	1.85
11	2:06	2:36	30	10	8.00	5.75	5.22	1.77
12	2:36	3:06	30	10	4.00	5.75	5.22	1.53

Comments:

PERCOLATION TEST DATA SHEET

Project:	McDonald	Project No:	1705-02	Date:	5/27/2019
Test Hole No:	P-2	Tested By:	Christopher Krall		
Depth of Test (D_T):	39"-51"	USCS Soil Classification:	Gravelly Sand (GW) with clay		
Test Hole Radius (inches):	4	Depth of Test Hole (in.)	20		

SANDY SOIL CRITERIA TEST*

Trial No.	Start (t)	Stop (t)	Time Interval (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Water Level Change (in.)	Greater than or Equal to 6" (y/n)
1						0	n
2						0	n

*If two consecutive measurments demonstrate that 6 inches of water seeps into soil in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, test holes were pre-soaked overnight and at least twleve measurements were recorded over a 6 hour period (approximately 30 minute intervals).

Reading No.	Start (t)	Stop (t)	(Δt) Time Interval (min.)	(D_o) Initial Depth to Water (in.)	($D_{F)}$ Final Depth to Water (in.)	(ΔH) Water Head Level Change (in.)	Percolation Rate (min./in.)	Infiltration Rate (in./hr.)
1	9:05	9:35	30	10	3.75	6.25	4.80	1.65
2	9:35	10:05	30	10	3.75	6.25	4.80	1.65
3	10:05	10:35	30	10	4.00	6.00	5.00	1.60
4	10:37	11:07	30	10	4.00	6.00	5.00	1.60
5	11:07	11:37	30	10	4.50	5.50	5.45	1.49
6	11:37	12:07	30	10	4.50	5.50	5.45	1.49
7	12:07	12:37	30	10	4.75	5.25	5.71	1.44
8	12:37	1:07	30	10	4.75	5.25	5.71	1.44
9	1:07	1:37	30	10	4.75	5.25	5.71	1.44
10	1:37	2:07	30	10	5.00	5.00	6.00	1.38
11	2:07	2:37	30	10	5.00	5.00	6.00	1.38
12	2:37	3:07	30	10	5.00	5.00	6.00	1.38

Comments: