Appendix 11.0

Project-Specific Water Quality Management Plan

Project Specific Water Quality Management Plan (WQMP)

A Template for preparing Project Specific Water Quality Management Plans (WQMPs) for Priority Development Projects located in the City of Wildomar.

Attention: This submittal package only applies to “Priority Development Projects” and does not apply to “Other Development Projects”. Proceed only if the Applicabilty Checklist completed for your project categorizes project activities as a “Priority Development Project.”

Project Title: St. Frances of Rome

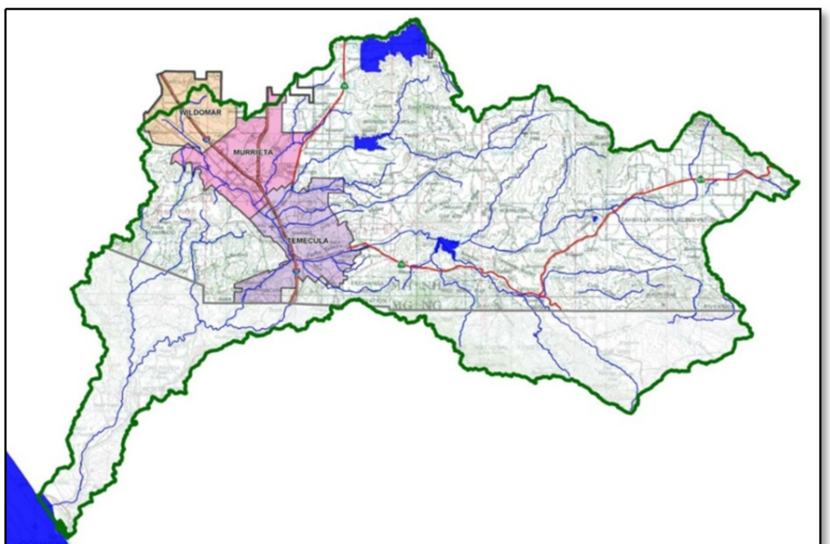
Prepared for: **Diocese of San Bernardino**
1201 E. Highland Avenue
San Bernardino, Ca 92404

Development No: 21591 Lemon Street, Wildomar

Prepared by: W.J. McKeever Inc.,
William J. McKeever, RCE
900 E. Washington St., Ste. 208
Colton, CA 92324
(909) 825-8048

City Project No: Insert text here

WQMP Type: ☒ **Preliminary (entitlement submittal)**
☐ **Final**



Original Date Prepared: August 4, 2019

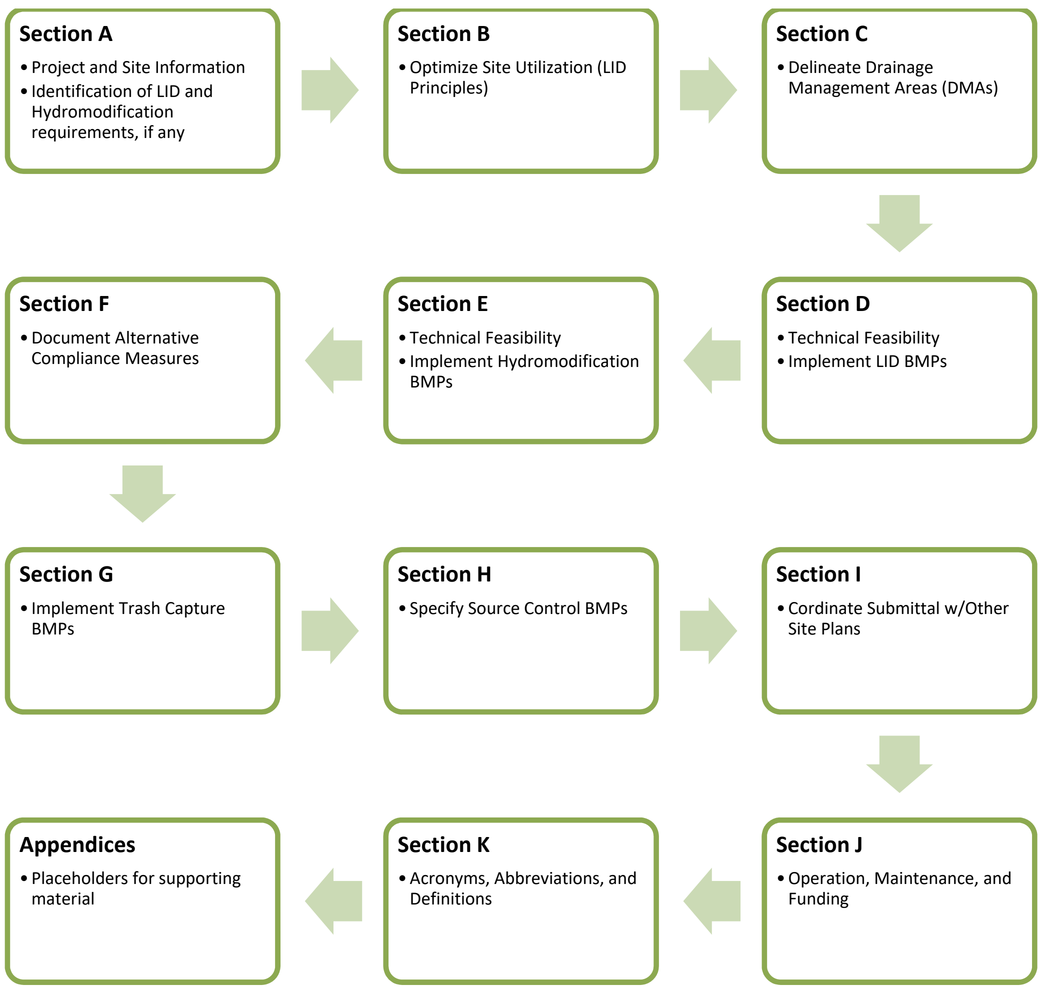
Revision Summary (post WQMP acceptance):

MARK	**BY**	**DATE**	**REVISIONS**	**APPRV.**	**DATE**
ENGINEER				**CITY**	

Prepared for Compliance with Regional Board Order No. **<u>R9-2013-0001</u>** *as amended by Order No.* **R9-2015-0001** *and Order No.* **R9-2015-0100**

A Brief Introduction

The Regional Municipal Separate Stormwater Sewer System (MS4) Permit[1] requires that a Project-Specific WQMP be prepared for all development projects within the Santa Margarita Region (SMR) that meet the 'Priority Development Project' categories and thresholds listed in the SMR Water Quality Management Plan (WQPM). This Project-Specific WQMP Template for Development Projects in the **Santa Margarita Region** has been prepared to help document compliance and prepare a WQMP submittal. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



[1] Order No. R9-2013-0001 as amended by Order Nos. R9-2015-0001 and R9-2015-0100, NPDES No. CAS0109266, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the MS4s Draining the Watersheds within the San Diego Region, California Regional Water Quality Control Board, May 8, 2013.

OWNER'S CERTIFICATION

This Project-Specific WQMP has been prepared for Archdiocese of San Bernardino by McKeever Engineering for the St. Frances of Rome Church project (PA No. 19-0017)

This WQMP is intended to comply with the requirements of the City of Wildomar for Wildomar Municipal Code Ch. 13.12 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of storm water Best Management Practices until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under the City of Wildomar Water Quality Ordinance (Wildomar Municipal Code Ch. 13.12).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control Best Management Practices (BMPs) in this plan meet the requirements of Regional Water Quality Control Board Order No. **R9-2013-0001** as amended by Order Nos. **R9-2015-0001 and R9-2015-0100**."

Preparer's Signature	Date
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

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List of Appendices

Section A: Project and Site Information

Use the table below to compile and summarize basic site information that will be important for completing subsequent steps. Subsections A.1 through A.4 provide additional detail on documentation of additional project and site information.

PROJECT INFORMATION	
Type of PDP:	Re-Development
Type of Project:	Institutional – Church
Planning Area:	Insert Planning Area if known
Community Name:	Insert Community Name if known
Development Name:	St. Frances of Rome Church
PROJECT LOCATION	
Latitude & Longitude (DMS):	33.633 and -117.2828
Project Watershed and Sub-Watershed:	Santa Margarita River or Santa Ana River (select one), Santa Ana River – Lake Elsinore
24-Hour 85th Percentile Storm Depth (inches):	0.686
Is project subject to Hydromodification requirements?	☐ Y ☒ N (Select based on Section A.3)
APN(s):	366170058, 366330013, 366380020, RW, 366330011, 366380022, 366170005, 366170003
Map Book and Page No.:	Insert text here
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Church
Proposed or Potential SIC Code(s)	8661
Existing Impervious Area of Project Footprint (SF)	261,360 Sf / 6 acres
Total area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	51,400.8 / 1.18 acres
Total Project Area (ac)	10.42
Does the project consist of offsite road improvements?	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
Is the project exempt from Hydromodification Performance Standards?	☐ Y ☒ N
Does the project propose the use of Alternative Compliance to satisfy BMP requirements? (note, alternative compliance is not allowed for coarse sediment performance standards)	☐ Y ☒ N
Has preparation of Project-Specific WQMP included coordination with other site plans?	☒ Y ☐ N
EXISTING SITE CHARACTERISTICS	
Is the project located within any Multi-Species Habitat Conservation Plan area (MSHCP Criteria Cell?)	☐ Y ☒ N If "Y" insert Cell Number
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the Natural Resources Conservation Service (NRCS) soils type(s) present on the site (A, B, C and/or D)	Insert text here.

Project Description

The proposed project is the construction of a new church on an existing church site. Existing parking lot areas will be reconfigured and slightly expanded. Water quality basins and drought tolerant landscaping will be part of the new construction at the site.

The current site flows include an existing drainage course (with easement) which bisects the project site. This drainage runs from east to west between the existing church site to the north and the existing parking lot at the south end of the project site.

The portion of the project site north of this existing drainage course (church site and office building) drain from the northeast corner to southwest, with the flows generated by this area being deposited into the future Sedco Master Drainage Plan Line E. The portion of the project site south of the existing drainage course (overflow parking area) generally sheet flows from east to west.

The sitewide water quality approach has three key points:

1) All site flows are included into the on-site treatment BMPs. Three basins are proposed for the water quality treatment of on-site flows. Existing on-site flows will also now be managed.
2) The new church roof will be hydrologically disconnected from the parking lot areas. The landscape is drought tolerant. All parking area flows will be directed to a water quality basin. These are all Low Impact Development approaches.
3) Off-site flows will be managed as presented in the approved Hydrology Report:
    a) The existing church site has a slope running along its east boundary. The runoff from the top of this slope, which is comprised of the backyards of 4 residential houses (Lots 8,9, 10 and 11) on the west side of Wagon Rim Court, currently flow down the slope and enter the church's parking lot (Hydrology Report Appendix A: Figure 9). These flows will remain conveyed across the property line, through discharge holes to be included in the perimeter wall. These flows will now be directed to Basin A.
    b) The portion of Lemon Street north of the existing office building at the northeast corner of the site, is currently unimproved (Hydrology Report Appendix A: Figure 10). As a result, offsite flows being conveyed from east to west along Lemon Street currently overtop the existing street section and enter the project site east of the office building. These flows are conveyed south through the project site and are deposited into the drainage course bisecting the project site (Line E). The flow events greater than the 10 year rain event will still be allowed to enter the site, sheet flow across the parking lot and then will be captured by Basin B.
    c) Offsite flows enter the overflow parking lot, at the south end of the project site, along the eastern boundary line. Like the parking lot itself, the offsite area east of the parking lot sheet flows from east to west, with a slight fall to the north towards the natural drainage course. The flows will now be captured by a rectangular culvert, kept segregated from the site flows, and will be transported to Line E. The culvert will be located at the property line.

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the Project vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Vicinity and location maps
- Parcel Boundary and Project Footprint
- Existing and Proposed Topography
- Drainage Management Areas (DMAs)
- Proposed Structural Best Management Practices (BMPs)
- Drainage Paths
- Drainage infrastructure, inlets, overflows
- Source Control BMPs
- Site Design BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Pervious Surfaces (i.e. Landscaping)
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Copermittee plan reviewer must be able to easily analyze your Project utilizing this template and its associated site plans and maps. Complete the checklists in Appendix 1 to verify that all exhibits and components are included.

A.2 Identify Receiving Waters

Using Table A-1 below, list in order of upstream to downstream, the Receiving Waters that the Project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated Beneficial Uses, and proximity, if any, to a RARE Beneficial Use. Include a map of the Receiving Waters in Appendix 1. This map should identify the path of the storm water discharged from the site all the way to the outlet of the Santa Margarita River to the Pacific Ocean. Use the most recent 303(d) list available from the State Water Resources Control Board Website.
(http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/)

Table A-1 Identification of Receiving Waters

Receiving Waters	USEPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Lake Elsinore	PCBs(Organic Compound),Nutrients, Organic Enrichment (Low DO), Sediment Toxicity, Unknown Toxicity	REC1, REC2, WARM, WILD	Not classified as RARE

A.3 Drainage System Susceptibility to Hydromodification

Using Table A-2 below, list in order of the point of discharge at the project site down to the Santa Margarita River[2], each drainage system or receiving water that the project site is tributary to. Continue to fill each row with the material of the drainage system, and any exemption (if applicable). Based on the results, summarize the applicable hydromodification performance standards that will be documented in Section E. Exempted categories of receiving waters include:

- Existing storm drains that discharge directly to water storage reservoirs, lakes, or enclosed embayments, or

[2] Refer to Exhibit G of the WQMP for a map of exempt and potentially exempt areas. These maps are from the Draft SMR WMAA as of January 5, 2018 and will be replaced upon acceptance of the SMR WMAA.

- Conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- Other water bodies identified in an approved Watershed Management Area Analysis (WMAA) (See Exhibit G to the WQMP)

Include a map exhibiting each drainage system and the associated susceptibility in Appendix 1.

Table A-2 Identification of Susceptibility to Hydromodification

Drainage System	Drainage System Material	Hydromodification Exemption	Hydromodification Exempt
Sheet flow to Lake Elsinore (*see below)	Sheet flow /curb and gutter	None	☒ Y ☐ N
Insert name and length (in miles) of 2nd drainage system	Identify either (1) the type of material of bed and bank for open channels; or (2) the material of storm drain pipes and conduits	Insert exemption justification for the 2nd receiving water may qualify for. If none, insert NONE.	☐ Y ☐ N
Summary of Performance Standards			
☒ **Hydromodification Exempt** – Select if "Y" is selected in the Hydromodification Exempt column above, project is exempt from hydromodification requirements. ☐ **Not Exempt**-Select if "N" is selected in any row of the Hydromodification Exempt column above. Project is subject to hydrologic control requirements and may be subject to sediment supply requirements.			
*The MDP outlines the flows from Line E to be carried west, to Mission Trail, where they will then be directed northwest. After crossing Corydon Road, the flows are to be spread out into sheet flow conditions and are then directed into Lake Elsinore.			

Additional Permits/Approvals required for the Project:

Table A-3 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act Section 401 Water Quality Certification	☐ Y	☒ N
US Army Corps of Engineers, Clean Water Act Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside Multiple Species Habitat Conservation Plan (MSHCP) Consistency Approval (e.g., Joint Project Review (JPR), Determination of Biological Equivalent or Superior Preservation (DBESP))	☐ Y	☒ N
Other *(please list in the space below as required)*	☐ Y	☐ N

If yes is answered to any of the questions above, the Copermittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, constraints might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. Opportunities might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for LID Bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your Low Impact Development (LID) design and explain your design decisions to others.

Apply the following LID Principles to the layout of the Priority Development Project (PDP) to the extent they are applicable and feasible. Putting thought upfront about how best to organize the various elements of a site can help to significantly reduce the PDP's potential impact on the environment and reduce the number and size of Structural LID BMPs that must be implemented. Integrate opportunities to accommodate the following LID Principles within the preliminary PDP site layout to maximize implementation of LID Principles.

Site Optimization

Complete checklist below to determine applicable Site Design BMPs for your site.

Project- Specific WQMP Site Design BMP Checklist
The following questions below are based upon Section 3.2 of the SMR WQMP will help you determine how to best optimize your site and subsequently identify opportunities and/or constraints, and document compliance.
SITE DESIGN REQUIREMENTS
Answer the following questions below by indicating "Yes," "No," or "N/A" (Not Applicable). Justify all "No" and "N/A" answers by inserting a narrative at the end of the section. The narrative should include identification and justification of any constraints that would prevent the use of those categories of LID BMPs. Upon identifying Site Design BMP opportunities, include these on your WQMP Site plan in Appendix 1.

<table>
<tr><th colspan="2">Project- Specific WQMP Site Design BMP Checklist</th></tr>
<tr><td>☒ Yes ☐ No ☐ N/A</td><td>Did you identify and preserve existing drainage patterns?
Integrating existing drainage patterns into the site plan helps to maintain the time of concentration and infiltration rates of runoff, decreasing peak flows, and may also help preserve the contribution of Critical Coarse Sediment (i.e., Bed Sediment Supply) from the PDP to the Receiving Water. Preserve existing drainage patterns by:
• Minimizing unnecessary site grading that would eliminate small depressions, where appropriate add additional “micro” storage throughout the site landscaping.
• Where possible conform the PDP site layout along natural landforms, avoid excessive grading and disturbance of vegetation and soils, preserve or replicate the sites natural drainage features and patterns.
• Set back PDP improvements from creeks, wetlands, riparian habitats and any other natural water bodies.
• Use existing and proposed site drainage patterns as a natural design element, rather than using expensive impervious conveyance systems. Use depressed landscaped areas, vegetated buffers, and bioretention areas as amenities and focal points within the site and landscape design.</td></tr>
<tr><td colspan="2">Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer.
Insert discussion/justification here</td></tr>
<tr><td>☐ Yes ☐ No ☒ N/A</td><td>Did you identify and protect existing vegetation?
Identify any areas containing dense native vegetation or well-established trees, and try to avoid disturbing these areas. Soils with thick, undisturbed vegetation have a much higher capacity to store and infiltrate runoff than do disturbed soils. Reestablishment of a mature vegetative community may take decades. Sensitive areas, such as streams and floodplains should also be avoided.
• Define the development envelope and protected areas, identifying areas that are most suitable for development and areas that should be left undisturbed.
• Establish setbacks and buffer zones surrounding sensitive areas.
• Preserve significant trees and other natural vegetation where possible.</td></tr>
<tr><td colspan="2">Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer.
Site is already developed.</td></tr>
<tr><td>☒ Yes ☐ No ☐ N/A</td><td>Did you identify and preserve natural infiltration capacity?
A key component of LID is taking advantage of a site's natural infiltration and storage capacity. A site survey and geotechnical investigation can help define areas with high potential for infiltration and surface storage.
• Identify opportunities to locate LID Principles and Structural BMPs in highly pervious areas. Doing so will maximize infiltration and limit the amount of runoff generated.
• Concentrate development on portions of the site with less permeable soils, and preserve areas that can promote infiltration.</td></tr>
<tr><td colspan="2">Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. Insert discussion/justification here</td></tr>
</table>

<table>
<tr><th colspan="2">Project- Specific WQMP Site Design BMP Checklist</th></tr>
<tr><td>☒ Yes ☐ No ☐ N/A</td><td>Did you minimize impervious area?
Look for opportunities to limit impervious cover through identification of the smallest possible land area that can be practically impacted or disturbed during site development.
• Limit overall coverage of paving and roofs. This can be accomplished by designing compact, taller structures, narrower and shorter streets and sidewalks, clustering buildings and sharing driveways, smaller parking lots (fewer stalls, smaller stalls, and more efficient lanes), and indoor or underground parking.
• Inventory planned impervious areas on your preliminary site plan. Identify where permeable pavements, or other permeable materials, such as crushed aggregate, turf block, permeable modular blocks, pervious concrete or pervious asphalt could be substituted for impervious concrete or asphalt paving. This will help reduce the amount of Runoff that may need to be addressed through Structural BMPs.
• Examine site layout and circulation patterns and identify areas where landscaping can be substituted for pavement, such as for overflow parking.
• Consider green roofs. Green roofs are roofing systems that provide a layer of soil/vegetative cover over a waterproofing membrane. A green roof mimics pre-development conditions by filtering, absorbing, and evapotranspiring precipitation to help manage the effects of an otherwise impervious rooftop.</td></tr>
<tr><td colspan="2">Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. Insert discussion/justification here</td></tr>
<tr><td>☒ Yes ☐ No ☐ N/A</td><td>Did you identify and disperse runoff to adjacent pervious areas or small collection areas?
Look for opportunities to direct runoff from impervious areas to adjacent landscaping, other pervious areas, or small collection areas where such runoff may be retained. This is sometimes referred to as reducing Directly Connected Impervious Areas.
• Direct roof runoff into landscaped areas such as medians, parking islands, planter boxes, etc., and/or areas of pervious paving. Instead of having landscaped areas raised above the surrounding impervious areas, design them as depressed areas that can receive Runoff from adjacent impervious pavement. For example, a lawn or garden depressed 3"-4" below surrounding walkways or driveways provides a simple but quite functional landscape design element.
• Detain and retain runoff throughout the site. On flatter sites, smaller Structural BMPs may be interspersed in landscaped areas among the buildings and paving.
• On hillside sites, drainage from upper areas may be collected in conventional catch basins and piped to landscaped areas and LID BMPs and/or Hydrologic Control BMPs in lower areas. Low retaining walls may also be used to create terraces that can accommodate LID BMPs. Wherever possible, direct drainage from landscaped slopes offsite and not to impervious surfaces like parking lots.
• Reduce curb maintenance and provide for allowances for curb cuts.
• Design landscaped areas or other pervious areas to receive and infiltrate runoff from nearby impervious areas.
• Use Tree Wells to intercept, infiltrate, and evapotranspire precipitation and runoff before it reaches structural BMPs. Tree wells can be used to limit the size of Drainage Management Areas that must be treated by structural BMPs. Guidelines for Tree Wells are included in the Tree Well Fact Sheet in the LID BMP Design Handbook.</td></tr>
<tr><td colspan="2">Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. Insert discussion/justification here</td></tr>
</table>

Project- Specific WQMP Site Design BMP Checklist	
☒ Yes ☐ No ☐ N/A	**Did you utilize native or drought tolerant species in site landscaping?** Wherever possible, use native or drought tolerant species within site landscaping instead of alternatives. These plants are uniquely suited to local soils and climate and can reduce the overall demands for potable water use associated with irrigation.
Discuss how this was included or provide a discussion/justification for "No" or "N/A" answer. *Insert discussion/justification here*	
☐ Yes ☒ No ☐ N/A	**Did implement harvest and use of runoff?** Under the Regional MS4 Permit, Harvest and Use BMPs must be employed to reduce runoff on any site where they are applicable and feasible. However, Harvest and Use BMPs are effective for retention of stormwater runoff only when there is adequate demand for non-potable water during the wet season. If demand for non-potable water is not sufficiently large, the actual retention of stormwater runoff will be diminished during larger storms or during back-to-back storms. For the purposes of planning level Harvest and Use BMP feasibility screening, Harvest and Use is only considered to be a feasible if the total average wet season demand for non-potable water is sufficiently large to use the entire DCV within 72 hours. If the average wet season demand for non-potable water is not sufficiently large to use the entire DCV within 72 hours, then Harvest and Use is not considered to be feasible and need not be considered further. The general feasibility and applicability of Harvest and Use BMPs should consider: • Any downstream impacts related to water rights that could arise from capturing storm water (not common). • Conflicts with recycled water used – where the project is conditioned to use recycled water for irrigation, this should be given priority over storm water capture as it is a year-round supply of water. • Code Compliance - If a particular use of captured storm water, and/or available methods for storage of captured storm water would be contrary to building codes in effect at the time of approval of the preliminary Project-Specific WQMP, then an evaluation of harvesting and use for that use would not be required. • Wet season demand – the applicant shall demonstrate, to the acceptance of the [Insert Jurisdiction], that there is adequate demand for harvested water during the wet season to drain the system in a reasonable amount of time.
Discuss how this was included or provide a discussion/justification for "No" or "N/A" answer. Site use, as a Church, will not have large water usage. Also will have little to no irrigation.	
☒ Yes ☐ No ☐ N/A	**Did you keep the runoff from sediment producing pervious area hydrologically separate from developed areas that require treatment?** Pervious area that qualify as self-treating areas or off-site open space should be kept separate from drainage to structural BMPs whenever possible. This helps limit the required size of structural BMPs, helps avoid impacts to sediment supply, and helps reduce clogging risk to BMPs.
Discuss how this was included or provide a discussion/justification for "No" or "N/A" answer. *Insert discussion/justification here*	

Delineate Drainage Management Areas (DMAs)

This section provides streamlined guidance and documentation of the DMA delineation and categorization process, for additional information refer to the procedure in Section 3.3 of the SMR WQMP which discusses the methods of delineating and mapping your project site into individual DMAs. Complete Steps 1 to 4 to successfully delineate and categorize DMAs.

Step 1: Identify Surface Types and Drainage Pathways

Carefully delineate pervious areas and impervious areas (including roofs) throughout site and identify overland flow paths and above ground and below ground conveyances. Also identify common points (such as BMPs) that these areas drain to.

Step 2: DMA Delineation

Use the information in Step 1 to divide the entire PDP site into individual, discrete DMAs. Typically, lines delineating DMAs follow grade breaks and roof ridge lines. Where possible, establish separate DMAs for each surface type (e.g., landscaping, pervious paving, or roofs). Assign each DMA a unique code and determine its size in square feet. The total area of your site should total the sum of all of your DMAs (unless water from outside the project limits comingles with water from inside the project limits, i.e. run-on). Complete Table B-1

Table B-1 DMA Identification

DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
DMA A (+off-site D)	Mixed	4.11 acres/179,036 sq. ft	Type D
DMA B	Mixed	5.05 acres/ 219,978 sq. ft	
DMA C	Mixed	2.32 acres/101,036 sq. ft	
DMA B.1	Mixed	1.29 acres/56,303 sq. ft.	
Enter Unique Code	Enter Pervious, Impervious, or Mixed	Enter Area in Square Feet	
Enter Unique Code	Enter Pervious, Impervious, or Mixed	Enter Area in Square Feet	

Add Columns as Needed

Step 3: DMA Classification

Determine how drainage from each DMA will be handled by using information from Steps 1 and 2 and by completing Steps 3.A to 3.C. Each DMA will be classified as one of the following four types:

- Type 'A': Self-Treating Areas:
- Type 'B': Self-Retaining Areas
- Type 'C': Areas Draining to Self-Retaining Areas
- Type 'D': Areas Draining to BMPs

Step 3.A – Identify Type 'A' Self-Treating Area

Indicate if the DMAs meet the following criteria by answering "Yes" or "No".

☒ Yes ☐ No	Area is undisturbed from their natural condition OR restored with Native and/or California Friendly vegetative covers.
☒ Yes ☐ No	Area is irrigated, if at all, with appropriate low water use irrigation systems to prevent irrigation runoff.

☒ Yes ☐ No	Runoff from the area will not comingle with runoff from the developed portion of the site, or across other landscaped areas that do not meet the above criteria.

If all answers indicate "Yes," complete Table B-2 to document the DMAs that are classified as Self-Treating Areas.

Table B-2 Type 'A', Self-Treating Areas

DMA Name or Identification	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
DMA B.1 (vegetation area)	56,303	Drought tolerant vegetation	drip

Step 3.B – Identify Type 'B' Self-Retaining Area and Type 'C' Areas Draining to Self-Retaining Areas

Type 'B' Self-Retaining Area: A Self-Retaining Area is shallowly depressed 'micro infiltration' areas designed to retain the Design Storm rainfall that reaches the area, without producing any Runoff.

Indicate if the DMAs meet the following criteria by answering "Yes," "No," or "N/A".

☒ Yes ☐ No ☐ N/A	Slopes will be graded toward the center of the pervious area.
☒ Yes ☐ No ☐ N/A	Soils will be freely draining to not create vector or nuisance conditions.
☒ Yes ☐ No ☐ N/A	Inlet elevations of area/overflow drains, if any, should be clearly specified to be three inches or more above the low point to promote ponding.
☐ Yes ☐ No ☒ N/A	Pervious pavements (e.g., crushed stone, porous asphalt, pervious concrete, or permeable pavers) can be self-retaining when constructed with a gravel base course four or more inches deep below any underdrain discharge elevation.

If all answers indicate "Yes," DMAs may be categorized as Type 'B', proceed to identify Type 'C' Areas Draining to Self-Retaining Areas.

Type 'C' Areas Draining to Self-Retaining Areas: Runoff from impervious or partially pervious areas can be managed by routing it to Self-Retaining Areas consistent with the LID Principle discussed in SMR WQMP Section 3.2.5 for 'Dispersing Runoff to Adjacent Pervious Areas'.
Indicate if the DMAs meet the following criteria by answering "Yes" or "No".

☐ Yes ☒ No	The drainage from the tributary area must be directed to and dispersed within the Self-Retaining Area.
☐ Yes ☒ No	Area must be designed to retain the entire Design Storm runoff without flowing offsite.

If all answers indicate "Yes," DMAs may be categorized as Type 'C'.

Complete Table B-3 and Table B-4 to identify Type 'B' Self-Retaining Areas and Type 'C' Areas Draining to Self-Retaining Areas.

Table B-3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet)	Storm Depth (inches)	DMA Name / ID	[C] from Table B-4=	Required Retention Depth (inches)
		[A]	[B]		[C]	[D] = $[B] + \frac{[B]\cdot[C]}{[A]}$

Table B-4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					**Receiving Self-Retaining DMA**		
DMA Name/ ID	Area (square feet)	Post-project surface type	Runoff factor	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]

<u>Note:</u> (See Section 3.3 of SMR WQMP) Ensure that partially pervious areas draining to a Self-Retaining area do not exceed the following ratio:

$$\left(\frac{\mathbf{2}}{\boldsymbol{Impervious\ Fraction}}\right)\mathbf{:1}$$

(Tributary Area**:** Self-Retaining Area)

Step 3.C – Identify Type 'D' Areas Draining to BMPs

Areas draining to BMPs are those that could not be fully managed through LID Principles (DMA Types A through C) and will instead drain to an LID BMP and/or a Conventional Treatment BMP designed to manage water quality impacts from that area, and Hydromodification where necessary.

Complete Table B-5 to document which DMAs are classified as Areas Draining to BMPs

Table B-5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID Receiving Runoff from DMA
DMA A (+off-site D)	Basin A
DMA B	Basin B
DMA C	Basin C
DMA B.1	Trenches and to Basin B (in series)

Note: More than one DMA may drain to a single LID BMP; however, one DMA may not drain to more than one BMP.

Section C: Implement LID BMPs

The Regional MS4 Permit requires the use of LID BMPs to provide retention or treatment of the DCV and includes a BMP hierarchy which requires Full Retention BMPs (Priority 1) to be considered before Biofiltration BMPs (Priority 2) and Flow-Through Treatment BMPs and Alternative Compliance BMPs (Priority 3). LID BMP selection must be based on technical feasibility and should be considered early in the site planning and design process. Use this section to document the selection of LID BMPs for each DMA. Note that feasibility is based on the DMA scale and may vary between DMAs based on site conditions.

C.1 Full Infiltration Applicability

An assessment of the feasibility of utilizing full infiltration BMPs is required for all projects, *except where it can be shown that site design LID principals fully retain the DCV (i.e., all DMAs are Type A, B, or C), or where Harvest and Use BMPs fully retain the DCV. Check the following box if applicable:*

☒ Site design LID principals fully retain the DCV (i.e., all DMAs are Type A, B, or C), (Proceed to Section E).

If the above box remains unchecked, perform a site-specific evaluation of the feasibility of Infiltration BMPs using each of the applicable criteria identified in Chapter 2.3.3 of the SMR WQMP and complete the remainder of Section D.1.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Copermittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the SMR WQMP. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Infiltration Feasibility

Table C-1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the SMR WQMP in Chapter 2.3.3. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table C-1 Infiltration Feasibility

Downstream Impacts (SMR WQMP Section 2.3.3.a)		
Does the project site…	**YES**	**NO**
…have any DMAs where infiltration would negatively impact downstream water rights or other Beneficial Uses[3]?		X
If Yes, list affected DMAs:		
Groundwater Protection (SMR WQMP Section 2.3.3.b)		
Does the project site…	**YES**	**NO**
…have any DMAs with industrial, and other land uses that pose a high threat to water quality, which cannot be treated by Bioretention BMPs? Or have DMAs with active industrial process areas?		X
If Yes, list affected DMAs:		
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet horizontally of a water supply well?		X
If Yes, list affected DMAs:		
…have any DMAs that would restrict BMP locations to within a 2:1 (horizontal: vertical) influence line extending from any septic leach line?		X
If Yes, list affected DMAs:		
…have any DMAs been evaluated by a licensed Geotechnical Engineer, Hydrogeologist, or Environmental Engineer, who has concluded that the soils do not have adequate physical and chemical characteristics for the protection of groundwater, and has treatment provided by amended media layers in Bioretention BMPs been considered in evaluating this factor?		X
If Yes, list affected DMAs:		
Public Safety and Offsite Improvements (SMR WQMP Section 2.3.3.c)		
Does the project site…	**YES**	**NO**
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
Infiltration Characteristics For LID BMPs (SMR WQMP Section 2.3.3.d)		
Does the project site…	**YES**	**NO**
…have factored infiltration rates of less than 0.8 inches / hour? (Note: on a case-by-case basis, the City may allow a factor of safety as low as 1.0 to support selection of full infiltration BMPs. Therefore, measured infiltration rates could be as low as 0.8 in/hr to support full infiltration. A higher factor of safety would be required for design in accordance with the LID BMP Deign Handbook).		X
If Yes, list affected DMAs:		
Cut/Fill Conditions (SMR WQMP Section 2.3.3.e)		
Does the project site…	**YES**	**NO**
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
Other Site-Specific Factors (SMR WQMP Section 2.3.3.f)		
Does the project site…	**YES**	**NO**
…have DMAs where the geotechnical investigation discovered other site-specific factors that would preclude effective and/or safe infiltration?		X
Describe here:		

If you answered “Yes” to any of the questions above for any DMA, Infiltration BMPs that rely solely on infiltration should not be used for those DMAs and you should proceed to the assessment for Biofiltration BMPs below. Biofiltration BMPs that provide partial infiltration may still be feasible and

[3] Such a condition must be substantiated by sufficient modeling to demonstrate an impact and would be subject to [Insert Jurisdiction] discretion. There is not a standardized method for assessing this criterion. Water rights evaluations should be site-specific.

should be assessed in Section D.2. Summarize concerns identified in the Geotechnical Report, if any, that resulted in a "YES" response above in the table below.

Table C-2 Geotechnical Concerns for Onsite Infiltration

Type of Geotechnical Concern	DMAs Feasible (By Name or ID)	DMAs Infeasible (By Name or ID)
Collapsible Soil		
Expansive Soil		
Slopes		
Liquefaction		
Other		

C.2 Biofiltration Applicability

This section should document the applicability of biofiltration BMPs for Type D DMAs that are not feasible for full infiltration BMPs. The key decisions to be documented in this section include:

1. Are biofiltration BMPs with partial infiltration feasible?
    a. Biofiltration BMPs must be designed to maximize incidental infiltration via a partial infiltration design unless it is demonstrated that this design is not feasible.
    b. These designs can be used at sites with low infiltration rates where other feasibility factors do not preclude incidental infiltration.

    Document summary in Table C-3.

2. If not, what are the factors that require the use of biofiltration with no infiltration? This may include:
    a. Geotechnical hazards
    b. Water rights issues
    c. Water balance issues
    d. Soil contamination or groundwater quality issues
    e. Very low infiltration rates (factored rates < 0.1 in/hr)
    f. Other factors, demonstrated to the acceptance of the City

    If this applies to any DMAs, then rationale must be documented in Table C-3.

3. Are biofiltration BMPs infeasible?
    a. If yes, then provide a site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee with jurisdiction over the Project site to discuss this option. Proceed to Section F to document your alternative compliance measures.

Table C-3 Evaluation of Biofiltration BMP Feasibility

DMA ID	Is Partial/ Incidental Infiltration Allowable? (Y/N)	Basis for Infeasibility of Partial Infiltration (provide summary and include supporting basis if partial infiltration not feasible)
Insert text here		
Insert text here		
Insert text here		
Insert text here		

Proprietary Biofiltration BMP Approval Criteria

If the project will use proprietary BMPs as biofiltration BMPs, then this section is completed to document that the proprietary BMPs are selected in accordance with Section 2.3.7 of the SMR WQMP. Proprietary Biofiltration BMPs must meet both of the following approval criteria:

1. Approval Criteria for All Proprietary BMPs, and
2. Acceptance Criteria for Proprietary Biofiltration BMPs.

When the use of proprietary biofiltration BMPs is proposed to meet the Pollutant Control performance standards, use Table C-4 to document that appropriate approval criteria have been met for the proposed BMPs. Add additional rows to document approval criteria are met for each type of BMP proposed.

Table C-4 Proprietary BMP Approval Requirement Summary

Proposed Proprietary Biofiltration BMP	Approval Criteria	Notes/Comments
Insert BMP Name and Manufacturer Here	☐ Proposed BMP has an active TAPE GULD Certification for the project pollutants of concern[4] or equivalent 3rd party demonstrated performance.	Insert text here
	☐ The BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification.	Insert text here
	☐ The BMP includes biological features including vegetation supported by engineered or other growing media.	Describe features here.
	☐ The BMP is designed to maximize infiltration, or supplemental infiltration is provided to achieve retention equivalent to Biofiltration with Partial Infiltration BMPs if factored infiltration rate is between 0.1 and 0.8 inches/hour.	Describe supplemental retention practices if applicable.
	☐ The BMP is sized using one of two Biofiltration LID sizing options in Section 2.3.2 of the SRM WQMP.	List sizing method used, resulting size (i.e. volume or flow), and provided size (for proposed unit)

[4] Use Table F-1 and F-2 to identify and document the pollutants of concern and include these tables in Appendix 5.

C.3 Feasibility Assessment Summaries

From the Infiltration, Biofiltration with Partial Infiltration and Biofiltration with No Infiltration Sections above, complete Table C-5 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table C-5 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy			No LID (Alternative Compliance)
	1. Infiltration	2. Biofiltration with Partial Infiltration	3. Biofiltration with No Infiltration	
DMA A	☒	☐	☐	☐
DMA B	☒	☐	☐	☐
DMA C	☒	☐	☐	☐
DMA B.1	☒	☐	☐	☐
Insert text here	☐	☐	☐	☐
Insert text here	☐	☐	☐	☐

For those DMAs where LID BMPs are not feasible, provide a narrative in Table C-6 below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section F below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

This is based on the clarification letter titled "San Diego Water Board's Expectations of Documentation to Support a Determination of Priority Development Project Infiltration Infeasibility" (April 28, 2017, Via email from San Diego Regional Water Quality Control Board to San Diego County Municipal Storm Water Copermittees[5]).

Table C-6 Summary of Infeasibility Documentation

Question	Narrative Summary (include reference to applicable appendix/attachment/report, as applicable)
a) When in the entitlement process did a geotechnical engineer analyze the site for infiltration feasibility?	
b) When in the entitlement process were other investigations conducted (e.g., groundwater quality, water rights) to evaluate infiltration feasibility?	
c) What was the scope and	

[5] http://www.projectcleanwater.org/download/pdp-infiltration-infeasibility/

results of testing, if conducted, or rationale for why testing was not needed to reach findings?	
d) What public health and safety requirements affected infiltration locations?	
e) What were the conclusions and recommendations of the geotechnical engineer and/or other professional responsible for other investigations?	
f) What was the history of design discussions between the permittee and applicant for the proposed project, resulting in the final design determination related locations feasible for infiltration?	
g) What site design alternatives were considered to achieve infiltration or partial infiltration on site?	
h) What physical impairments (i.e., fire road egress, public safety considerations, utilities) and public safety concerns influenced site layout and infiltration feasibility?	
i) What LID Principles (site design BMPs) were included in the project site design?	

C.4 LID BMP Sizing

Each LID BMP must be designed to ensure that the DCV will be captured by the selected BMPs with no discharge to the storm drain or surface waters during the DCV size storm. Infiltration BMPs must at minimum be sized to capture the DCV to achieve pollutant control requirements.

Biofiltration BMPs must at a minimum be sized to:

- Treat 1.5 times the DCV not reliably retained on site using a volume-base or flow-based sizing method, or
- Include static storage volume, including pore spaces and pre-filter detention volume, at least 0.75 times the portion of the DCV not reliably retained on site.

First**,** calculate the DCV for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using the methods included in Section 3 of the LID BMP Design Handbook. Utilize the worksheets found in the LID BMP Design Handbook or consult with the Copermittee to assist you in correctly sizing your LID BMPs. Use Table C-7 below to document the DCV for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

The sizing used for these calculations are based on HCOC rain event sizing.

Table C-7 DCV Calculations for LID BMPs

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***Enter BMP Name / Identifier Here***		
DMA A	[A]		[B]	[C]	[A] x [C]			
Parking Lot/ Building	*66172*	*Concrete/AC*	*1*	*.89*	*59025.4*			
Landscape	*63824*	*Ornamental*	*0.1*	*.110458*	*7049.9*			
Barren	*2787*	*Soil C*	*0.1*	*.110458*	*307.8*			
Offsite D	*46253.43*	*Vacant*	*0.1*	*.110458*	*5299.7*			
						Design Storm Depth (in)	*DCV,* ***V_{BMP}*** *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	179036.4				71,682.8	1.3	7,765.64	33,748

[B], [C] is obtained as described in Section 2.6.1.b of the SMR WQMP
[E] is obtained from Exhibit A in the SMR WQMP
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6.

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here*		
DMA B	[A]		[B]	[C]	[A] x [C]			
Parking Lot/ Building	*117387*	*Concrete/AC*	*1*	*0.89*	*104709.2*			
Landscape	*98732*	*Ornamental*	*0.1*	*.110458*	*10905.7*			
Barren	*3841*	*Soil C*	*0.1*	*.110458*	*424.3*			
						Design Storm Depth (in)	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	219,960				116,039.2	1.3	12,570.9	35,799

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here*		
DMA C	[A]		[B]	[C]	[A] x [C]			
Parking Lot	*77970*	*Concrete/AC*	*1*	*0.89*	*69549.2*			
Landscape	*23066*	*Ornamental*	*0.1*	*0.11458*	*2547.8*			
						Design Storm Depth (in)	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	101036				72,097	1.3	6,071.7	12,863

<table>
<tr><th>DMA Type/ID WEST</th><th>DMA (square feet)</th><th>Post-Project Surface Type</th><th>Effective Impervious Fraction, I_f</th><th>DMA Runoff Factor</th><th>DMA Areas x Runoff Factor</th><th colspan="3" rowspan="2">Enter BMP Name / Identifier Here</th></tr>
<tr><td>DMA B.1</td><td>[A]</td><td></td><td>[B]</td><td>[C]</td><td>[A] x [C]</td></tr>
<tr><td>Roof</td><td>8800</td><td>Roof</td><td>1</td><td>0.89</td><td>7832</td><td rowspan="6">Design Storm Depth (in)</td><td rowspan="6">DCV, V_{BMP} (cubic feet)</td><td rowspan="6">Proposed Volume on Plans (cubic feet)</td></tr>
<tr><td>Landscape</td><td>15239</td><td>Ornamental</td><td>0.1</td><td>0.11458</td><td>1746</td></tr>
<tr><td>Other Impervious</td><td>3595</td><td>Concrete</td><td>1</td><td>0.89</td><td>3199.5</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>27634</td><td colspan="3"></td><td>12777.5</td><td>1.3</td><td>1384.2</td><td>1,216.0</td></tr>
</table>

<table>
<tr><th>DMA Type/ID EAST</th><th>DMA (square feet)</th><th>Post-Project Surface Type</th><th>Effective Impervious Fraction, I_f</th><th>DMA Runoff Factor</th><th>DMA Areas x Runoff Factor</th><th colspan="3" rowspan="2">Enter BMP Name / Identifier Here</th></tr>
<tr><td>DMA B.1</td><td>[A]</td><td></td><td>[B]</td><td>[C]</td><td>[A] x [C]</td></tr>
<tr><td>Roof</td><td>8800</td><td>Roof</td><td>1</td><td>0.89</td><td>7832</td><td rowspan="6">Design Storm Depth (in)</td><td rowspan="6">DCV, V_{BMP} (cubic feet)</td><td rowspan="6">Proposed Volume on Plans (cubic feet)</td></tr>
<tr><td>Landscape</td><td>17093</td><td>Ornamental</td><td>0.1</td><td>0.11458</td><td>1958.5</td></tr>
<tr><td>Other Impervious</td><td>2776</td><td>Concrete</td><td>1</td><td>0.89</td><td>2470.6</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>28669</td><td colspan="3"></td><td>11811.11</td><td>1.3</td><td>1279.5</td><td>1,216.0</td></tr>
</table>

Complete Table C-8 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. You can add rows to the table as needed. Alternatively, the Santa Margarita Hydrology Model (SMRHM) can be used to size LID BMPs to address the DCV and, if applicable, to size Hydrologic Control BMPs to meet the Hydrologic Performance Standard described in the SMR WQMP, as identified in Section E.

Table C-8 LID BMP Sizing

BMP Name / ID	DMA No.	BMP Type / Description	Design Capture Volume (ft^3)	Proposed Volume (ft^3)
Basin A	A +D	Infiltration Basin	7765	33748
Basin B	B	Infiltration Basin	12570.9	35799
Basin C	C	Infiltration Basin	6071.7	12863
Trench B.1 (2- E and W)	B.1	Infiltration Trench	2663.7	1216

If bioretention will include a capped underdrain, then include sizing calculations demonstrating that the BMP will meet infiltration sizing requirements with the underdrain capped and also meet biofiltration sizing requirements if the underdrain is uncapped.

Section D: Implement Hydrologic Control BMPs and Sediment Supply BMPs

If a completed Table 1.2 demonstrates that the project is exempt from Hydromodification Performance Standards, specify N/A and proceed to Section G.

☐ N/A Project is Exempt from Hydromodification Performance Standards.

If a PDP is not exempt from hydromodification requirements than the PDP must satisfy the requirements of the performance standards for hydrologic control BMPs and Sediment Supply BMPs. The PDP may choose to satisfy hydrologic control requirements using onsite or offsite BMPs (i.e. Alternative Compliance). Sediment supply requirements cannot be met via alternative compliance. If N/A is not selected above, select one of the two options below and complete the applicable sections.

☒ Project is Not Hydromodification Exempt and chooses to implement Hydrologic Control and Sediment Supply BMPs Onsite (complete Section E).

☐ Project is Not Hydromodification Exempt and chooses to implement Hydrologic Control Requirements using Alternative Compliance (complete Section F). Selection of this option must be approved by the Copermittee.

D.1 Hydrologic Control BMP Selection

Capture of the DCV and achievement of the Hydrologic Performance Standard may be met by combined and/or separate structural BMPs. The user should consider the full suite of Hydrologic Control BMPs to manage runoff from the post-development condition and meet the Hydrologic Performance Standard identified in this section.

The Hydrologic Performance Standard consists of matching or reducing the flow duration curve of post-development conditions to that of pre-existing, naturally occurring conditions, for the range of geomorphically significant flows (10% of the 2-year runoff event up to the 10-year runoff event). Select each of the hydrologic control BMP types that are applied to meet the above performance standard on the site.

☐ LID principles as defined in Section 3.2 of the SMR WQMP.

☒ Structural LID BMPs that may be modified or enlarged, if necessary, beyond the DCV.

☐ Structural Hydrologic Control BMPs that are distinct from the LID BMPs above. The LID BMP Design Handbook provides information not only on Hydrologic Control BMP design, but also on BMP design to meet the combined LID requirement and Hydrologic Performance Standard. The Handbook specifies the type of BMPs that can be used to meet the Hydrologic Performance Standard.

D.2 Hydrologic Control BMP Sizing

Hydrologic Control BMPs must be designed to ensure that the flow duration curve of the post-development DMA will not exceed that of the pre-existing, naturally occurring, DMA for the range of geomorphically significant flows. Using SMRHM, (or another acceptable continuous simulation model if approved by the Copermittee) the applicant shall demonstrate that the performance of the Hydrologic Control BMPs complies with the Hydrologic Performance Standard. Complete Table D-1 below and identify, for each DMA, the type of Hydrologic Control BMP, if the SMRHM model confirmed the management (Identified as "passed" in SMRHM), the total volume capacity of the Hydrologic Control BMP, the Hydrologic Control BMP footprint at top floor elevation, and the drawdown time of the Hydrologic Control BMP. SMRHM summary reports should be documented in Appendix 7. Refer to the SMRHM Guidance Document for additional information on SMRHM. You can add rows to the table as needed.

Table D-1 Hydrologic Control BMP Sizing

BMP Name / ID	DMA No.	BMP Type / Description	SMRHM Passed	BMP Volume (ac-ft)	BMP Footprint (ac)	Drawdown time (hr)
Basin A	A	Infiltration Basin	☐	0.7747	.1253	48
Basin B	B	Infiltration Basin	☐	0.8218	.2354	48
Basin C	C	Infiltration Basin	☐	0.2952	.1575	48
Trench B.1	D	Infiltration Trench	☐	0.0614	.0371	48

Site is located within the SANTA ANA region

If a bioretention BMP with capped underdrain is used and hydromodification requirements apply, then sizing calculations must demonstrate that the BMP meets flow duration control criteria with the underdrain capped and uncapped. Both calculations must be included.

D.3 Implement Sediment Supply BMPs

The sediment supply performance standard applies to PDPs for which hydromodification applied that have the potential to impact Potential Critical Coarse Sediment Yield Areas. Refer to Exhibit G of the WQMP to determine if there are onsite Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas. Select one of the two options below and include the Potential Critical Coarse Sediment Yield Area Exhibit showing your project location in Appendix 7.

☒ There are no mapped Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas on the site. The Sediment Supply Performance Standard is met with no further action.

☐ There are mapped Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas on the site, the Sediment Supply Performance Standard will be met through Option 1 or Option 2 below.

The applicant may refer to Section 3.6.4 of the SMR WQMP for a description of the methodology to meet the Sediment Supply Performance Standard. Select the applicable compliance pathway and complete the appropriate sections to demonstrate compliance with the Sediment Supply Performance Standard if the second box is selected above:

☐ Avoid impacts related to any PDP activities to Potential Critical Coarse Sediment Yield Areas. Proceed to Section E.3.1.

☐ Complete a Site-Specific Critical Coarse Sediment Analysis. Proceed to Section E.3.2.

E.3.1 Option 1: Avoid Potential Critical Coarse Sediment Yield Areas and Potential Sediment Source Areas

The simplest approach for complying with the Sediment Supply Performance Standard is to avoid impacts to areas identified as Potential Critical Coarse Sediment Yield Areas or Potential Sediment Supply Areas. If a portion of PDP is identified as a Potential Critical Coarse Sediment Yield Area or a Potential Sediment Source Area, that PDP may still achieve compliance with the Sediment Supply Performance Standards if Potential Critical Coarse Sediment Yield Areas and Potential Sediment Supply Areas are avoided, i.e. areas are not developed and thereby delivery of Critical Coarse Sediment to the receiving waters is not impeded by site developments.

Provide a narrative describing how the PDP has avoided impacts to Potential Critical Coarse Sediment Yield Areas and/or Potential Sediment Source Areas below.

Insert narrative description here

If it is not feasible to avoid these areas, proceed to Option 2 to complete a Site-Specific Critical Coarse Sediment Analysis.

E.3.2 Option 2: Site-Specific Critical Coarse Sediment Analysis

Perform a stepwise assessment to ensure the maintenance of the pre-project source(s) of Critical Coarse Sediment (i.e., Bed Sediment Supply):

1. Determine whether the site or a portion of the site is a Significant Source of Bed Sediment Supply to the Receiving Channel (i.e., an actual verified Critical Coarse Sediment Yield Area);
2. Avoid areas identified as actual verified Critical Coarse Sediment Yield Areas in the PDP design and maintain pathways for discharge of Bed Sediment Supply from these areas to receiving waters.

Step 1: Identify if the site is an actual verified Critical Coarse Sediment Yield Area supplying Bed Sediment Supply to the receiving channel

☐ **Step 1.A** – Is the Bed Sediment of onsite streams similar to that of receiving streams?

Rate the similarity: ☐ High
☐ Medium
☐ Low

Results from the geotechnical and sieve analysis to be performed both onsite and in the receiving channel should be documented in Appendix 7. Of particular interest, the results of the sieve analysis, the soil erodibility factor, a description of the topographic relief of the project area, and the lithology of onsite soils should be reported in Appendix 7.

☐ **Step 1.B** – Are onsite streams capable of delivering Bed Sediment Supply from the site, if any, to the receiving channel?

Rate the potential:

☐ High

☐ Medium

☐ Low

Results from the analyses of the sediment delivery potential to the receiving channel should be documented in Appendix 7 and identify, at a minimum, the Sediment Source, the distance to the receiving channel, the onsite channel density, the project watershed area, the slope, length, land use, and rainfall intensity.

☐ **Step 1.C** – Will the receiving channel adversely respond to a change in Bed Sediment Load?

Rate the need for bed sediment supply:

☐ High

☐ Medium

☐ Low

Results from the in-stream analysis to be performed both onsite should be documented in Appendix 7. The analysis should, at a minimum, quantify the bank stability and the degree of incision, provide a gradation of the Bed Sediment within the receiving channel, and identify if the channel is sediment supply-limited.

☐ **Step 1.D** – Summary of Step 1

Summarize in Table E.3 the findings of Step 1 and associate a score (in parenthesis) to each step. The sum of the three individual scores determines if a stream is a significant contributor to the receiving stream.

- Sum is equal to or greater than eight - Site is a significant source of sediment bed material – all on-site streams must be preserved or by-passed within the site plan. The applicant shall proceed to Step 2 for all onsite streams.
- Sum is greater than five but lower than eight. Site is a source of sediment bed material – some of the on-site streams must be preserved (with identified streams noted). The applicant shall proceed to Step 2 for the identified streams only.
- Sum is equal to or lower than five. Site is not a significant source of sediment bed material. The applicant may advance to Section F.

Table D-2 Triad Assessment Summary

Step	Rating			Total Score
1.A	☐ High (3)	☐ Medium (2)	☐ Low (1)	
1.B	☐ High (3)	☐ Medium (2)	☐ Low (1)	
1.C	☐ High (3)	☐ Medium (2)	☐ Low (1)	
Significant Source Rating of Bed Sediment to the receiving channel(s)				

Step 2: Avoid Development of Critical Coarse Sediment Yield Areas, Potential Sediment Sources Areas, and Preserve Pathways for Transport of Bed Sediment Supply to Receiving Waters

Onsite streams identified as a actual verified Critical Coarse Sediment Yield Areas should be avoided in the site design and transport pathways for Critical Coarse Sediment should be preserved

Check those that apply:

☐ The site design does avoid all onsite channels identified as actual verified Critical Coarse Sediment Yield Areas

AND

☐ The drainage design bypasses flow and sediment from onsite upstream drainages identified as actual verified Critical Coarse Sediment Yield Areas to maintain Critical Coarse Sediment supply to receiving waters

(If both are yes, the applicant may disregard subsequent steps of Section E.3 and directly advance directly to Section G).

\- *Or* -

☐ The site design **does NOT avoid** all onsite channels identified as actual verified Critical Coarse Sediment Yield Areas

OR

☐ The project impacts transport pathways of Critical Coarse Sediment from onsite upstream drainages.

(If either of these are the case, the applicant may proceed with the subsequent steps of Section E.3).

Provide in Appendix 7 a site map that identifies all onsite channels and highlights those onsite channels that were identified as a Significant Source of Bed Sediment. The site map shall demonstrate, if feasible, that the site design avoids those onsite channels identified as a Significant Source of Bed Sediment. In addition, the applicant shall describe the characteristics of each onsite channel identified as a Significant Source of Bed Sediment. If the design plan cannot avoid the onsite channels, please provide a rationale for each channel individually.

The site map shall demonstrate that the drainage design bypasses those onsite channels that supply Critical Coarse Sediment to the receiving channel(s). In addition, the applicant shall describe the characteristics of each onsite channel identified as an actual verified Critical Coarse Sediment Yield Area.

Identified Channel #1 - Insert narrative description here

Identified Channel #2 - Insert narrative description here

Identified Channel #3 - Insert narrative description here

E.3.3 Sediment Supply BMPs to Result in No Net Impact to Downstream Receiving Waters

If impacts to Critical Coarse Sediment Yield Areas cannot be avoided, sediment supply BMPs must be implemented such there is no net impact to receiving waters. Sediment supply BMPs may consist of approaches that permit flux of bed sediment supply from Critical Coarse Sediment Yield Areas within the project boundary. This approach is subject to acceptance by the [Insert Jurisdiction]. It may require extensive documentation and analysis by qualified professionals to support this demonstration.

Appendix H of the San Diego Model BMP Design Manual provides additional information on site-specific investigation of Critical Coarse Sediment Supply areas.

http://www.projectcleanwater.org/download/2018-model-bmp-design-manual/

If applicable, insert narrative description here

Documentation of sediment supply BMPs should be detailed in Appendix 7.

Section E: Alternative Compliance

Alternative Compliance may be used to achieve compliance with pollutant control and/or hydromodification requirements for a given PDP. Alternative Compliance may be used under two scenarios, check the applicable box if the PDP is proposing to use Alternative Compliance to satisfy all or a portion of the Pollutant Control and/or Hydrologic Control requirements (but not sediment supply requirements)

☐ If it is not feasible to fully implement Infiltration or Biofiltration BMPs at a PDP site, Flow-Through Treatment Control BMPs may be used to treat pollutants contained in the portion of DCV not reliably retained on site and Alternative Compliance measures must also be implemented to mitigate for those pollutants in the DCV that are not retained or removed on site prior to discharging to a receiving water.

☐ Alternative Compliance is selected to comply with either pollutant control or hydromodification flow control requirements even if complying with these requirements is potentially feasible on-site. If such voluntary Alternative Compliance is implemented, Flow-Through Treatment Control BMPs must still be used to treat those pollutants in the portion of the DCV not reliably retained on site prior to discharging to a receiving water.

Refer to Section 2.7 of the SMR WQMP and consult the City for currently available Alternative Compliance pathways. Coordinate with the Copermittee if electing to participate in Alternative Compliance and complete the sections below to document implementation of the Flow-Through BMP component of the program.

E.1 Identify Pollutants of Concern

The purpose of this section is to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs and to document compliance and.

Utilize Table A-1 from Section A, which noted your project's Receiving Waters, to identify impairments for Receiving Waters (including downstream receiving waters) by completing Table E-1. Table E-1 includes the watersheds identified as impaired in the Approved 2010 303(d) list; check box corresponding with the PDP's receiving water. The most recent 303(d) lists are available from the State Water Resources Control Board website: https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml).https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml.

Table E-1 Summary of Approved 2010 303(d) listed waterbodies and associated pollutants of concern for the Riverside County SMR Region and downstream waterbodies.

	Water Body	Nutrients[1]	Metals[2]	Toxicity	Bacteria and Pathogens	Pesticides and Herbicides	Sulfate	Total Dissolved Solids
☐	De Luz Creek	X	X				X	
☐	Long Canyon Creek		X		X	X		
☐	Murrieta Creek	X	X	X		X		
☐	Redhawk Channel	X	X		X	X		X
☐	Santa Gertudis Creek	X	X		X	X		
☐	Santa Margarita Estuary	X						
☐	Santa Margarita River (Lower)	X			X			
☐	Santa Margarita River (Upper)	X		X				
☐	Temecula Creek	X	X	X		X		X
☐	Warm Springs Creek	X	X		X	X		

[1] Nutrients include nitrogen, phosphorus and eutrophic conditions caused by excess nutrients.

[2] Metals includes copper, iron, and manganese.

Use Table E-2 to identify the pollutants identified with the project site. Indicate the applicable PDP Categories and/or Project Features by checking the boxes that apply. If the identified General Pollutant Categories are the same as those listed for your Receiving Waters, then these will be your Pollutants of Concern; check the appropriate box or boxes in the last row.

Table E-2 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)		General Pollutant Categories									
		Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease	Total Dissolved Solids	Sulfate
☐	Detached Residential Development	P	N	P	P	N	P	P	P	N	N
☐	Attached Residential Development	P	N	P	P	N	P	P	P(2)	N	N
☐	Commercial/Industrial Development	P(3)	P(7)	P(1)	P(1)	P	P(1)	P	P	N	N
☐	Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P	N	N
☐	Restaurants (>5,000 ft^2)	P	N	N	P(1)	N	N	P	P	N	N
☐	Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P	N	N
☒	Parking Lots (>5,000 ft^2)	P(6)	P(7)	P(1)	P(1)	P(4)	P	P	P	N	N
☐	Streets, Highways, and Freeways	P(6)	P(7)	P(1)	P(1)	P(4)	P	P	P	N	N
☐	Retail Gasoline Outlets	N	P(7)	N	N	P(4)	N	P	P	N	N
Project Priority Pollutant(s) of Concern		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste products; otherwise not expected

(4) Including petroleum hydrocarbons

(5) Including solvents

(6) Bacterial indicators are routinely detected in pavement runoff

(7) A potential source of metals, primarily copper and zinc. Iron, magnesium, and aluminum are commonly found in the environment and are commonly associated with soils, but are not primarily of anthropogenic stormwater origin in the municipal environment.

E.2 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential Pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must be selected to address the Project Priority Pollutants of Concern (identified above) and meet the acceptance criteria described in Section 2.3.7 of the SMR WQMP. Documentation of acceptance criteria must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E-3 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.
[2] Cross Reference Table E.1 above to populate this column.
[3] As documented in a Copermittee Approved Study and provided in Appendix 6.

E.3 Sizing Criteria

Utilize Table E-4 below to appropriately size flow-through BMPs to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.1 of the SMR WQMP for further information.

Table E-4 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***Enter BMP Name / Identifier Here***	
	[A]		[B]	[C]	[A] x [C]		
						Design Storm (in)	*Design Flow Rate (cfs)*
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x[E]}{[G]}$

[B], [C] is obtained as described in Section 2.6.1.b from the SMR WQMP
[E] either 0.2 inches or 2 times the 85th percentile hourly rainfall intensity
[G] = 43,560,.

E.4 Hydrologic Performance Standard – Alternative Compliance Approach

Alternative compliance options are only available if the governing Copermittee has acknowledged the infeasibility of onsite Hydrologic Control BMPs and approved an alternative compliance approach. See Section 3.5 and 3.6 of the SMR WQMP.

Select the pursued alternative and describe the specifics of the alternative:

☐ Offsite Hydrologic Control Management within the same channel system

Insert narrative description here

☐ In-Stream Restoration Project

Insert narrative description here

For Offsite Hydrologic Control BMP Option

Each Hydrologic Control BMP must be designed to ensure that the flow duration curve of the post-development DMA will not exceed that of the pre-existing, naturally occurring, DMA by more than ten percent over a one-year period. Using SMRHM, the applicant shall demonstrate that the performance of each designed Hydrologic Control BMP is equivalent with the Hydrologic Performance Standard for onsite conditions. Complete Table E-5 below and identify, for each Hydrologic Control BMP, the equivalent DMA the Hydrologic Control BMP mitigates, that the SMRHM model passed, the total volume capacity of the BMP, the BMP footprint at top floor elevation, and the drawdown time of the BMP. SMRHM summary reports for the alternative approach should be documented in Appendix 7. Refer to the SMRHM Guidance Document for additional information on SMRHM. You can add rows to the table as needed.

Table E-5 Offsite Hydrologic Control BMP Sizing

BMP Name / Type	Equivalent DMA (ac)	SMRHM Passed	BMP Volume (ac-ft)	BMP Footprint (ac)	Drawdown time (hr)
		☐			
		☐			
		☐			
		☐			

For Instream Restoration Option

Attach to Appendix 7 the technical report detailing the condition of the receiving channel subject to the proposed hydrologic and sediment regimes. Provide the full design plans for the in-stream restoration project that have been approved by the Copermittee. Utilize the San Diego Regional Water Quality Equivalency Guidance Document.

Section F: Implement Trash Capture BMPs

The City may require full trash capture BMPs to be installed as part of the project. Consult with the City to determine applicability.

Trash Capture BMPs may be applicable to Type 'D' DMAs, as defined in Section 2.3.4 of the SMR WQMP. Trash Capture BMPs are designed to treat Q_{TRASH}, the runoff flow rate generated during the 1-year 1-hour precipitation depth. Utilize Table F-1 to size Trash Capture BMP. Refer to Table F-2 to determine the Trash Capture Design Storm Intensity (E).

Table F-1 Sizing Trash Capture BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***Enter BMP Name / Identifier Here***	
	[A]		[B]	[C]	[A] x [C]		
						Trash Capture Design Storm Intensity (in)	*Trash Capture Design Flow Rate (cubic feet or cfs)*
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x[E]}{[G]}$

[B], [C] is obtained as described in Section 2.6.1.b from the SMR WQMP
[G] = 43,560

Table F-2 Approximate precipitation depth/intensity values for calculation of the Trash Capture Design Storm

City	1-year 1-hour Precipitation Depth/Intensity (inches/hr)
Murrieta	0.47
Temecula	0.50
Wildomar	0.37

Use Table F-3 to summarize and document the selection and sizing of Trash Capture BMPs.

Table F-3 Trash Capture BMPs

BMP Name / ID	DMA No(s)	BMP Type / Description	Required Trash Capture Flowrate (cfs)	Provided Trash Capture Flowrate (cfs)

Section G: Source Control BMPs

Source Control BMPs include permanent, structural features that may be required in your Project plans, such as roofs over and berms around trash and recycling areas, and Operational BMPs, such as regular sweeping and "housekeeping," that must be implemented by the site's occupant or user. The Maximum Extent Practicable (MEP) standard typically requires both types of BMPs. In general, Operational Source Control BMPs cannot be substituted for a feasible and effective Structural Source Control BMP. Complete checklist below to determine applicable Source Control BMPs for your site.

Project-Specific WQMP Source Control BMP Checklist

All development projects must implement Source Control BMPs. Source Control BMPs are used to minimize pollutants that may discharge to the MS4. Refer to Chapter 3 (Section 3.8) of the SMR WQMP for additional information. Complete Steps 1 and 2 below to identify Source Control BMPs for the project site.

Step 1: Identify Pollutant Sources

Review project site plans and identify the applicable pollutant sources. "Yes" indicates that the pollutant source is applicable to project site. "No" indicates that the pollutant source is not applicable to project site.

☒ Yes ☐ No	Storm Drain Inlets	☐ Yes ☒ No	Outdoor storage areas
☐ Yes ☒ No	Floor Drains	☐ Yes ☒ No	Material storage areas
☐ Yes ☒ No	Sump Pumps	☐ Yes ☒ No	Fueling areas
☐ Yes ☒ No	Pets Control/Herbicide Application	☐ Yes ☒ No	Loading Docks
☐ Yes ☒ No	Food Service Areas	☐ Yes ☒ No	Fire Sprinkler Test/Maintenance water
☒ Yes ☐ No	Trash Storage Areas	☐ Yes ☒ No	Plazas, Sidewalks and Parking Lots
☐ Yes ☒ No	Industrial Processes	☐ Yes ☒ No	Pools, Spas, Fountains and other water features
☐ Yes ☒ No	Vehicle and Equipment Cleaning and Maintenance/Repair Areas		

Step 2: Required Source Control BMPs

List each Pollutant source identified above in column 1 and fill in the corresponding Structural Source Control BMPs and Operational Control BMPs by referring to the Stormwater Pollutant Sources/Source Control Checklist included in Appendix 8. The resulting list of structural and operational source control BMPs must be implemented as long as the associated sources are present on the project site. Add additional rows as needed.

Pollutant Source	Structural Source Control BMP	Operational Source Control BMP
Trash Enclosure	Covered Enclosure	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here

Section H: Coordinate Submittal with Other Site Plans

Populate Table H-1 below to assist the plan checker in an expeditious review of your project. During construction and at completion, City inspectors will verify the installation of BMPs against the approved plans. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H-1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. The Copermittee with jurisdiction over the Project site can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Use Table H-2 to identify other applicable permits that may impact design of the site. If yes is answered to any of the items below, the Copermittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Table H-2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act Section 401 Water Quality Certification	☐ Y	☒ N
US Army Corps of Engineers, Clean Water Act Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)*	☐ Y	☐ N

Section I: Operation, Maintenance and Funding

The Copermittee with jurisdiction over the Project site will periodically verify that BMPs on your Project are maintained and continue to operate as designed. To make this possible, the Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement maintenance of BMPs in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized Operations and Maintenance or inspections but will require typical landscape maintenance as noted in Chapter 5, in the SMR WQMP. Include a brief description of typical landscape maintenance for these areas.

The Copermittee with jurisdiction over the Project site will also require that you prepare and submit a detailed BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a BMP Operation and Maintenance Plan are in Chapter 5 of the SMR WQMP.

Maintenance Mechanism: St. Frances Church management

Will the proposed BMPs be maintained by a Homeowners' Association (HOA) or Property Owners Association (POA)?

☐ Y ☒ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

The sitewide operations and maintenance will be directed by St. Frances Church facility management. This is overseen by San Bernardino Archdiocese maintenance staff.

Section J: Acronyms, Abbreviations and Definitions

Regional MS4 Permit	Order No. R9-2013-0001 as amended by Order No. R9-2015-0001 and Order No. R9-2015-0100 an NPDES Permit issued by the San Diego Regional Water Quality Control Board.
Applicant	Public or private entity seeking the discretionary approval of new or replaced improvements from the Copermittee with jurisdiction over the project site. The Applicant has overall responsibility for the implementation and the approval of a Priority Development Project. The WQMP uses consistently the term "user" to refer to the applicant such as developer or project proponent. The WQMP employs also the designation "user" to identify the Registered Professional Civil Engineer responsible for submitting the Project-Specific WQMP, and designing the required BMPs.
Best Management Practice (BMP)	Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.
BMP Fact Sheets	BMP Fact Sheets are available in the LID BMP Design Handbook. Individual BMP Fact Sheets include sitting considerations, and design and sizing guidelines for seven types of structural BMPs (infiltration basin, infiltration trench, permeable pavement, harvest-and-use, bioretention, extended detention basin, and sand filter).
California Stormwater Quality Association (CASQA)	Publisher of the California Stormwater Best Management Practices Handbooks, available at www.cabmphandbooks.com.
Conventional Treatment Control BMP	A type of BMP that provides treatment of storm water runoff. Conventional treatment control BMPs, while designed to treat particular Pollutants, typically do not provide the same level of volume reduction as LID BMPs, and commonly require more specialized maintenance than LID BMPs. As such, the Regional MS4 Permit and this WQMP require the use of LID BMPs wherever feasible, before Conventional Treatment BMPs can be considered or implemented.
Copermittees	The Regional MS4 Permit identifies the Cities of Murrieta, Temecula, and Wildomar, the County, and the District, as Copermittees for the SMR.
County	The abbreviation refers to the County of Riverside in this document.
CEQA	California Environmental Quality Act - a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.

CIMIS	California Irrigation Management Information System - an integrated network of 118 automated active weather stations all over California managed by the California Department of Water Resources.
CWA	Clean Water Act - is the primary federal law governing water pollution. Passed in 1972, the CWA established the goals of eliminating releases of high amounts of toxic substances into water, eliminating additional water pollution by 1985, and ensuring that surface waters would meet standards necessary for human sports and recreation by 1983. CWA Section 402(p) is the federal statute requiring NPDES permits for discharges from MS4s.
CWA Section 303(d) Waterbody	Impaired water in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of urban runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.
Design Storm	The Regional MS4 Permit has established the 85th percentile, 24-hour storm event as the "Design Storm". The applicant may refer to Exhibit A to identify the applicable Design Storm Depth (D85) to the project.
DCV	Design Capture Volume (DCV) is the volume of runoff produced from the Design Storm to be mitigated through LID Retention BMPs, Other LID BMPs and Volume Based Conventional Treatment BMPs, as appropriate.
Design Flow Rate	The design flow rate represents the minimum flow rate capacity that flow-based conventional treatment control BMPs should treat to the MEP, when considered.
DCIA	Directly Connected Impervious Areas - those impervious areas that are hydraulically connected to the MS4 (i.e. street curbs, catch basins, storm drains, etc.) and thence to the structural BMP without flowing over pervious areas.
Discretionary Approval	A decision in which a Copermittee uses its judgment in deciding whether and how to carry out or approve a project.
District	Riverside County Flood Control and Water Conservation District.
DMA	A Drainage Management Area - a delineated portion of a project site that is hydraulically connected to a common structural BMP or conveyance point. The Applicant may refer to Section 3.3 for further guidelines on how to delineate DMAs.

Drawdown Time	Refers to the amount of time the design volume takes to pass through the BMP. The specified or incorporated drawdown times are to ensure that adequate contact or detention time has occurred for treatment, while not creating vector or other nuisance issues. It is important to abide by the drawdown time requirements stated in the fact sheet for each specific BMP.
Effective Area	Area which 1) is suitable for a BMP (for example, if infiltration is potentially feasible for the site based on infeasibility criteria, infiltration must be allowed over this area) and 2) receives runoff from impervious areas.
ESA	An Environmental Sensitive Area (ESA) designates an area "in which plants or animals life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments". (Reference: California Public Resources Code § 30107.5).
ET	Evapotranspiration (ET) is the loss of water to the atmosphere by the combined processes of evaporation (from soil and plant surfaces) and transpiration (from plant tissues). It is also an indicator of how much water crops, lawn, garden, and trees need for healthy growth and productivity
FAR	The Floor Area Ratio (FAR) is the total square feet of a building divided by the total square feet of the lot the building is located on.
Flow-Based BMP	Flow-based BMPs are conventional treatment control BMPs that are sized to treat the design flow rate.
FPPP	Facility Pollution Prevention Plan
HCOC	Hydrologic Condition of Concern - Exists when the alteration of a site's hydrologic regime caused by development would cause significant impacts on downstream channels and aquatic habitats, alone or in conjunction with impacts of other projects.
HMP	Hydromodification Management Plan – Plan defining Performance Standards for PDPs to manage increases in runoff discharge rates and durations.
Hydrologic Control BMP	BMP to mitigate the increases in runoff discharge rates and durations and meet the Performance Standards set forth in the HMP.
HSG	Hydrologic Soil Groups – soil classification to indicate the minimum rate of infiltration obtained for bare soil after prolonged wetting. The HSGs are A (very low runoff potential/high infiltration rate), B, C, and D (high runoff potential/very low infiltration rate)
Hydromodification	The Regional MS4 Permit identifies that increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses.

JRMP	A separate Jurisdictional Runoff Management Plan (JRMP) has been developed by each Copermittee and identifies the local programs and activities that the Copermittee is implementing to meet the Regional MS4 Permit requirements.
LID	Low Impact Development (LID) is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff.
LID BMP	A type of storm water BMP that is based upon Low Impact Development concepts. LID BMPs not only provide highly effective treatment of storm water runoff, but also yield potentially significant reductions in runoff volume – helping to mimic the pre-project hydrologic regime, and also require less ongoing maintenance than Treatment Control BMPs. The applicant may refer to Chapter 2.
LID BMP Design Handbook	The LID BMP Design Handbook was developed by the Copermittees to provide guidance for the planning, design and maintenance of LID BMPs which may be used to mitigate the water quality impacts of PDPs within the County.
LID Bioretention BMP	LID Bioretention BMPs are bioretention areas are vegetated (i.e., landscaped) shallow depressions that provide storage, infiltration, and evapotranspiration, and provide for pollutant removal (e.g., filtration, adsorption, nutrient uptake) by filtering storm water through the vegetation and soils. In bioretention areas, pore spaces and organic material in the soils help to retain water in the form of soil moisture and to promote the adsorption of pollutants (e.g., dissolved metals and petroleum hydrocarbons) into the soil matrix. Plants use soil moisture and promote the drying of the soil through transpiration. The Regional MS4 Permit defines "retain" as to keep or hold in a particular place, condition, or position without discharge to surface waters.
LID Biofiltration BMP	BMPs that reduce stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration, and other biological and chemical processes. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and plants, and collected through an underdrain.
LID Harvest and Reuse BMP	BMPs used to facilitate capturing storm water runoff for later use without negatively impacting downstream water rights or other Beneficial Uses.

LID Infiltration BMP	BMPs to reduce storm water runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Typical LID Infiltration BMPs include infiltration basins, infiltration trenches and pervious pavements.
LID Retention BMP	BMPs to ensure full onsite retention without runoff of the DCV such as infiltration basins, bioretention, chambers, trenches, permeable pavement and pavers, harvest and reuse.
LID Principles	Site design concepts that prevent or minimize the causes (or drivers) of post-construction impacts, and help mimic the pre-development hydrologic regime.
MEP	Maximum Extent Practicable - standard established by the 1987 amendments to the Clean Water Act (CWA) for the reduction of Pollutant discharges from MS4s. Refer to Attachment C of the Regional MS4 Permit for a complete definition of MEP.
MF	Multi-family – zoning classification for parcels having 2 or more living residential units.
MS4	Municipal Separate Storm Sewer System (MS4) is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.
New Development Project	Defined by the Regional MS4 Permit as 'Priority Development Projects' if the project, or a component of the project meets the categories and thresholds described in Section 1.1.1.
NPDES	National Pollution Discharge Elimination System - Federal program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project - Includes New Development and Redevelopment project categories listed in Provision E.3.b of the Regional MS4 Permit.

Priority Pollutants of Concern	Pollutants expected to be present on the project site and for which a downstream water body is also listed as Impaired under the CWA Section 303(d) list or by a TMDL.
Project-Specific WQMP	A plan specifying and documenting permanent LID Principles and storm water BMPs to control post-construction Pollutants and storm water runoff for the life of the PDP, and the plans for operation and maintenance of those BMPs for the life of the project.
Receiving Waters	Waters of the United States.
Redevelopment Project	The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair. Project that meets the criteria described in Section 1.
Runoff Fund	Runoff Funds have not been established by the Copermittees and are not available to the Applicant. If established, a Runoff Fund will develop regional mitigation projects where PDPs will be able to buy mitigation credits if it is determined that implementing onsite controls is infeasible.
San Diego Regional Board	San Diego Regional Water Quality Control Board - The term "Regional Board", as defined in Water Code section 13050(b), is intended to refer to the California Regional Water Quality Control Board for the San Diego Region as specified in Water Code Section 13200. State agency responsible for managing and regulating water quality in the SMR.
SCCWRP	Southern California Coastal Water Research Project
Site Design BMP	Site design BMPs prevent or minimize the causes (or drivers) of post-construction impacts, and help mimic the pre-development hydrologic regime.
SF	Parcels with a zoning classification for a single residential unit.
SMC	Southern California Stormwater Monitoring Coalition
SMR	The Santa Margarita Region (SMR) represents the portion of the Santa Margarita Watershed that is included within the County of Riverside.

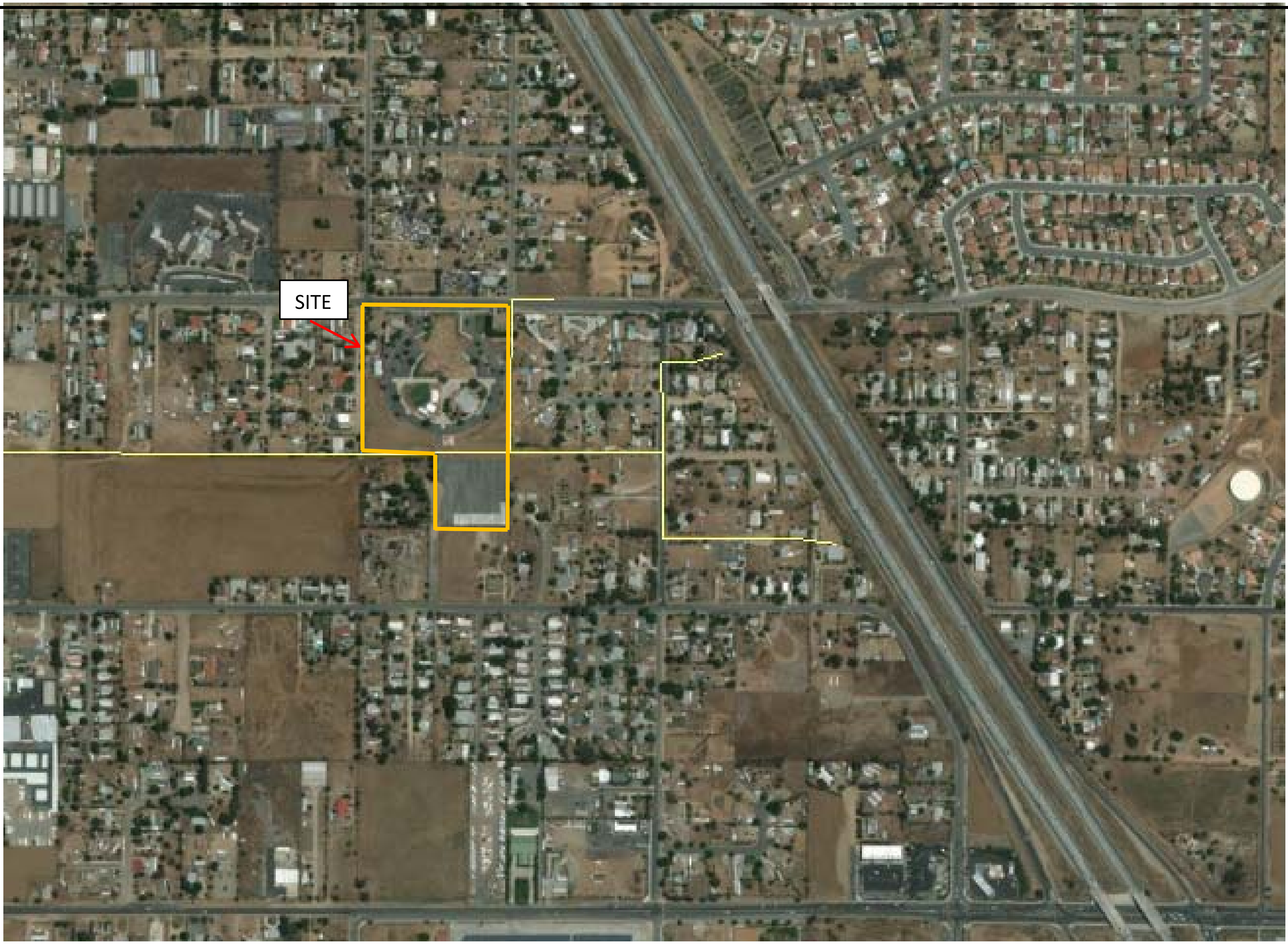
Source Control BMP	Source Control BMPs land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between Pollutants and runoff.
Structural BMP	Structures designed to remove pollutants from stormwater runoff and mitigate hydromodification impacts.
SWPPP	Storm Water Pollution Prevention Plan
Tentative Tract Map	Tentative Tract Maps are required for all subdivision creating five (5) or more parcels, five (5) or more condominiums as defined in Section 783 of the California Civil Code, a community apartment project containing five (5) or more parcels, or for the conversion of a dwelling to a stock cooperative containing five (5) or more dwelling units.
TMDL	Total Maximum Daily Load - the maximum amount of a Pollutant that can be discharged into a waterbody from all sources (point and non-point) and still maintain Water Quality Standards. Under CWA Section 303(d), TMDLs must be developed for all waterbodies that do not meet Water Quality Standards after application of technology-based controls.
USEPA	United States Environmental Protection Agency
Volume-Based BMP	Volume-Based BMPs applies to BMPs where the primary mode of pollutant removal depends upon the volumetric capacity such as detention, retention, and infiltration systems.
WQMP	Water Quality Management Plan
Wet Season	The Regional MS4 Permit defines the wet season from October 1 through April 30.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

Complete the checklist below to verify all exhibits and components are included in the Project-Specific WQMP. Refer Section 4 of the SMR WQMP and Section D of this Template.

Map and Site Plan Checklist
Indicate all Maps and Site Plans are included in your Project-Specific WQMP by checking the boxes below.
☒ Vicinity and Location Map
☒ Existing Site Map (unless exiting conditions are included in WQMP Site Plan)
☒ WQMP Site Plan
☒ Parcel Boundary and Project Footprint
☒ Existing and Proposed Topography
☒ Drainage Management Areas (DMAs)
☒ Proposed Structural Best Management Practices (BMPs)
☒ Drainage Paths
☒ Drainage infrastructure, inlets, overflows
☒ Source Control BMPs
☒ Site Design BMPs
☒ Buildings, Roof Lines, Downspouts
☒ Impervious Surfaces
☒ Pervious Surfaces (i.e. Landscaping)
☒ Standard Labeling



VICINITY MAP

St. Frances of Rome Church Project
21591 Lemon Street
Wildomar, California

CG Resource Management and Engineering

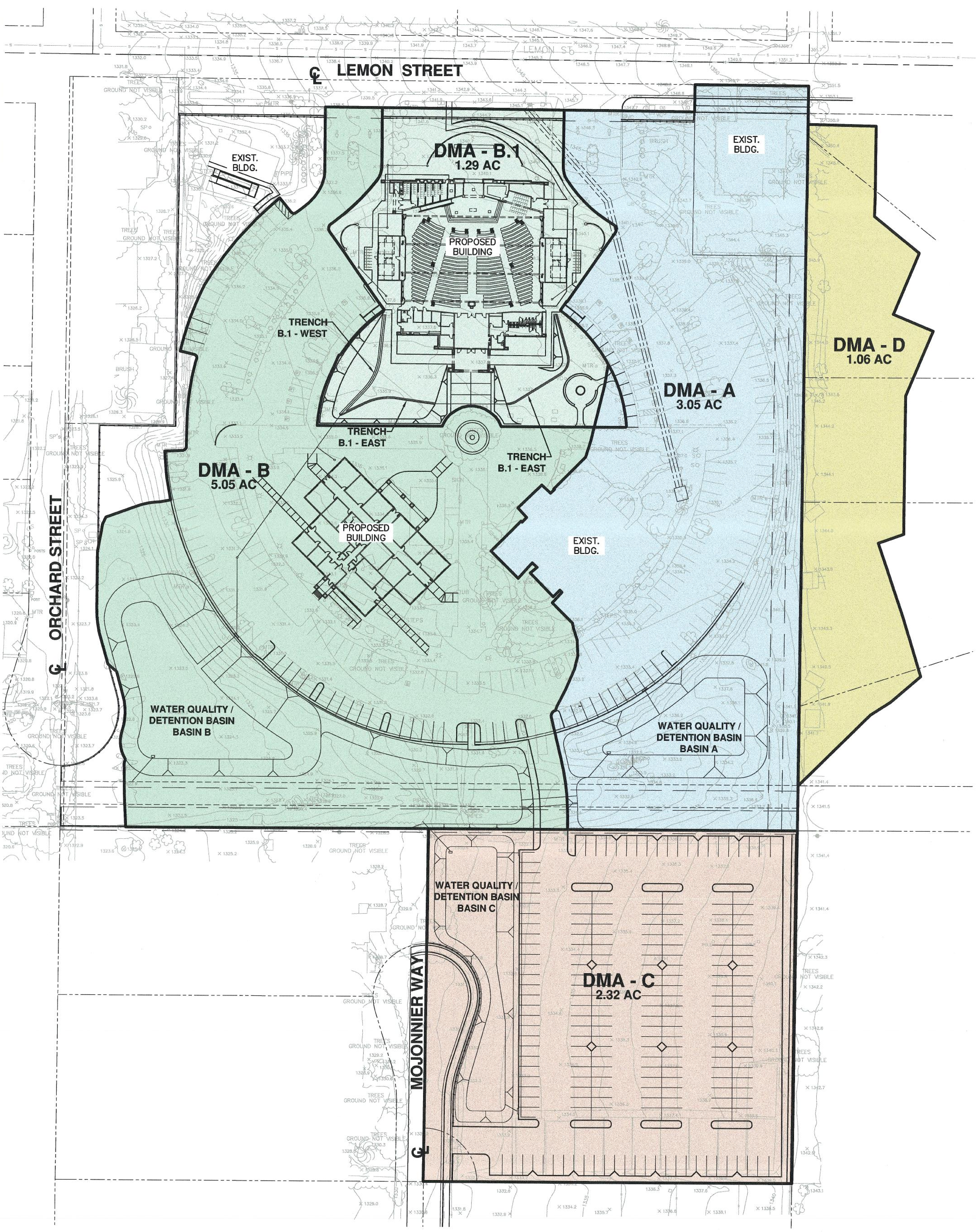
Flow path

Receiving Waters Map

St. Frances Church
21591 Lemon Street
Wildomar, California

CG Resource Management and Engineering

IN THE CITY OF WILDOMAR
DMA & BMP MAP
PRELIMINARY SITE PLAN



VICINITY MAP

SCALE: 1 INCH = 40 FEET (0, 20, 40, 80, 120, 160)

REGISTERED PROFESSIONAL ENGINEER — WILLIAM J. McKEEVER — No. 22502 — Exp. 12-31-19 — CIVIL — STATE OF CALIFORNIA

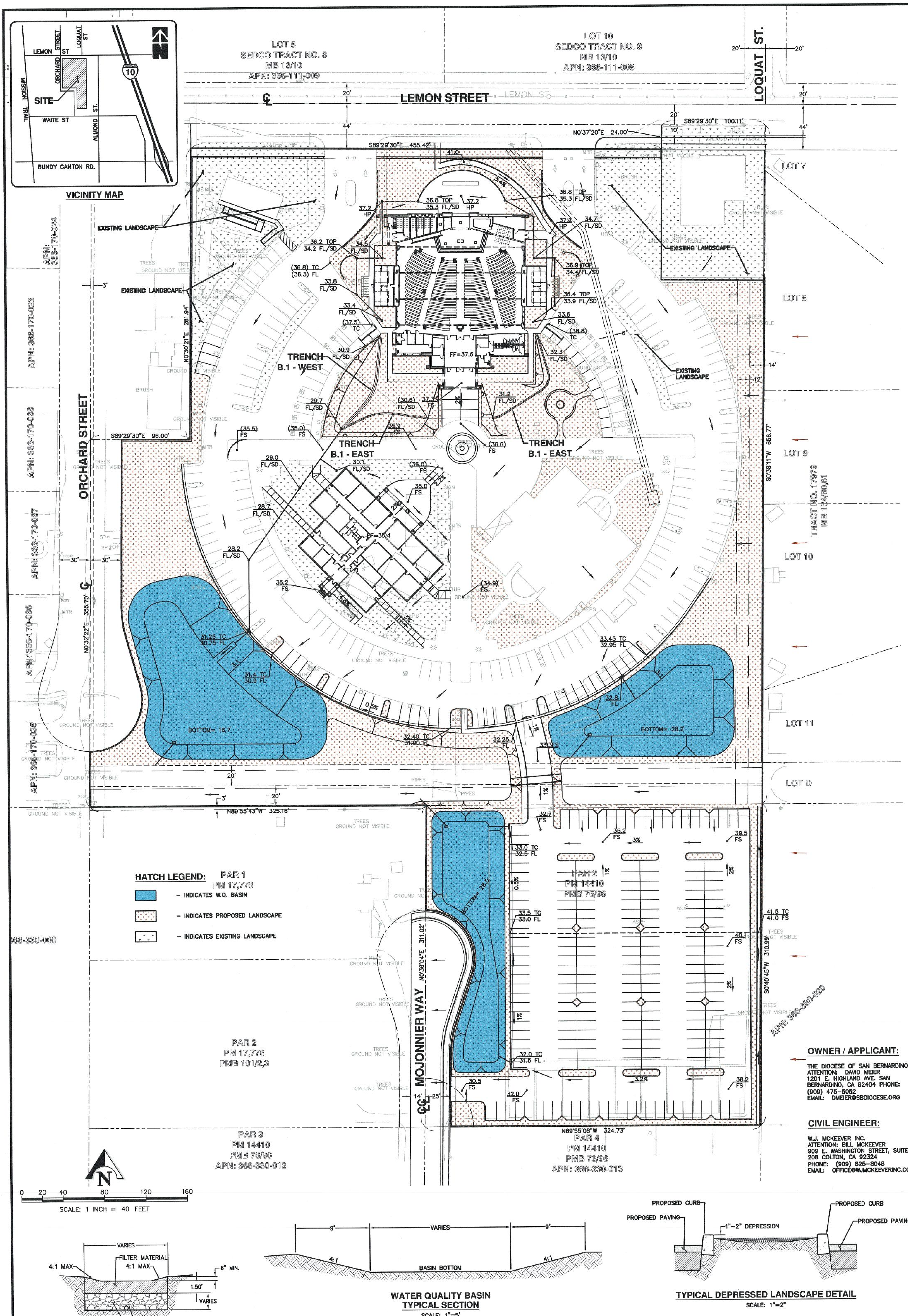
REVISIONS			
NO.	DESCRIPTION	DATE	APPROVED

W.J. McKEEVER, INC.
CIVIL ENGINEERING
900 E. WASHINGTON STREET, SUITE 208 COLTON, CA 92324
PH:(909) 825-8048 FAX:(909) 825-8639
EMAIL: OFFICE@WJMCKEEVERINC.COM
PREPARED BY: WILLIAM J. McKEEVER
R.C.E. NO. 22502
DATE: 8/14/19

IN THE CITY OF WILDOMAR
DMA & BMP MAP
PRELIMINARY SITE PLAN
ST. FRANCES OF ROME CATHOLIC CHURCH
21591 LEMON ST.
WILDOMAR, CA 92595

SHEET NO. 1 OF 1

PLOT DATE: 8/13/19



SEAL-ENGINEER

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-19 CIVIL STATE OF CALIFORNIA

W.J. McKEEVER, INC.
CIVIL ENGINEERING
900 E. WASHINGTON STREET, SUITE 208 COLTON, CA 92324
PH:(909) 825-8048 FAX:(909) 825-8639
EMAIL: OFFICE@WJMCKEEVERINC.COM

PREPARED BY: WILLIAM J. McKEEVER
R.C.E. NO. 22502
DATE: 8/14/19

PRELIMINARY WQMP SITE PLAN
ST. FRANCES OF ROME CATHOLIC CHURCH

21591 LEMON ST.
WILDOMAR, CA 92595

SHEET NO. 1
OF 1 SHEETS

PLOT DATE: 8/13/19

Appendix 2: Construction Plans

Grading and Drainage Plans

Examples of material to provide in Appendix 2 may include but are not limited to the following:

- Site grading plans from the Project's Civil Plan Set,
- Drainage plans showing the exiting condition and proposed drainage system from the project's drainage report,
- Other plan sheets containing elements that impact site grading and drainage.

Refer to Section 4 of the SMR WQMP and Section I of this Template.

Appendix 3: Soils Information

Geotechnical Study, Other Infiltration Testing Data, and/or Other Documentation

Examples of material to provide in Appendix 3 may include but are not limited to the following:

- Geotechnical Study/Report prepared for the project,
- Additional soils testing data (if not included in the Geotechnical Study),
- Exhibits/Maps/Other Documentation of the Hydrologic Soils Groups (HSG)s at the project site.

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 2.3 of the SMR WQMP and Sections A and D of this Template.

Geotechnical Report

New Church @ St. Frances of Rome

Wildomar, California

Prepared for:

Diocese of San Bernardino
1201 E Highland Avenue
San Bernardino, CA 92404

LANDMARK
Geo-Engineers and Geologists

Prepared by:

LandMark Consultants, Inc.
77-948 Wildcat Drive
Palm Desert, CA 92211
(760) 360-0665

April 2016

LANDMARK
Geo-Engineers and Geologists
a MBE Company

780 N. 4th Street
El Centro, CA 92243
(760) 370-3000
(760) 337-8900 fax

77-948 Wildcat Drive
Palm Desert, CA 92211
(760) 360-0665
(760) 360-0521 fax

April 25, 2016

Mr. David E. Meir
Diocese of San Bernardino
1201 E. Highland Avenue
San Bernardino, CA 92404

Geotechnical Report
New Church @ St Frances of Rome
Wildomar, California
LCI Report No. LP16027

Dear Mr. Meir:

The attached geotechnical report is provided for design and construction of the proposed new church at St Frances of Rome, 21591 Lemon Street, Wildomar, California. Our geotechnical investigation was conducted in response to your request for our services. The enclosed report describes our soil engineering investigation and presents our professional opinions regarding geotechnical conditions at the site.

The findings of this study indicate the site is underlain by interbedded silty sands with traces of gravels and silty sands, with near surface silty sands with traces of gravels. The near surface, silty sands are expected to be low to non-expansive. The subsurface soils are loose to medium dense in nature. Groundwater was not encountered in the borings (51.5 feet) during the time of exploration.

Elevated sulfate and chloride levels were not encountered in the soil samples tested for this study. However, the soil is severely corrosive to metal. We recommend a minimum of 2,500 psi concrete of Type II Portland Cement with a maximum water/cement ratio of 0.60 (by weight) should be used for concrete placed in contact with native soils of this project.

Evaluation of liquefaction potential at the site indicates that it is unlikely that the subsurface soil will liquefy under seismically induced ground shaking since groundwater is believed to be deeper than 50 feet. No mitigation is required for liquefaction effects at this site.

Seismic settlements of the dry sands have been calculated to be approximately ½ to 1 inch based on the field exploration data. Total seismic settlements are not expected to exceed an inch with differential settlements approximately ¼ to ½ inch.

We did not encounter soil conditions that would preclude developing the new church at the site provided the professional opinions contained in this report are implemented in the design and construction of this project. Our findings, professional opinions, and application options are related ***only through reading the full report***, and are best evaluated with the active participation of the engineer of record who developed them.

We appreciate the opportunity to provide our findings and professional opinions regarding geotechnical conditions at the site. If you have any questions or comments regarding our findings, please call our office at (760) 360-0665.

Respectfully Submitted,
LandMark Consultants, Inc.

REGISTERED PROFESSIONAL ENGINEER
GREG M. CHANDRA
No. C 34432
CIVIL
STATE OF CALIFORNIA

Greg M. Chandra, P.E., M.ASCE
Principal Engineer

Distribution:
Client (electronic copy)

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Section 1
INTRODUCTION

1.1 Project Description

This report presents the findings of our geotechnical exploration and laboratory evaluation of recovered soils for the proposed new church building located in northern portion of St Frances of Rome, 21591 Lemon Street, Wildomar, California (See Vicinity Map, Plate A-1). The proposed development will consist of 1,200 seats new church building, additional car parking areas and other on-site improvements on the existing complex. A site plan for the proposed development was provided by W.J. Mckeever Inc.

The structure is planned to consist of wood and metal frame construction founded on shallow concrete footings and concrete slabs-on-grade. Footing loads at exterior bearing walls are estimated at 2 to 10 kips per lineal foot. Column loads are estimated to range from 5 to 60 kips. If structural loads exceed those stated above, we should be notified so we may evaluate their impact on foundation settlement and bearing capacity. Site development will include mass grading, building pad preparation, underground utility installation, parking lots construction, sidewalk placement, landscape areas and retention basins.

1.2 Purpose and Scope of Work

The purpose of this geotechnical study was to investigate the upper 11.5 to 51.5 feet of subsurface soil at selected locations within the site for evaluation of in-situ soil strength and physical/engineering properties. Professional opinions report regarding geotechnical conditions at this site and the effect on design and construction were developed from field exploration and laboratory evaluation of recovered soils. The scope of our services consisted of the following:

- Field exploration and in-situ testing of the site soils at selected locations and depths.
- Laboratory testing for physical and/or chemical properties of selected recovered soil samples.
- Review of literature and publications pertaining to local geology, faulting, and seismicity.
- Engineering analysis and evaluation of the data collected.

< Preparation of this report presenting our findings and professional opinion regarding the geotechnical aspects of project design and construction.

This report addresses the following geotechnical parameters:

< Subsurface soil and groundwater conditions
< Site geology, regional faulting and seismicity, near-source seismic factors, and site seismic accelerations
< Liquefaction potential
< Hydro-Collapse potential
< Expansive soil and methods of mitigation
< Aggressive soil conditions to metals and concrete
< Soil percolation rates of the native soil for retention basin areas

Professional opinions with regard to the above parameters are presented for the following:

< Mass grading and earthwork
< Building pad and foundation subgrade preparation
< Allowable soil bearing pressures and expected settlements
< Deep Foundations (drilled piers)
< Concrete slabs-on-grade
< Mitigation of the potential effects of salt concentrations in native soil to concrete mixes and steel reinforcement
< Excavation conditions and buried utility installations
< Lateral earth pressures
< Seismic design parameters
< Preliminary Pavement structural sections

Our scope of work for this report did not include an evaluation of the site for the presence of environmentally hazardous materials or conditions.

1.3 Authorization

Mr. David E. Meir of the Diocese of San Bernardino provided authorization by written agreement to proceed with our work on February 19, 2016. We conducted our work according to our written proposal dated January 27, 2016.

Section 2
METHODS OF INVESTIGATION

2.1 Field Exploration

Subsurface exploration was performed on March 15, 2016 using 2R Drilling of Ontario California to advance five (5) borings to depths of 11.5 to 51.5 feet below existing ground surface. The borings were advanced with a truck-mounted, CME 75 drill rig using 8-inch diameter, hollow-stem, continuous-flight augers. The approximate boring locations were established in the field and plotted on the site map by sighting to discernable site features. The boring locations are shown on the Site and Exploration Plan (Plate A-2).

A staff engineer observed the drilling operations and maintained a log of the soil encountered and sampling depths, visually classified the soil encountered during drilling in accordance with the Unified Soil Classification System, and obtained drive tube and bulk samples of the subsurface materials at selected intervals. Relatively undisturbed soil samples were retrieved using a 2-inch outside diameter (OD) split-spoon sampler or a 3-inch OD Modified California Split-Barrel (ring) sampler. The samples were obtained by driving the sampler ahead of the auger tip at selected depths.

The drill rig was equipped with a 140-pound CME automatic hammer with a 30-inch drop for conducting Standard Penetration Tests (SPT) in accordance with ASTM D1586. The number of blows required to drive the samplers the last 12 inches of an 18 inch drive length into the soil is recorded on the boring logs as "blows per foot". Blow count reported on the boring logs represent the field blow counts. No corrections have been applied for effects of overburden pressure, automatic hammer drive energy, drill rod lengths, liners, and sampler diameter.

After logging and sampling the soil, the exploratory borings were backfilled with the excavated material. The backfill was loosely placed and was not compacted to the requirements specified for engineered fill.

The subsurface logs are presented on Plates B-1 through B-6 in Appendix B. A key to the log symbols is presented on Plate B-7. The stratification lines shown on the subsurface logs represent the approximate boundaries between the various strata. However, the transition from one stratum to another may be gradual over some range of depth.

2.2 Laboratory Testing

Laboratory tests were conducted on selected bulk and relatively undisturbed soil samples to aid in classification and evaluation of selected engineering properties of the site soils. The tests were conducted in general conformance to the procedures of the American Society for Testing and Materials (ASTM) or other standardized methods as referenced below. The laboratory testing program consisted of the following tests:

< Particle Size Analyses (ASTM D422) – used for soil classification and liquefaction evaluation.

< Unit Dry Densities (ASTM D2937) and Moisture Contents (ASTM D2216) – used for insitu soil parameters.

< Moisture-Density Relationship (ASTM D1557) – used for soil compaction determinations.

< Direct Shear (ASTM D3080) – used for soil strength determination.

< Chemical Analyses (soluble sulfates & chlorides, pH, and resistivity) (Caltrans Methods) – used for concrete mix evaluations and corrosion protection requirements.

The laboratory test results are presented on the subsurface logs and on Plates C-1 through C-4 in Appendix C.

Engineering parameters of soil strength, compressibility and relative density utilized for developing design criteria provided within this report were either extrapolated from data obtained from the field and laboratory testing program.

Section 3
DISCUSSION

3.1 Site Conditions

The project site is rectangular-shaped in plan view, is relatively flat-lying slopes gently to the north, and consists of approximately 9.5 acres of existing St Frances of Rome wordship complex. The site is bounded by Lemon Street to the north and Orchird Street to the west. Residential homes are surrounding the complex and these properties are flat-lying and are approximately at the same elevation with this site.

The project site lies at an elevation between approximately 1,330 and 1,345 feet above mean sea level (MSL) in the French Valley of Southern California. Annual average rainfall in this region is approximately 11 inches with average summertime temperature highs above 90ºF and lows in the mid 50's to low 60's. Average winter temperature highs are in the high 60's with lows in mid 30's to low 40's.

3.2 Geologic Setting

The project site is located within the French Valley, which is located to the east/northeast of the Elsinore-Temecula Trough and to the south of the Perris Plain within the Peninsular Ranges geomorphic province. The Peninsular Ranges are one of the largest geologic units in western North America. They extend 200 kilometers (125 miles) from the Transverse Ranges and the Los Angeles Basin south to the Mexican border and beyond another 1,250 kilometers (775 miles) to the tip of Baja California. The total province varies in width from 48 to 160 Kilometers (30-100 miles) (Norris & Webb, 1976).

The Peninsular Ranges are a northwest-southeast oriented complex of blocks separated by similarly trending faults (Norris & Webb, 1976). Major faults of the Peninsular Ranges are the San Jacinto and related branches within the San Jacinto zone and the Elsinore and associated faults within the Elsinore zone.

The Elsinore-Temecula trough, located to the west/southwest of the project site, is a linear, low-lying block northeast of the Santa Ana Mountains and southwest of the Perris Plain. It extends from

Corona on the northwest about 30 miles (48 km) southeast and has a maximum width of 3 miles (4.8 km). The Perris Plain, located to the north of the project site, is a major topographic feature between the San Jacinto (northeast) and Elsinore (southwest) fault zones. The plain is a broad, nearly flat surface dotted with bedrock hills extending from near Corona southeasterly to Hemet. The average elevation of the Perris Plain is 520 meters (1,700 feet) (Norris & Webb, 1976). The nearby hills to the project site are composed of Mesozoic granitic rocks, Mesozoic intrusive rocks, and upper Jurassic marine rocks. Figure 1 shows the location of the site in relation to regional faults and physiographic features.

The surrounding regional geology includes the San Jacinto and Santa Rosa Mountains to the east/southeast, the Santa Ana Mountains to the west/northwest, the Elsinore Fault zone to the southwest, and the San Jacinto Fault zone to the northeast. Lake Elsinore is located to the west of the project site.

3.3 Subsurface Soil

Subsurface soils encountered during the field exploration conducted on March 15, 2016 consist of dominantly medium dense to dense, silty sands (SM) to a depth of 51.5 feet, the maximum depth of exploration. The near surface soils are granular and non-expansive in nature. The subsurface logs (Plates B-1 through B-6) depict the stratigraphic relationships of the various soil types.

3.4 Groundwater

Groundwater was not encountered in the borings during the time of exploration. Groundwater levels may fluctuate with precipitation, irrigation of adjacent properties, drainage, and site grading. The groundwater level noted should not be interpreted to represent an accurate or permanent condition. Based on the regional topography, groundwater flow is assumed to be generally towards the east to southeast within the site area. Flow directions may vary locally in the vicinity of the site.

Historic groundwater records in the vicinity of the project site indicate that groundwater has fluctuated between 10 to 31 feet below the ground surface within the past 40 years according to The California Department of Water Resources, Division of Planning and Local Assistance web site.

3.5 Faulting

The project site is located in the seismically active French Valley of southern California with numerous mapped faults of the Elsinore Fault Zone traversing the region. We have performed a computer-aided search of known faults or seismic zones that lie within a 62 mile (100 kilometer) radius of the project site (Table 1).

A fault map illustrating known active faults relative to the site is presented on Figure 1, *Regional Fault Map*. Figure 2 shows the project site in relation to local faults. The criterion for fault classification adopted by the California Geological Survey defines Earthquake Fault Zones along active or potentially active faults. An active fault is one that has ruptured during Holocene time (roughly within the last 11,000 years). A fault that has ruptured during the last 1.8 million years (Quaternary time), but has not been proven by direct evidence to have not moved within Holocene time is considered to be potentially active. A fault that has not moved during Quaternary time is considered to be inactive.

Review of the current Alquist-Priolo Earthquake Fault Zone maps (CGS, 2000a) indicates that the nearest mapped Earthquake Fault Zone is the Elsinore-Temecula fault located approximately 1.5 miles southwest of the project site. Riverside County fault maps indicate that the nearest Riverside County mapped fault is the Glen Ivy segment of the Elsinore Fault Zone located approximately 0.2 miles southwest of the project site. A portion of the project site lies within the County Fault Zone boundary and may require additional evaluation.

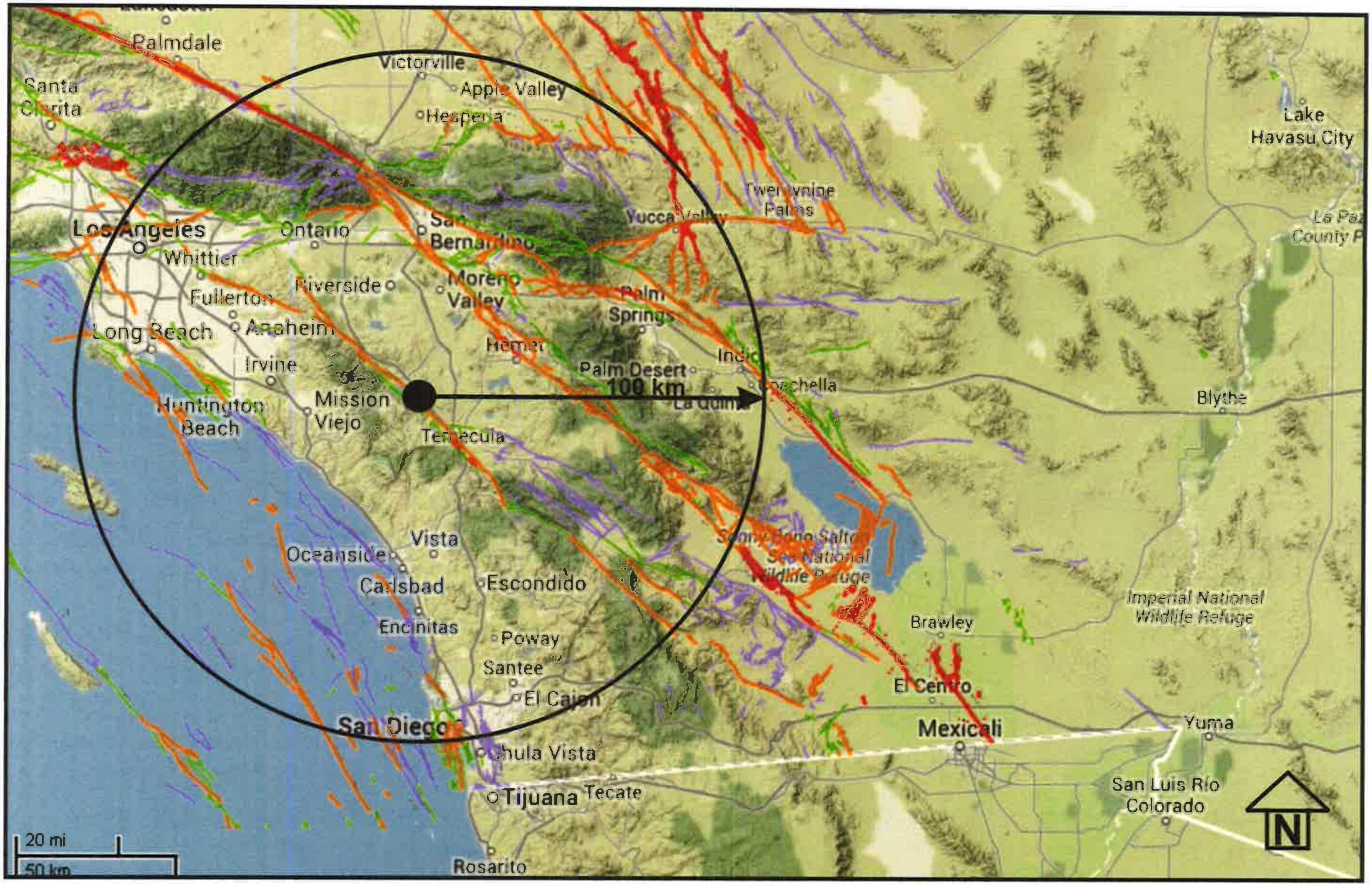
3.6 General Ground Motion Analysis

The project site is considered likely to be subjected to moderate to strong ground motion from earthquakes in the region. Ground motions are dependent primarily on the earthquake magnitude and distance to the seismogenic (rupture) zone. Acceleration magnitudes also are dependent upon attenuation by rock and soil deposits, direction of rupture and type of fault; therefore, ground motions may vary considerably in the same general area.

Table 1
Summary of Characteristics of Closest Known Active Faults

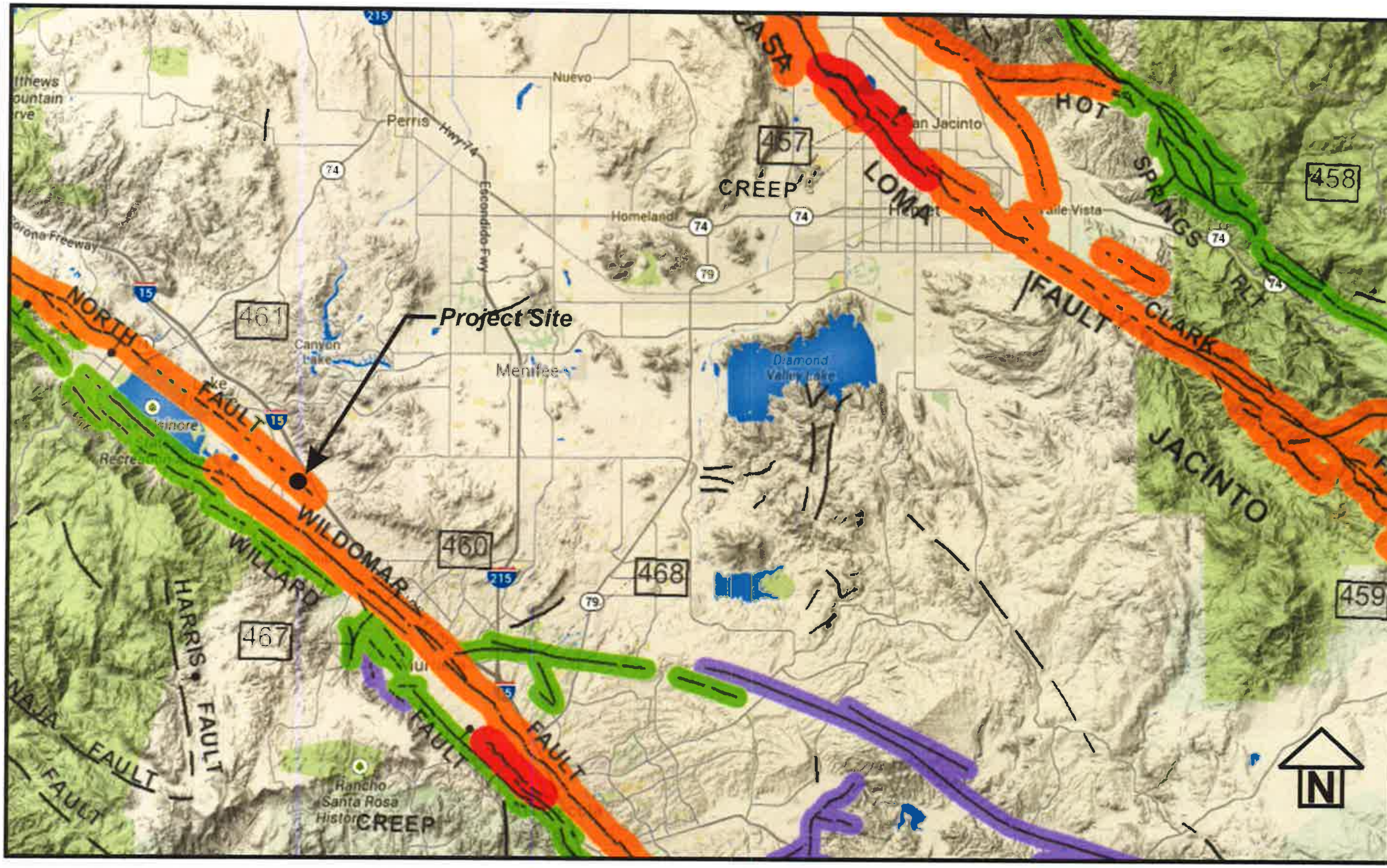
Fault Name	Approximate Distance (miles)	Approximate Distance (km)	Maximum Moment Magnitude (Mw)	Fault Length (km)	Slip Rate (mm/yr)
Elsinore - Glen Ivy	0.2	0.3	6.8	36 ± 4	5 ± 2
Elsinore - Temecula	1.5	2.4	6.8	43 ± 4	5 ± 2
Whittier	16.8	26.9	6.8	38 ± 4	2.5 ± 1
Chino Avenue	18.5	29.6	6.7	28 ± 3	1 ± 1
San Jacinto - San Jacinto Valley	22.0	35.1	6.9	43 ± 4	12 ± 6
San Jacinto - Anza	22.1	35.4	7.2	91 ± 9	12 ± 6
San Joaquin Hills	22.4	35.8	6.6	28 ± 3	0.5 ± 0.2
Elsinore - Julian	24.0	38.5	7.1	76 ± 8	5 ± 2
San Jacinto - San Bernardino	26.8	42.9	6.7	36 ± 4	12 ± 6
Newport-Inglewood (offshore)	28.8	46.0	7.1	66 ± 7	1.5 ± 0.5
San Andreas - San Bernardino (South)	34.1	54.6	7.4	103 ± 10	30 ± 7
Rose Canyon	35.1	56.1	7.2	70 ± 7	1.5 ± 0.5
Newport-Inglewood	36.7	58.7	7.1	66 ± 7	1 ± 0.5
Cucamonga	39.0	62.4	6.9	28 ± 3	5 ± 2
Puente Hills Blind Thrust	39.4	63.1	7.1	44 ± 4	0.7 ± 0.4
Garnet Hill *	40.0	64.1			
San Jose	40.4	64.6	6.4	20 ± 2	0.5 ± 0.5
Sierra Madre	42.7	68.4	7.2	57 ± 6	2 ± 1
Pinto Mtn.	43.7	69.9	7.2	74 ± 7	2.5 ± 2
Cleghorn	44.4	71.0	6.5	25 ± 3	3 ± 2
Coronado Bank	44.9	71.9	7.6	185 ± 19	3 ± 1
Palos Verdes	45.0	72.1	7.3	96 ± 10	3 ± 1

* Note: Faults not included in CGS database.



Source: California Geological Survey 2010 Fault Activity Map of California
http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#

LANDMARK Geo-Engineers and Geologists Project No.: LP16027	Regional Fault Map	Figure 1



Source: California Geological Survey 2010 Fault Activity Map of California
http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#

LANDMARK
Geo-Engineers and Geologists
Project No.: LP16027

Map of Local Faults

Figure 2

EXPLANATION

Fault traces on land are indicated by solid lines where well located, by dashed lines where approximately located or inferred, and by dotted lines where concealed by younger rocks or by lakes or bays. Fault traces are queried where continuation or existence is uncertain. Concealed faults in the Great Valley are based on maps of selected subsurface horizons, so locations shown are approximate and may indicate structural trend only. All offshore faults based on seismic reflection profile records are shown as solid lines where well defined, dashed where inferred, queried where uncertain.

FAULT CLASSIFICATION COLOR CODE
(Indicating Recency of Movement)

Fault along which historic (last 200 years) displacement has occurred and is associated with one or more of the following:

(a) a recorded earthquake with surface rupture. (Also included are some well-defined surface breaks caused by ground shaking during earthquakes, e.g. extensive ground breakage, not on the White Wolf fault, caused by the Arvin-Tehachapi earthquake of 1952). The date of the associated earthquake is indicated. Where repeated surface ruptures on the same fault have occurred, only the date of the latest movement may be indicated, especially if earlier reports are not well documented as to location of ground breaks.

(b) fault creep slippage - slow ground displacement usually without accompanying earthquakes.

(c) displaced survey lines.

A triangle to the right or left of the date indicates termination point of observed surface displacement. Solid red triangle indicates known location of rupture termination point. Open black triangle indicates uncertain or estimated location of rupture termination point.

Date bracketed by triangles indicates local fault break.

No triangle by date indicates an intermediate point along fault break.

Fault that exhibits fault creep slippage. Hachures indicate linear extent of fault creep. Annotation (creep with leader) indicates representative locations where fault creep has been observed and recorded.

Square on fault indicates where fault creep slippage has occured that has been triggered by an earthquake on some other fault. Date of causative earthquake indicated. Squares to right and left of date indicate terminal points between which triggered creep slippage has occurred (creep either continuous or intermittent between these end points).

Holocene fault displacement (during past 11,700 years) without historic record. Geomorphic evidence for Holocene faulting includes sag ponds, scarps showing little erosion, or the following features in Holocene age deposits: offset stream courses, linear scarps, shutter ridges, and triangular faceted spurs. Recency of faulting offshore is based on the interpreted age of the youngest strata displaced by faulting.

Late Quaternary fault displacement (during past 700,000 years). Geomorphic evidence similar to that described for Holocene faults except features are less distinct. Faulting may be younger, but lack of younger overlying deposits precludes more accurate age classification.

Quaternary fault (age undifferentiated). Most faults of this category show evidence of displacement sometime during the past 1.6 million years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age. Unnumbered Quaternary faults were based on Fault Map of California, 1975. See Bulletin 201, Appendix D for source data.

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement. Some faults are shown in this category because the source of mapping used was of reconnaissnce nature, or was not done with the object of dating fault displacements. Faults in this category are not necessarily inactive.

ADDITIONAL FAULT SYMBOLS

Bar and ball on downthrown side (relative or apparent).

Arrows along fault indicate relative or apparent direction of lateral movement.

Arrow on fault indicates direction of dip.

Low angle fault (barbs on upper plate). Fault surface generally dips less than 45° but locally may have been subsequently steepened. On offshore faults, barbs simply indicate a reverse fault regardless of steepness of dip.

OTHER SYMBOLS

Numbers refer to annotations listed in the appendices of the accompanying report. Annotations include fault name, age of fault displacement, and pertinent references including Earthquake Fault Zone maps where a fault has been zoned by the Alquist-Priolo Earthquake Fault Zoning Act. This Act requires the State Geologist to delineate zones to encompass faults with Holocene displacement.

Structural discontinuity (offshore) separating differing Neogene structural domains. May indicate discontinuities between basement rocks.

Brawley Seismic Zone, a linear zone of seismicity locally up to 10 km wide associated with the releasing step between the Imperial and San Andreas faults.

Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION: ON LAND	DESCRIPTION: OFFSHORE
Quaternary	Late Quaternary	Historic				Displacement during historic time (e.g. San Andreas fault 1906) Includes areas of known fault creep.	
			200				
		Holocene				Displacement during Holocene time	Fault offsets seafloor sediments or strata of Holocene age
			11,700				
		Pleistocene				Faults showing evidence of displacement during late Quaternary time	Fault cuts strata of Late Pleistocene age
			700,000				
	Early Quaternary					Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years, possible exceptions are faults which displace rocks of undifferentiated Plio Pleistocene age	Fault cuts strata of Quaternary age
			1,600,000*				
Pre-Quaternary						Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.
			4.5 billion (Age of Earth)				

* Quaternary now recognized as extending to 2.6 Ma (Walker and Geissman, 2009). Quaternary faults in this map were established using the previous 1.6 Ma criterion.

CBC General Ground Motion Parameters: The 2013 CBC general ground motion parameters are based on the Risk-Targeted Maximum Considered Earthquake (MCE_R). The U.S. Geological Survey "U.S. Seismic Design Maps Web Application" (USGS, 2014) was used to obtain the site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters. The site soils have been classified as Site Class D (stiff soil profile). Design spectral response acceleration parameters are defined as the earthquake ground motions that are two-thirds (2/3) of the corresponding MCE_R ground motions. Design earthquake ground motion parameters are provided in Table 2. ***A Risk Category II was determined using Table 1604.5 and the Seismic Design Category is E since S_1 is greater than 0.75.***

The Maximum Considered Earthquake Geometric Mean (MCE_G) peak ground acceleration (PGA_M) value was determined from the "U.S. Seismic Design Maps Web Application" (USGS, 2013) for liquefaction and seismic settlement analysis in accordance with 2013 CBC Section 1803.5.12 and CGS Note 48 ($PGA_M = F_{PGA}$*PGA). ***A PGA_M value of 0.94g has been determined for the project site.***

3.7 Seismic and Other Hazards

▸ **Groundshaking.** The primary seismic hazard at the project site is the potential for strong groundshaking during earthquakes along the Temecula Segment of the Elsinore Fault Zone. A further discussion of groundshaking follows in Section 3.4.

▸ **Surface Rupture.** The project site does not lie within a State of California, Alquist-Priolo Earthquake Fault Zone. The project site lies within the Riverside County designated fault zone for the Glen Ivy fault segment of the Elsinore Fault. Surface fault rupture is considered to be unlikely at the project site because of the well-delineated fault lines through the French Valley as shown on USGS, CDMG, and Riverside County maps. However, because of the high tectonic activity and deep alluvium of the region, we cannot preclude the potential for surface rupture on undiscovered or new faults that may underlie the site.

▸ **Liquefaction.** Liquefaction is unlikely to be a potential hazard at the site, due to groundwater deeper than 50 feet (the maximum depth that liquefaction is known to occur).

Table 2
2013 California Building Code (CBC) and ASCE 7-10 Seismic Parameters

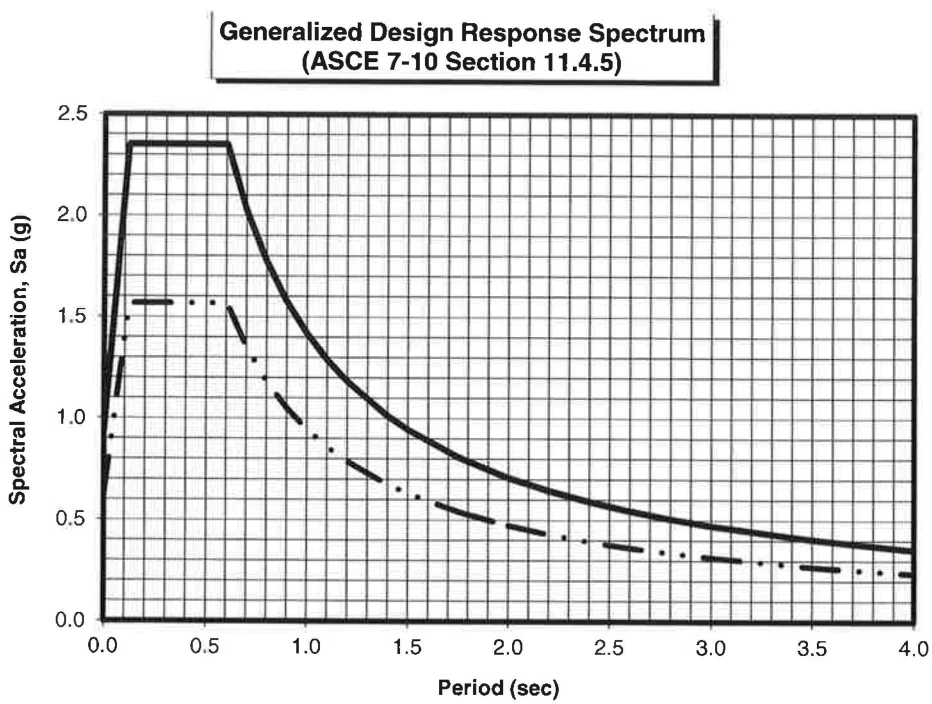
			CBC Reference
Soil Site Class:	**D**		Table 20.3-1
Latitude:	33.6333	N	
Longitude:	-117.2828	W	
Risk Category:	II		
Seismic Design Category:	E		

Maximum Considered Earthquake (MCE) Ground Motion

Mapped MCE_R Short Period Spectral Response	S_s	2.351 g	Figure 1613.3.1(1)	
Mapped MCE_R 1 second Spectral Response	S_1	0.946 g	Figure 1613.3.1(2)	
Short Period (0.2 s) Site Coefficient	F_a	1.00	Table 1613.3.3(1)	
Long Period (1.0 s) Site Coefficient	F_v	1.50	Table 1613.3.3(2)	
MCE_R Spectral Response Acceleration Parameter (0.2 s)	S_{MS}	2.351 g	$= F_a * S_s$	Equation 16-37
MCE_R Spectral Response Acceleration Parameter (1.0 s)	S_{M1}	1.419 g	$= F_v * S_1$	Equation 16-38

Design Earthquake Ground Motion

Design Spectral Response Acceleration Parameter (0.2 s)	S_{DS}	1.567 g	$= 2/3*S_{MS}$	Equation 16-39
Design Spectral Response Acceleration Parameter (1.0 s)	S_{D1}	0.946 g	$= 2/3*S_{M1}$	Equation 16-40
	T_L	8.00 sec		ASCE Figure 22-12
	T_O	0.12 sec	$=0.2*S_{D1}/S_{DS}$	
	T_S	0.60 sec	$=S_{D1}/S_{DS}$	
Peak Ground Acceleration	PGA_M	0.94 g		ASCE Equation 11.8-1



Period T (sec)	Sa (g)	MCE_R Sa (g)
0.00	0.63	0.94
0.12	1.57	2.35
0.60	1.57	2.35
0.70	1.35	2.03
0.80	1.18	1.77
0.90	1.05	1.58
1.00	0.95	1.42
1.10	0.86	1.29
1.20	0.79	1.18
1.20	0.79	1.18
1.40	0.68	1.01
1.50	0.63	0.95
1.75	0.54	0.81
2.00	0.47	0.71
2.20	0.43	0.65
2.40	0.39	0.59
2.60	0.36	0.55
2.80	0.34	0.51
3.00	0.32	0.47
3.50	0.27	0.41
4.00	0.24	0.35

— · · — · · — Design Response Spectra

——— MCE_R Response Spectra

Other Potential Geologic Hazards.

▸ **Landsliding.** The hazard of landsliding is unlikely due to the regional planar topography. No ancient landslides are shown on geologic maps of the region and no indications of landslides were observed during our site investigation.

▸ **Volcanic hazards.** The site is not located in proximity to any known volcanically active area and the risk of volcanic hazards is considered very low.

▸ **Tsunamis, sieches, and flooding.** The site does not lie near any large bodies of water, so the threat of tsunami, sieches, or other seismically-induced flooding is unlikely.

▸ **Expansive soil.** The near surface soils at the project site consist of silty sands which are non-expansive.

3.8 Seismic Settlement

An evaluation of the non-liquefaction seismic settlement potential was performed using the relationships developed by Tokimatsu and Seed (1984, 1987) for dry sands. This method is an empirical approach to quantify seismic settlement using SPT blow counts and PGA estimates from the probabilistic seismic hazard analysis.

The soils beneath the site consist primarily of loose to medium dense silty sands to maximum penetrated. Based on the empirical relationships, total induced settlements are estimated to be on the order or ½ to1 inch in the event of a MCE_G earthquake (0.94g peak ground acceleration). Should settlement occur, buried utility lines and the buildings may not settle equally. Therefore we recommend that utilities, especially at the points of entry to the buildings, be designed to accommodate differential movement.

The computer printouts for the estimates of induced settlement are included in Appendix D.

3.9 Hydroconsolidation

In arid climatic regions, granular soils have a potential to collapse upon wetting. This collapse (hydroconsolidation) phenomena is the result of the lubrication of soluble cements (carbonates) in the soil matrix causing the soil to densify from its loose configuration during deposition.

Based on our experience in the vicinity of the project site, there is a slight risk of collapse upon inundation from at the site. Therefore, development of building foundation is not required to include provisions for mitigating the hydroconsolidation caused by soil saturation from landscape irrigation or broken utility lines.

3.10 Soil Infiltration Rate

A total of four (4) infiltration tests were conducted on March 18, 2016 at the proposed location for the on-site storm-water retention basins as shown on the Site and Exploration Plan (Plate A-2). The infiltration tests were performed to the guideline from Design Handbook for Low Impact Development Best Management Practices, prepared by Riverside County Flood Control and Water Conservation District, Appendix A, Section 2.3, dated September 2011.

The tests were performed using perforated pipes inside an 8-inch diameter flight auger borehole made to depths of approximately 5.0 feet below the existing ground surface, corresponding to the anticipated bottom depth of the stormwater retention basin. The pipes were filled with water and successive readings of drop in water levels were made every 10 minutes for a total elapsed time of 60 minutes, until a stabilization drop was recorded.

The test results indicate that the stabilized soil infiltration rate for the soil ranges from 1.61 to 1.98 inches per hour. A maximum soil infiltration rate of 1.61 inches per hour may be used for the on-site storm-water retention basin design. An oil/water separator should be installed at inlets to the stormwater retention basin to prevent sealing of the basin bottom with silt and oil residues. The field and conversion calculation worksheets are included in Appendix E.

We recommend additional testing should be performed after the completion of rough grading operations, to verify the soil infiltration rate.

Section 4
DESIGN CRITERIA

4.1 Site Preparation

Pre-grade Meeting: Prior to site preparation, a meeting should be held at the site with as a minimum, the owner's representative, grading contractor and geotechnical engineer in attendance.

Clearing and Grubbing: All surface improvements, debris and/or vegetation including grass, trees, and weeds on the site at the time of construction should be removed from the construction area. Root balls should be completely excavated. Organic stripping should be hauled from the site and not used as fill. Any trash, construction debris, concrete slabs, old pavement, landfill, and buried obstructions such as old foundations and utility lines exposed during rough grading should be traced to the limits of the foreign materials and removed. Any excavations resulting from site clearing and grubbing should be dish-shaped to the lowest depth of disturbance and backfilled with engineered fill.

Mass Grading: Prior to placing any fills, the surface 12 inches of soil should be removed, the exposed surface uniformly moisture conditioned to a depth of 8 inches by discing and wetting to ±2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density. Native soils may be used for mass grading, placed in 6 inch maximum lifts, uniformly moisture conditioned to a depth of 8 inches by discing and wetting to ±2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

Building Pad Preparation: The exposed surface soil within the proposed building pad areas should be removed to 30 inches below the lowest foundation grades, or 60 inches below the original grade (whichever is deeper), extending five feet beyond all exterior wall/column lines (including adjacent concrete areas). The exposed sub-grade shall be saturated to a minimum depth of 5 feet and compacted with a vibratory steel drum roller to achieve a minimum compaction of 95% of the maximum dry density. Moisture penetration and compaction should be verified prior to construction of the engineered fill pad.

After achieving the recommended compaction, the engineered building pad may be constructed by placing the removed soils in uniformly moisture conditioned to ±2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

The on-site soils are suitable for use as compacted fill and utility trench backfill. Imported fill soil (if required) should similar to onsite soil or non-expansive, granular soil meeting the USCS classifications of SM, SP-SM, or SW-SM with a maximum rock size of 3 inches. ***The geotechnical engineer should approve imported fill soil sources before hauling material to the site***. Native and imported materials should be placed in lifts no greater than 8 inches in loose thickness, uniformly moisture conditioned to ±2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

In areas other than the building pad which are to receive concrete slabs and asphalt concrete pavement, the ground surface should be over-excavated to a depth of 12 inches, uniformly moisture conditioned to ±2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

Trench Backfill: On-site soil free of debris, vegetation, and other deleterious matter may be suitable for use as utility trench backfill. Backfill within roadways should be placed in layers not more that 6 inches in thickness, uniformly moisture conditioned to ±2% of optimum moisture and mechanically compacted to a minimum of 90% of the ASTM D1557 maximum dry density except for the top 12 inches of the trench which shall be compacted to at least 95%. Native backfill should only be placed and compacted after encapsulating buried pipes with suitable bedding and pipe envelope material.

Pipe envelope/bedding should either be clean sand (Sand Equivalent SE>30) or crushed rock when encountering groundwater. A geotextile filter fabric (Mirafi 140N or equivalent) should be used to encapsulate the crushed rock to reduce the potential for in-washing of fines into the gravel void space. Precautions should be taken in the compaction of the backfill to avoid damage to the pipes and structures.

Adequate site drainage is essential to future performance of the project. Infiltration of excess irrigation water and stormwaters can adversely affect the performance of the subsurface soil at the site. Positive drainage should be maintained away from all structures (5% for 5 feet minimum across unpaved areas) to prevent ponding and subsequent saturation of the native soil. Gutters and downspouts may be considered as a means to convey water away from foundations. If landscape irrigation is allowed next to the building, drip irrigation systems or lined planter boxes should be used. The subgrade soil should be maintained in a moist, but not saturated state, and not allowed to dry out. Drainage should be maintained without ponding.

Observation and Density Testing: All site preparation and fill placement should be continuously observed and tested by a representative of a qualified geotechnical engineering firm. Full-time observation services during the excavation and scarification process is necessary to detect undesirable materials or conditions and soft areas that may be encountered in the construction area. The geotechnical firm that provides observation and testing during construction shall assume the responsibility of "***geotechnical engineer of record***" and, as such, shall perform additional tests and investigation as necessary to satisfy themselves as to the site conditions and the recommendations for site development.

Auxiliary Structures Foundation Preparation: Auxiliary structures such as free standing or retaining walls should have the existing soil beneath the structure foundation prepared in the manner recommended for the building pad except the preparation needed only to extend 30 inches below and beyond the footing.

4.2 Foundations and Settlements

Shallow column footings and continuous wall footings are suitable to support the structures provided they are founded on a layer of properly prepared and compacted soil as described in Section 4.1. The foundations may be designed using an allowable soil bearing pressure of 2,000 psf. The allowable soil pressure may be increased by 20% for each foot of embedment depth in excess of 18 inches and by one-third for short term loads induced by winds or seismic events. The maximum allowable soil pressure at increased embedment depths shall not exceed 2,800 psf.

All exterior and interior] foundations should be embedded a minimum of 18 inches below the building support pad or lowest adjacent final grade, whichever is deeper. Continuous wall footings should have a minimum width of 12 inches. Isolated column footings should have a minimum width of 24 inches. ***Recommended concrete reinforcement and sizing for all footings should be provided by the structural engineer.***

Resistance to horizontal loads will be developed by passive earth pressure on the sides of footings and frictional resistance developed along the bases of footings and concrete slabs. Passive resistance to lateral earth pressure may be calculated using an equivalent fluid pressure of 300 pcf to resist lateral loadings. The top one foot of embedment should not be considered in computing passive resistance unless the adjacent area is confined by a slab or pavement. An allowable friction coefficient of 0.35 may also be used at the base of the footings to resist lateral loading.

Foundation movement under the estimated static loadings and seismic site conditions are estimated to not exceed ¾ inch with differential movement of about two-thirds of total movement for the loading assumptions stated above when the subgrade preparation guidelines given above are followed. Foundation movements under the seismic loading due to dry settlement are provided in Section 3.8 of this report.

4.3 Slabs-On-Grade

Concrete slabs and flatwork should be a minimum of 5 inches thick. Concrete floor slabs may either be monolithically placed with the foundation or dowelled after footing placement. The concrete slabs may be placed on granular subgrade that has been compacted at least 90% relative compaction (ASTM D1557).

American Concrete Institute (ACI) guidelines (ACI 302.1R-04 Chapter 3, Section 3.2.3) provide recommendations regarding the use of moisture barriers beneath concrete slabs. The concrete floor slabs should be underlain by a 10-mil polyethylene vapor retarder that works as a capillary break to reduce moisture migration into the slab section. All laps and seams should be overlapped 6-inches or as recommended by the manufacturer. The vapor retarder should be protected from puncture. The joints and penetrations should be sealed with the manufacturer's recommended adhesive, pressure-sensitive tape, or both. The vapor retarder should extend a minimum of 12 inches into the footing excavations. The vapor retarder should be covered by 4 inches of clean sand (Sand Equivalent SE>30) unless placed on 2.5 feet of granular fill, in which case, the vapor retarder may lie directly on the granular fill with 2 inches of clean sand cover.

Placing sand over the vapor retarder may increase moisture transmission through the slab, because it provides a reservoir for bleed water from the concrete to collect. The sand placed over the vapor retarder may also move and mound prior to concrete placement, resulting in an irregular slab thickness. For areas with moisture sensitive flooring materials, ACI recommends that concrete slabs be placed without a sand cover directly over the vapor retarder, provided that the concrete mix uses a low-water cement ratio and concrete curing methods are employed to compensate for release of bleed water through the top of the slab. The vapor retarder should have a minimum thickness of 15-mil (Stego-Wrap or equivalent).

Concrete slab and flatwork reinforcement should consist of chaired rebar slab reinforcement (minimum of No. 4 bars at 18-inch centers, both horizontal directions) placed at slab mid-height to resist potential swell forces and cracking. ***Slab thickness and steel reinforcement are minimums only and should be verified by the structural engineer/designer knowing the actual project loadings.*** The construction joint between the foundation and any mowstrips/sidewalks placed adjacent to foundations should be sealed with a polyurethane based non-hardening sealant to prevent moisture migration between the joint.

Control joints should be provided in all concrete slabs-on-grade at a maximum spacing (in feet) of 2 to 3 times the slab thickness (in inches) as recommended by American Concrete Institute (ACI) guidelines. All joints should form approximately square patterns to reduce randomly oriented contraction cracks. Contraction joints in the slabs should be tooled at the time of the pour or sawcut (¼ of slab depth) within 6 to 8 hours of concrete placement. Construction (cold) joints in foundations and area flatwork should either be thickened butt-joints with dowels or a thickened keyed-joint designed to resist vertical deflection at the joint. All joints in flatwork should be sealed to prevent moisture, vermin, or foreign material intrusion. Precautions should be taken to prevent curling of slabs in this arid desert region (refer to ACI guidelines).

All independent concrete flatworks should be underlain by 12 inches of moisture conditioned and compacted soils. All flatwork should be jointed in square patterns and at irregularities in shape at a maximum spacing of 10 feet or the least width of the sidewalk.

4.4 Concrete Mixes and Corrosivity

Selected chemical analyses for corrosivity were conducted on bulk samples of the near surface soil from the project site (Plate C-4). The native soils tested were shown to have low levels of sulfate and chloride ion concentrations. Resistivity determinations on the soil indicate severely potential for metal loss because of electrochemical corrosion processes.

A minimum of 2,500 psi concrete of Type II Portland Cement with a maximum water/cement ratio of 0.60 (by weight) should be used for concrete placed in contact with native soil on this project (sitework including streets, sidewalks, driveways, patios, and foundations).

A minimum concrete cover of three (3) inches is recommended around steel reinforcing or embedded components (anchor bolts, hold-downs, etc.) exposed to native soil or landscape water (to 18 inches above grade). The concrete should also be thoroughly vibrated during placement.

Landmark does not practice corrosion engineering. We recommend that a qualified corrosion engineer evaluate the corrosion potential on metal construction materials and concrete at the site.

4.5 Excavations

All trench excavations should conform to CalOSHA requirements for Type C soil. The contractor is solely responsible for the safety of workers entering trenches. Temporary excavations with depths of 4 feet or less may be cut nearly vertical for short duration. Temporary slopes should be no steeper than 1.5:1 (horizontal:vertical). Sandy soil slopes should be kept moist, but not saturated, to reduce the potential of raveling or sloughing.

Trench excavations deeper than 4 feet will require shoring or slope inclinations in conformance to CAL/OSHA regulations for Type C soil. Surcharge loads of stockpiled soil or construction materials should be set back from the top of the slope a minimum distance equal to the height of the slope. All permanent slopes should not be steeper than 3:1 to reduce wind and rain erosion. Protected slopes with ground cover may be as steep as 2:1. However, maintenance with motorized equipment may not be possible at this inclination.

4.6 Lateral Earth Pressures

Earth retaining structures, such as retaining walls, should be designed to resist the soil pressure imposed by the retained soil mass. Walls with granular drained backfill may be designed for an assumed static earth pressure equivalent to that exerted by a fluid weighing 38 pcf for unrestrained (active) conditions (able to rotate 0.1% of wall height), and 52 pcf for restrained (at-rest) conditions. These values should be verified at the actual wall locations during construction.

4.7 Seismic Design

This site is located in the seismically active southern California area and the site structures are subject to strong ground shaking due to potential fault movements along the San Andreas Fault. Engineered design and earthquake-resistant construction are the common solutions to increase safety and development of seismic areas. Designs should comply with the latest edition of the CBC for Site Class D using the seismic coefficients given in Section 3.6 of this report.

4.8 Pavements

Pavements should be designed according to CALTRANS or other acceptable methods. Traffic indices were not provided by the project engineer or owner; therefore, we have provided structural sections for several traffic indices for comparative evaluation. The public agency or design engineer should determine the appropriate traffic index for the site. Maintenance of proper drainage is necessary to prolong the service life of the pavements. Based on the current State of California CALTRANS method, an estimated R-value of 30 for the subgrade soil and assumed traffic indices, the following table provides structure thicknesses for asphaltic concrete (AC) pavement sections.

PAVEMENT STUCTURAL SECTIONS

R-Value of Subgrade Soil - 30 (estimated) Design Method - CALTRANS 2006

Traffic Index (assumed)	Flexible Pavements	
	Asphaltic Concrete Thickness (in.)	Aggregate Base Thickness (in.)
5.0	3.0	6.0
6.0	3.5	8.5
7.0	4.5	9.5
8.0	5.0	11.5

Notes:

1) Asphaltic concrete shall be Caltrans, Type B, ¾ inch maximum medium grading, (½ inch for parking areas) compacted to a minimum of 95% of the 50-blow Marshall density (ASTM D1559).
2) Aggregate base shall conform to Caltrans Class 2 (¾ in. maximum), compacted to a minimum of 95% of ASTM D1557 maximum dry density.
3) Place pavements on 12 inches of moisture conditioned (at least 2% of over optimum) native soil compacted to a minimum of 95% of the maximum dry density determined by ASTM D1557, or the governing agency requirements.

Final pavement sections may need to be determined by sampling and R-Value testing during grading operations when actual subgrade soils are exposed.

Section 5
LIMITATIONS AND ADDITIONAL SERVICES

5.1 Limitations

The findings and professional opinions within this report are based on current information regarding the proposed new church at St Frances of Rome, 21591 Lemon Street, Wildomar, California. The conclusions and professional opinions of this report are invalid if:

< Proposed building(s) location and size are changed from those shown in this report
< Structural loads change from those stated or the structures are relocated.
< The Additional Services section of this report is not followed.
< This report is used for adjacent or other property.
< Changes of grade or groundwater occur between the issuance of this report and construction other than those anticipated in this report.
< Any other change that materially alters the project from that proposed at the time this report was prepared.

Findings and professional opinions in this report are based on selected points of field exploration, geologic literature, laboratory testing, and our understanding of the proposed project. Our analysis of data and professional opinions presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific exploratory locations. Variations in soil conditions can exist between and beyond the exploration points or groundwater elevations may change. If detected, these conditions may require additional studies, consultation, and possible design revisions.

This report contains information that may be useful in the preparation of contract specifications. However, the report is not worded is such a manner that we recommend its use as a construction specification document without proper modification. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

This report was prepared according to the generally accepted *geotechnical engineering standards of practice* that existed in Riverside County at the time the report was prepared. No express or implied warranties are made in connection with our services. This report should be considered invalid for periods after two years from the report date without a review of the validity of the findings and professional opinions by our firm, because of potential changes in the Geotechnical Engineering Standards of Practice.

The client has responsibility to see that all parties to the project including, designer, contractor, and subcontractor are made aware of this entire report. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

5.2 Additional Services

We recommend that a qualified geotechnical consultant be retained to provide the tests and observations services during construction. ***The geotechnical engineering firm providing such tests and observations shall become the geotechnical engineer of record and assume responsibility for the project.***

The professional opinions presented in this report are based on the assumption that:

< Consultation during development of design and construction documents to check that the geotechnical professional opinions are appropriate for the proposed project and that the geotechnical professional opinions are properly interpreted and incorporated into the documents.

< ***LandMark Consultants, Inc.*** will have the opportunity to review and comment on the plans and specifications for the project prior to the issuance of such for bidding.

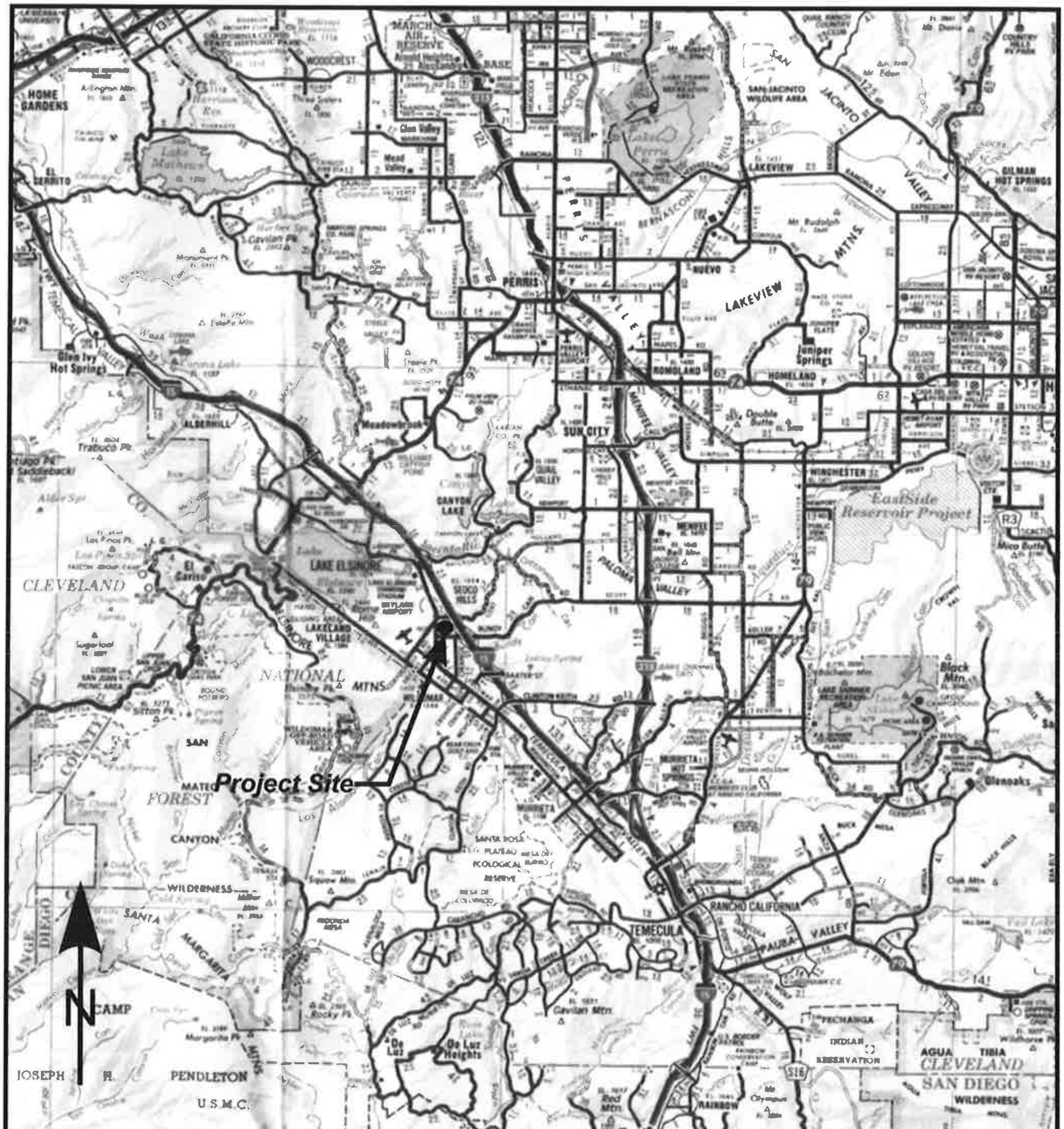
< Continuous observation, inspection, and testing by the geotechnical consultant of record during site clearing, grading, excavation, placement of fills, building pad and subgrade preparation, and backfilling of utility trenches.

< Observation of foundation excavations and reinforcing steel before concrete placement.

< Other consultation as necessary during design and construction.

We emphasize our review of the project plans and specifications to check for compatibility with our professional opinions and conclusions. Additional information concerning the scope and cost of these services can be obtained from our office.

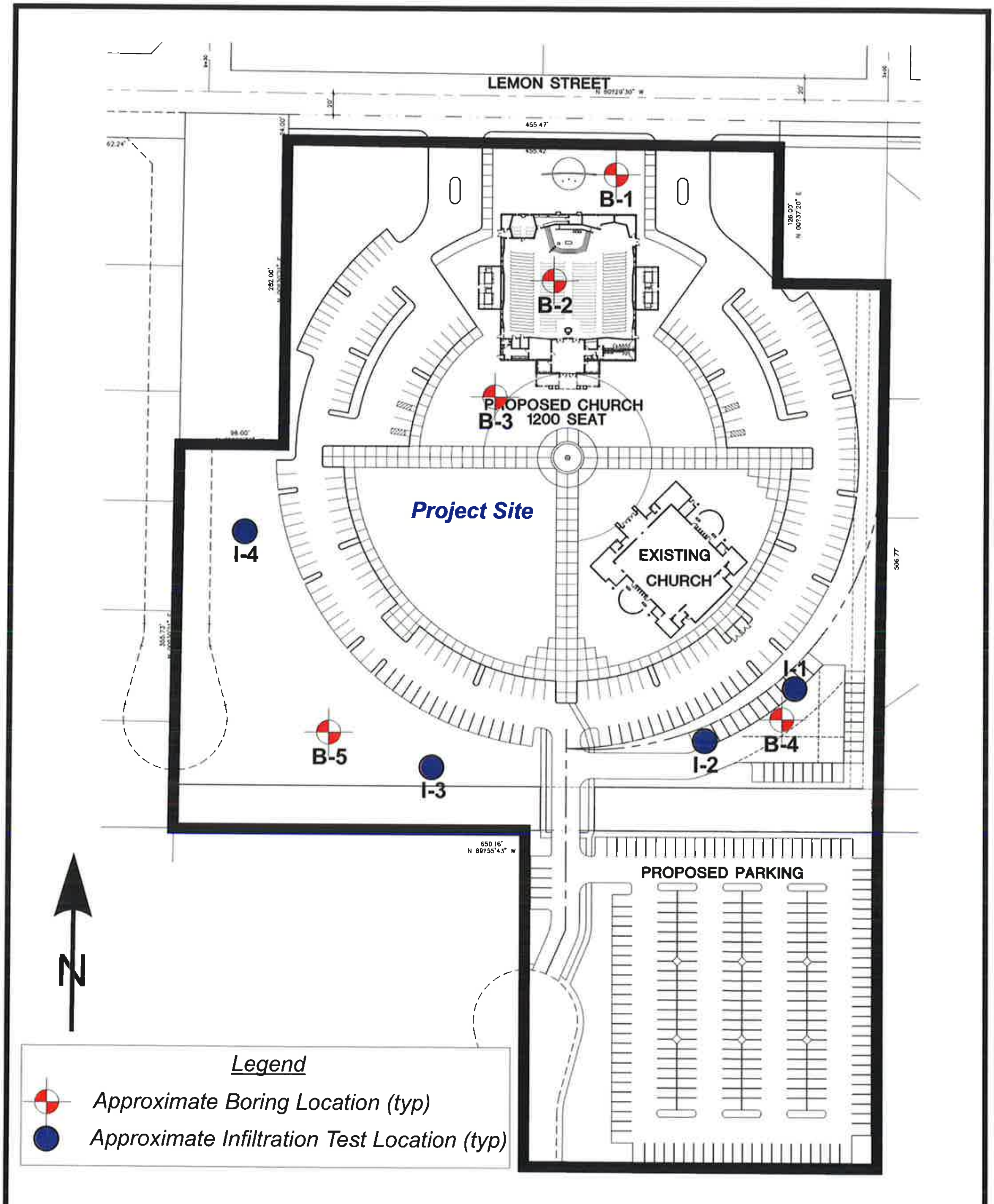
APPENDIX A



LANDMARK
Geo-Engineers and Geologists
Project No.: LP16027

Vicinity Map

Plate A-1



LANDMARK
Geo-Engineers and Geologists

Project No.: LP16027

Site Map

Plate
A-2

117° 17' 9" W

117° 16' 43" W

Map Scale: 1:4,350 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0, 50, 100, 200, 300

Feet: 0, 200, 400, 800, 1200

Map projection: Web Mercator Corner coordinates: WGS84

LANDMARK Geo-Engineers and Geologists Project No.: LP16027	USDA Soil Conservation Soil Service Map	Plate A-3

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 8, Sep 22, 2015

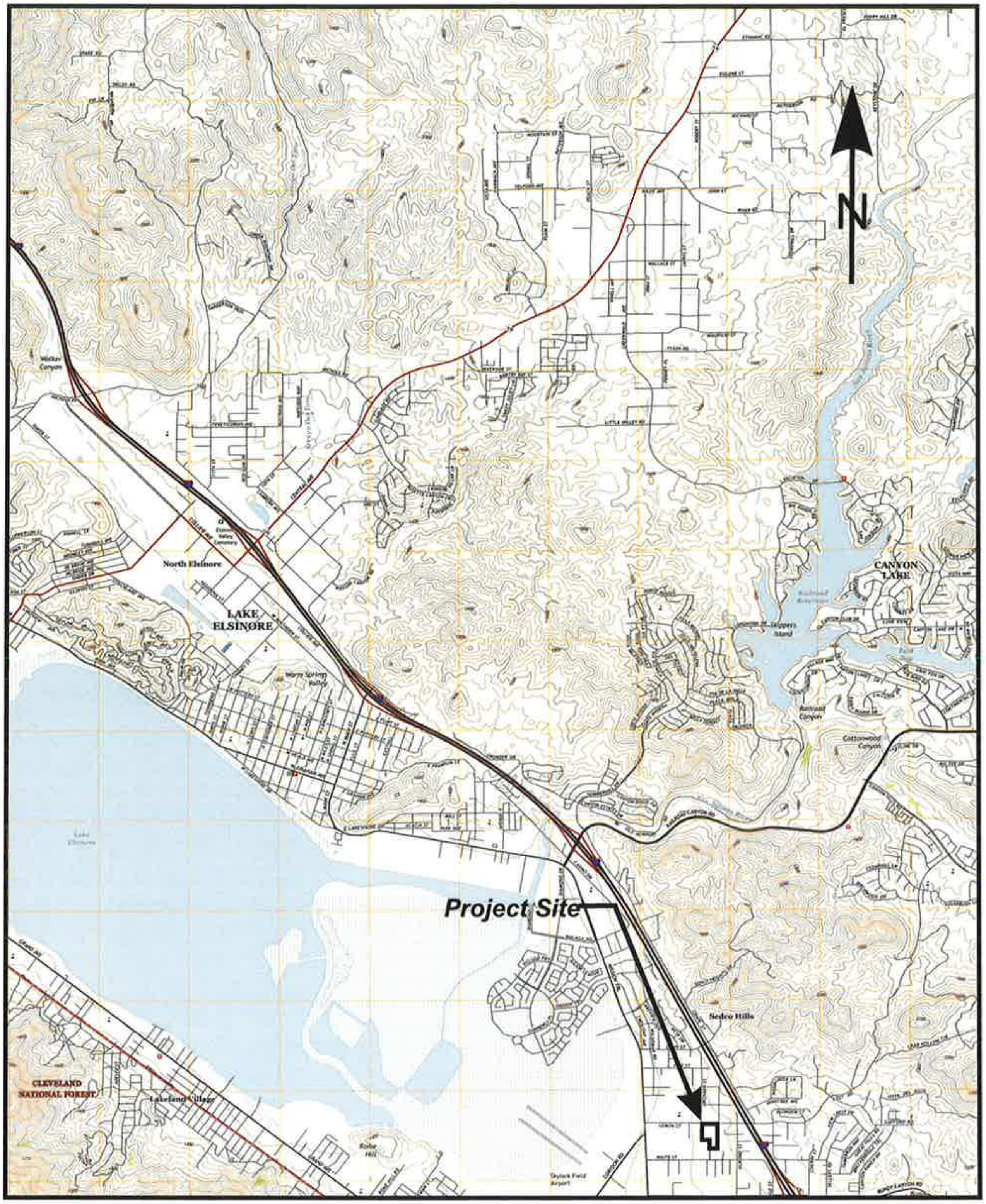
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 24, 2015—Feb 26, 2015

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

Map Unit Legend

Western Riverside Area, California (CA679)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GyC2	Greenfield sandy loam, 2 to 8 percent slopes, eroded	77.5	79.8%
GyD2	Greenfield sandy loam, 8 to 15 percent slopes, eroded	0.3	0.3%
HcC	Hanford coarse sandy loam, 2 to 8 percent slopes	16.8	17.2%
ReC2	Ramona very fine sandy loam, 0 to 8 percent slopes, ero ded	0.9	1.0%
TeG	Terrace escarpments	1.7	1.7%
Totals for Area of Interest		**97.2**	**100.0%**



Lake Elsinore Quadrangle
California - Riverside Co.
7.5 Minute Series

Site Coordinates
Lat: 33.6333 N
Long: 117.2828 W

LANDMARK Geo-Engineers and Geologists **Project No.: LP16027**	USGS U.S. Department of the Interior U.S. Gelogical Survey **Topographic Map**	**Plate** **A-4**

Reference: Federal Emergency Management Agency (FEMA)
Wildomar, California - Riverside County
Community-Panel Numbers 06065C 2043G

LANDMARK Geo-Engineers and Geologists **Project No.: LP16027**	**Flood Insurance Rate Map (FIRM)**	**Plate** **A-5**

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

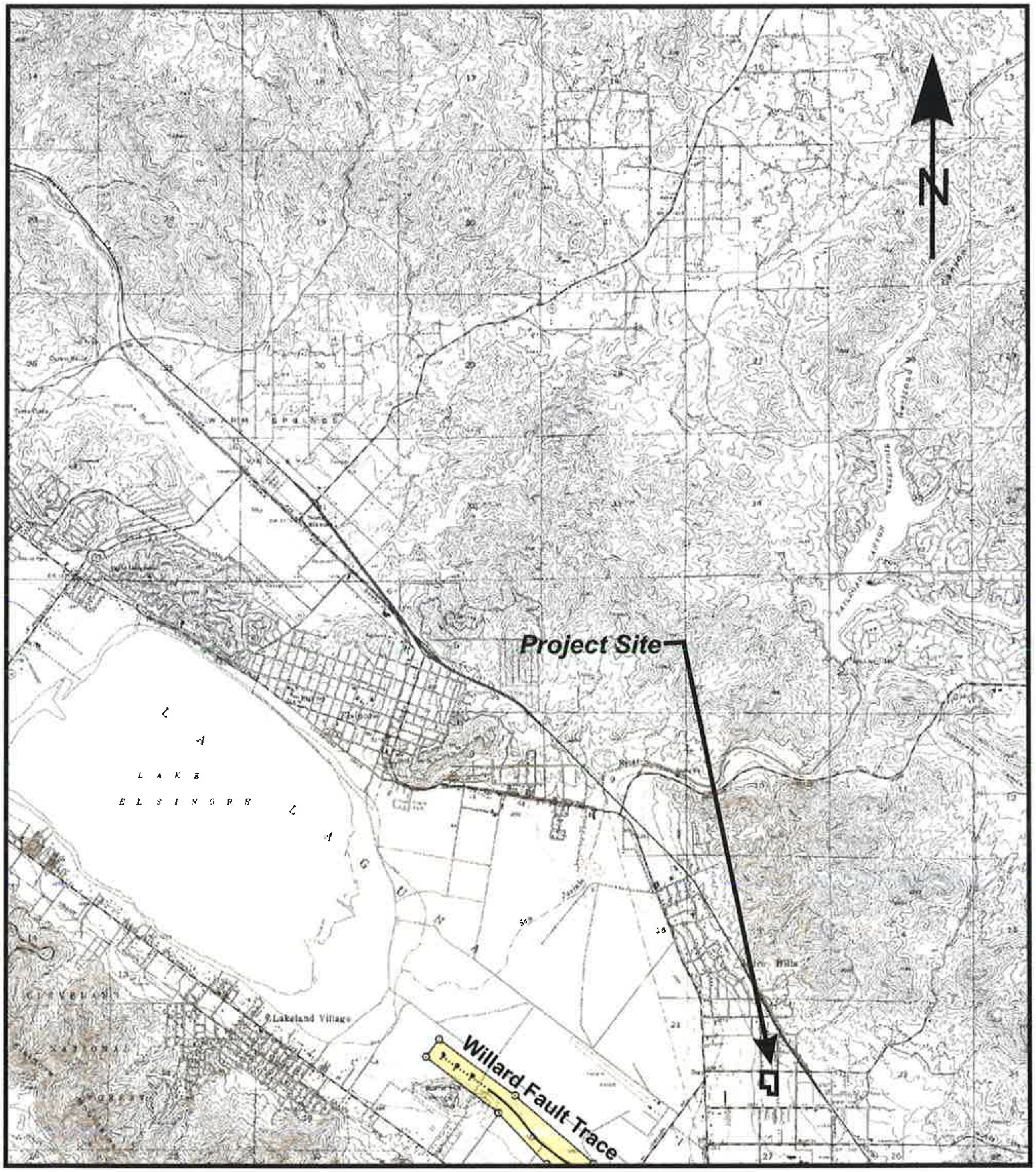
OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A)———(A)	Cross section line
(23)- - - - - - -(23)	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{24}76^{000m}$N	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile



Lake Elsinore Quadrangle
California - Riverside Co.
7.5 Minute Series

0 ½ 1
Scale in Miles

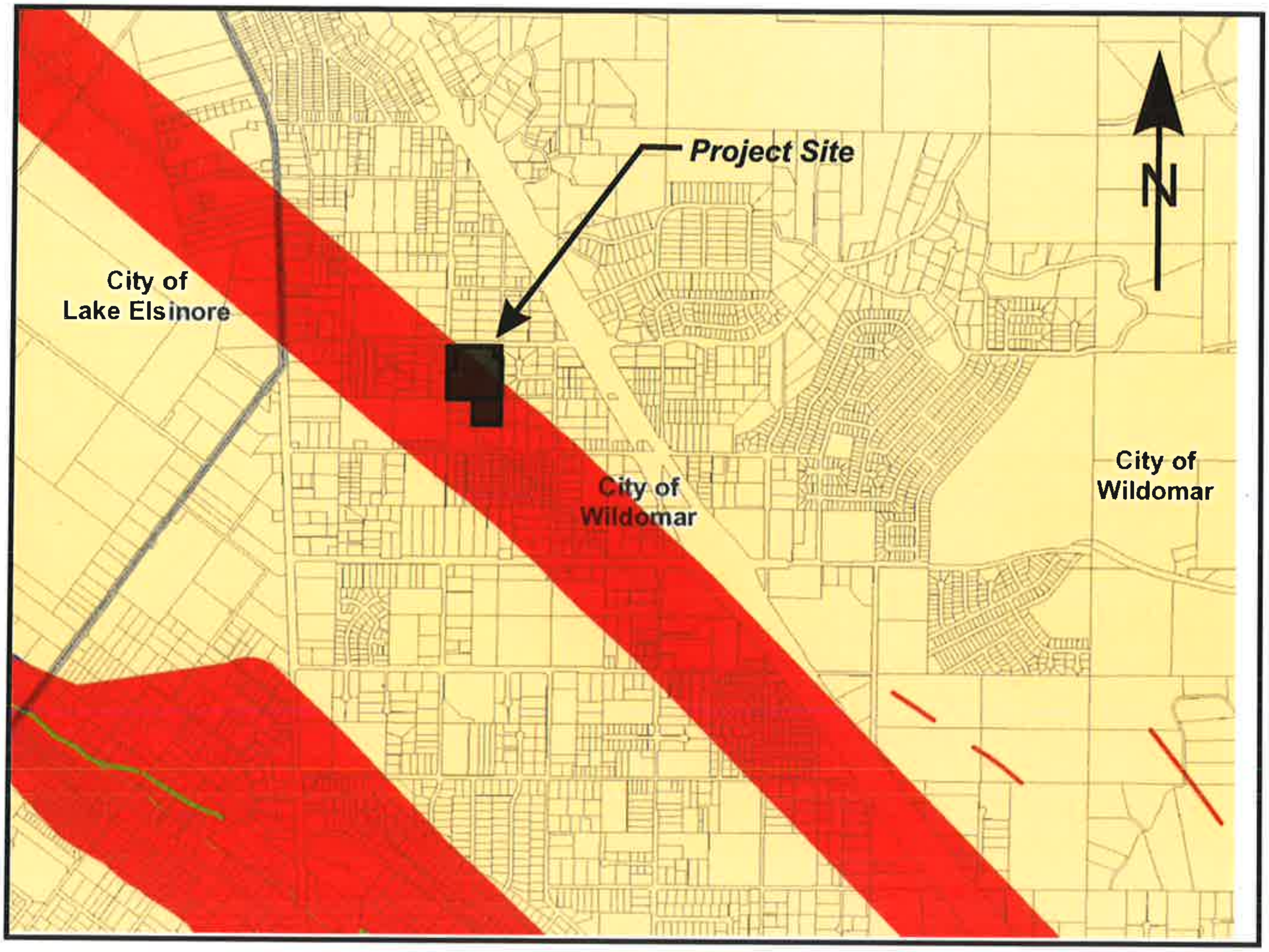
Site Coordinates
Lat: 33.6333 N
Long:117.2828 W

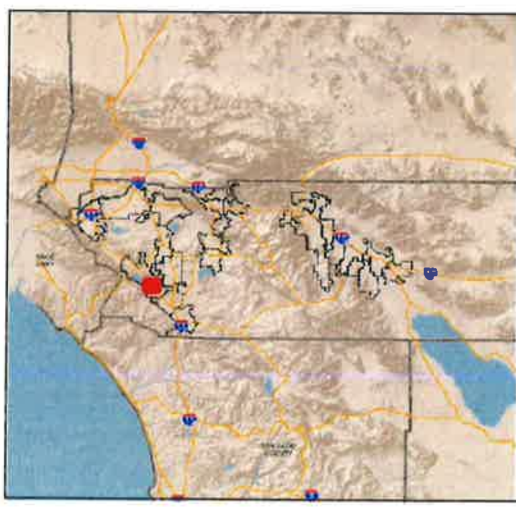
LANDMARK
Geo-Engineers and Geologists

Project No.: LP16027

State of California
The Resources Agency
Department of Conservation
A-P Earthquake Fault Zone Map

Plate
A-6





Legend

City Boundaries
Cities
Faults
<all other values>
ALQUIST-PRIOLO
RIVERSIDE COUNTY
Fault Zones
<all other values>
COUNTY FAULT ZONE
ELSINORE FAULT ZONE

LANDMARK Geo-Engineers and Geologists Project No.: LP16027	Riverside County Information Technology (RCIT) Geographic Information Services **Fault Map**	**Plate A-7**

APPENDIX B

CLIENT: Diosis of San Bernardino
PROJECT: St. Frances of Rome Catholic Church
LOCATION: 21591 Lemon Street, Wildomar, CA

METHOD OF DRILLING: CME 75 w/autohammer
DATE OBSERVED: 3/15/2016
LOGGED BY: G. Chandra

LOG OF BORING: B-1

DEPTH (FT)	FIELD: CLASSIFICATION	FIELD: SAMPLE TYPE	FIELD: BLOW COUNT	FIELD: POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	LABORATORY: MOISTURE CONTENT	LABORATORY: DRY UNIT WT. (PCF)	LABORATORY: UNCONFINED COMPRESSION (TSF)	LABORATORY: LIQUID LIMIT	LABORATORY: PLASTICITY INDEX	LABORATORY: PASSING #200
					SILTYSAND (SM): Brown, with traces of gravel moist and dense with depth						40
5			23			3.5	118.9				
10			55			8.5	131.3				
15			47		SILTY SAND (SM): Dark brown. moist and medium dense	10.3	134.5				
											40
20			24			9.2					
25			20		SILTY SAND (SM): Brown. moist and medium dense	11.0					34
30			22			8.1					24
35											
40											

SURFACE ELEVATION: 1334 ft TOTAL DEPTH: 31.5 ft DEPTH TO WATER: N/A

PROJECT NO.: LP16027

LANDMARK
Geo-Engineers and Geologists

PLATE B-1

CLIENT: Diocese of San Bernardino
PROJECT: St. Francis of Rome Catholic Church
LOCATION: 21591 Lemon Street, Wildomar, CA

METHOD OF DRILLING: CME 75 w/autohammer
DATE OBSERVED: 3/15/2016
LOGGED BY: G. Chandra

LOG OF BORING: B-2

DEPTH (FT)	FIELD: CLASSIFICATION	FIELD: SAMPLE TYPE	FIELD: BLOW COUNT	FIELD: POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	LABORATORY: MOISTURE CONTENT	LABORATORY: DRY UNIT WT. (PCF)	LABORATORY: UNCONFINED COMPRESSION (TSF)	LABORATORY: LIQUID LIMIT	LABORATORY: PLASTICITY INDEX	LABORATORY: PASSING #200
5			15		SILTY SAND (SM): Brown, with traces of gravel.	7.3	123.5				30
10			21			4.9	113.0				
15			29			3.0	110.9				
20			21		SILTY SAND (SM): Brown.	9.3					24
25			25		SILTY SAND (SM): Dark brown.	10.2					31
30			25			8.1					21
35			22								41
40			34								27

SURFACE ELEVATION: 1331 ft   TOTAL DEPTH: 51.5 ft   DEPTH TO WATER: N/A

PROJECT NO.: LP16027

LANDMARK Geo-Engineers and Geologists

PLATE B-2

CLIENT:	Diosis of San Bernardino	**METHOD OF DRILLING:**	CME 75 w/autohammer
PROJECT:	St. Frances of Rome Catholic Church	**DATE OBSERVED:**	3/15/2016
LOCATION:	21591 Lemon Street, Wildomar, CA	**LOGGED BY:**	G. Chandra

LOG OF BORING: B-2

DEPTH (FT)	FIELD: CLASSIFICATION	FIELD: SAMPLE TYPE	FIELD: BLOW COUNT	FIELD: POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	LABORATORY: MOISTURE CONTENT	LABORATORY: DRY UNIT WT. (PCF)	LABORATORY: UNCONFINED COMPRESSION (TSF)	LABORATORY: LIQUID LIMIT	LABORATORY: PLASTICITY INDEX	LABORATORY: PASSING #200
					SILTY SAND (SM): Brown.						
45			47		dense with depth						15
50			41								13
55											
60											
65											
70											
75											
80											

SURFACE ELEVATION: 1331 ft TOTAL DEPTH: 51.5 ft DEPTH TO WATER: N/A

PROJECT NO.: LP16027	LANDMARK Geo-Engineers and Geologists	**PLATE B-3**

CLIENT: Diosis of San Bernardino
METHOD OF DRILLING: CME 75 w/autohammer
PROJECT: St. Frances of Rome Catholic Church
DATE OBSERVED: 3/15/2016
LOCATION: 21591 Lemon Street, Wildomar, CA
LOGGED BY: G. Chandra

LOG OF BORING: B-3

DEPTH (FT)	FIELD: CLASSIFICATION	FIELD: SAMPLE TYPE	FIELD: BLOW COUNT	FIELD: POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	LABORATORY: MOISTURE CONTENT	LABORATORY: DRY UNIT WT. (PCF)	LABORATORY: UNCONFINED COMPRESSION (TSF)	LABORATORY: LIQUID LIMIT	LABORATORY: PLASTICITY INDEX	LABORATORY: PASSING #200
0	SM				SILTY SAND (SM): Brown, with traces of gravel.						
5			23		moist and medium dense	5.5	123.0				32
10			15			5.2	119.5				
15	SM		49		SILTY SAND (SM): Brown. moist and dense	7.0	135.5				20
20	SM		23		SILTY SAND (SM): Dark brown. moist and medium dense	11.0					
25			22			9.0					23
30			21			11.1					

SURFACE ELEVATION: 1307 ft TOTAL DEPTH: 31.5 ft DEPTH TO WATER: N/A

PROJECT NO.: LP16027

LANDMARK
Geo-Engineers and Geologists

PLATE B-4

CLIENT: Diosis of San Bernardino	**METHOD OF DRILLING:** CME 75 w/autohammer
PROJECT: St. Francis of Rome Catholic Church	**DATE OBSERVED:** 3/15/2016
LOCATION: 21591 Lemon Street, Wildomar, CA	**LOGGED BY:** G. Chandra

LOG OF BORING: B-4

DEPTH (FT)	FIELD: CLASSIFICATION	FIELD: SAMPLE TYPE	FIELD: BLOW COUNT	FIELD: POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	LABORATORY: MOISTURE CONTENT	LABORATORY: DRY UNIT WT. (PCF)	LABORATORY: UNCONFINED COMPRESSION (TSF)	LABORATORY: LIQUID LIMIT	LABORATORY: PLASTICITY INDEX	LABORATORY: PASSING #200
	SM				SILTY SAND (SM): Brown, with traces of gravel.						
5		⧅	6		moist and loose	10.1					39
10		⧅	10			10.1					

SURFACE ELEVATION: 1329 ft TOTAL DEPTH: 11.5 ft DEPTH TO WATER: N/A

PROJECT NO.: LP16027

LANDMARK Geo-Engineers and Geologists

PLATE B-5

CLIENT: Diosis of San Bernardino
METHOD OF DRILLING: CME 75 w/autohammer
PROJECT: St. Frances of Rome Catholic Church
DATE OBSERVED: 3/15/2016
LOCATION: 21591 Lemon Street, Wildomar, CA
LOGGED BY: G. Chandra

LOG OF BORING: B-5

DEPTH (FT)	FIELD: CLASSIFICATION	FIELD: SAMPLE TYPE	FIELD: BLOW COUNT	FIELD: POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	LABORATORY: MOISTURE CONTENT	LABORATORY: DRY UNIT WT. (PCF)	LABORATORY: UNCONFINED COMPRESSION (TSF)	LABORATORY: LIQUID LIMIT	LABORATORY: PLASTICITY INDEX	LABORATORY: PASSING #200
					SILTY SAND (SM): Brown, with traces of gravel.						
5			14		moist and medium dense	9.8					
10			15			11.4					32
15											
20											
25											
30											
35											
40											

SURFACE ELEVATION: 1328 ft TOTAL DEPTH: 11.5 ft DEPTH TO WATER: N/A

PROJECT NO.: **LP16027**

LANDMARK
Geo-Engineers and Geologists

PLATE B-6

DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS	SECONDARY DIVISIONS
Coarse grained soils More than half of material is larger that No. 200 sieve	Gravels: More than half of coarse fraction is larger than No. 4 sieve	Clean gravels (less than 5% fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, or gravel-sand mixtures, little or no fines
		Gravel with fines	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines
	Sands: More than half of coarse fraction is smaller than No. 4 sieve	Clean sands (less than 5% fines)	SW	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands or gravelly sands, little or no fines
		Sands with fines	SM	Silty sands, sand-silt mixtures, non-plastic fines
			SC	Clayey sands, sand-clay mixtures, plastic fines
Fine grained soils More than half of material is smaller than No. 200 sieve	Silts and clays: Liquid limit is less than 50%		ML	Inorganic silts, clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticily, gravely, sandy, or lean clays
			OL	Organic silts and organic clays of low plasticity
	Silts and clays: Liquid limit is more than 50%		MH	Inorganic silts, micaceous or diatomaceous silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticily, organic silts
Highly organic soils			PT	Peat and other highly organic soils

GRAIN SIZES

Silts and Clays	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

200 40 10 4 3/4" 3" 12"

US Standard Series Sieve — Clear Square Openings

Sands, Gravels, etc.	Blows/ft. *
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Clays & Plastic Silts	Strength **	Blows/ft. *
Very Soft	0-0.25	0-2
Soft	0.25-0.5	2-4
Firm	0.5-1.0	4-8
Stiff	1.0-2.0	8-16
Very Stiff	2.0-4.0	16-32
Hard	Over 4.0	Over 32

* Number of blows of 140 lb. hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 in. I.D.) split spoon (ASTM D1586).

** Unconfined compressive strength in tons/s.f. as determined by laboratory testing or approximated by the Standard Penetration Test (ASTM D1586), Pocket Penetrometer, Torvane, or visual observation.

Type of Samples:

Ring Sample — Standard Penetration Test — Shelby Tube — Bulk (Bag) Sample

Drilling Notes:

1. Sampling and Blow Counts
   - Ring Sampler - Number of blows per foot of a 140 lb. hammer falling 30 inches.
   - Standard Penetration Test - Number of blows per foot.
   - Shelby Tube - Three (3) inch nominal diameter tube hydraulically pushed.
2. P. P. = Pocket Penetrometer (tons/s.f.).
3. NR = No recovery.
4. GWT ▼ = Ground Water Table observed @ specified time.

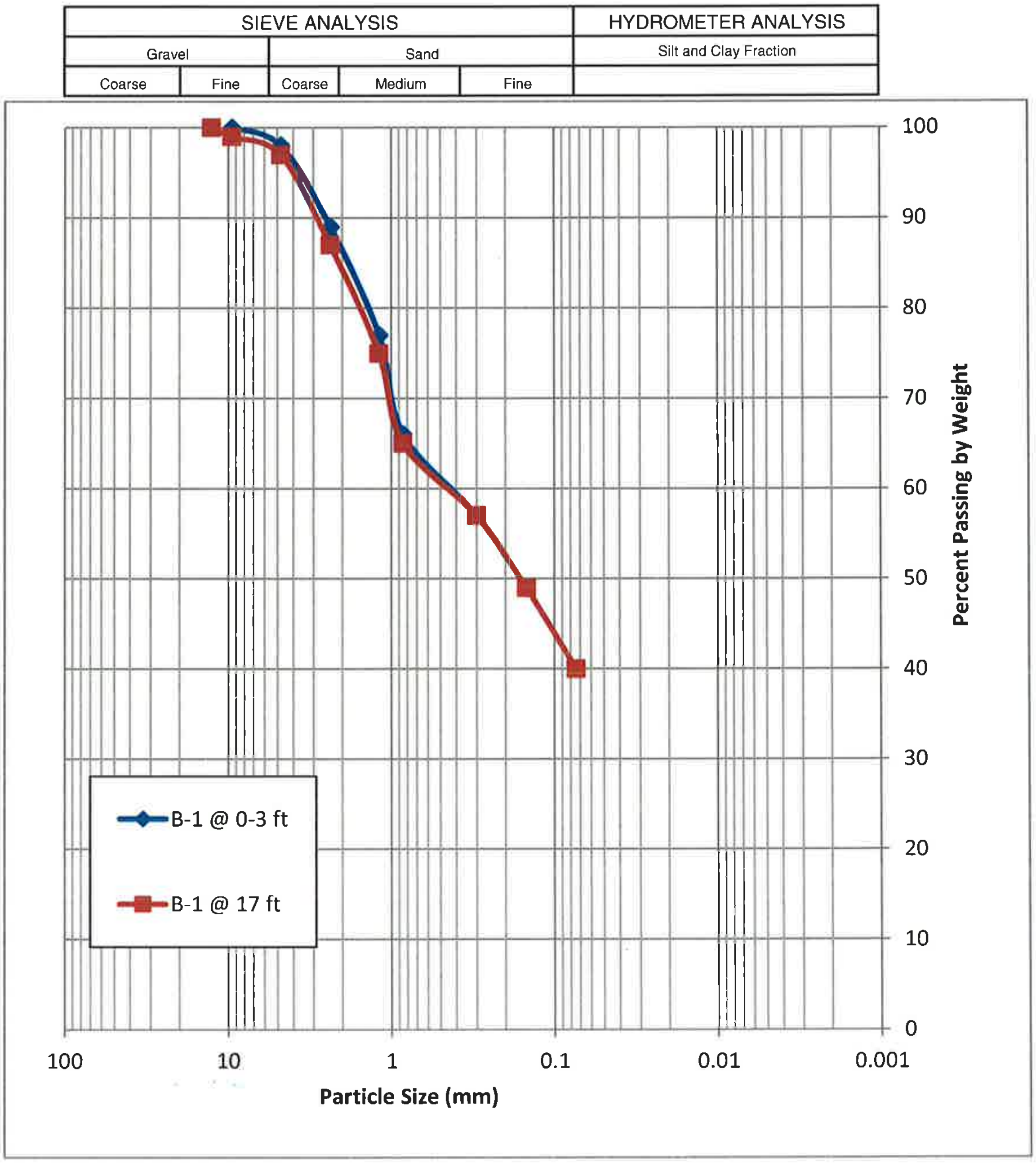
LANDMARK Geo-Engineers and Geologists

Project No.: LP16027

Key to Logs

Plate B-7

APPENDIX C



LANDMARK
Geo-Engineers and Geologists

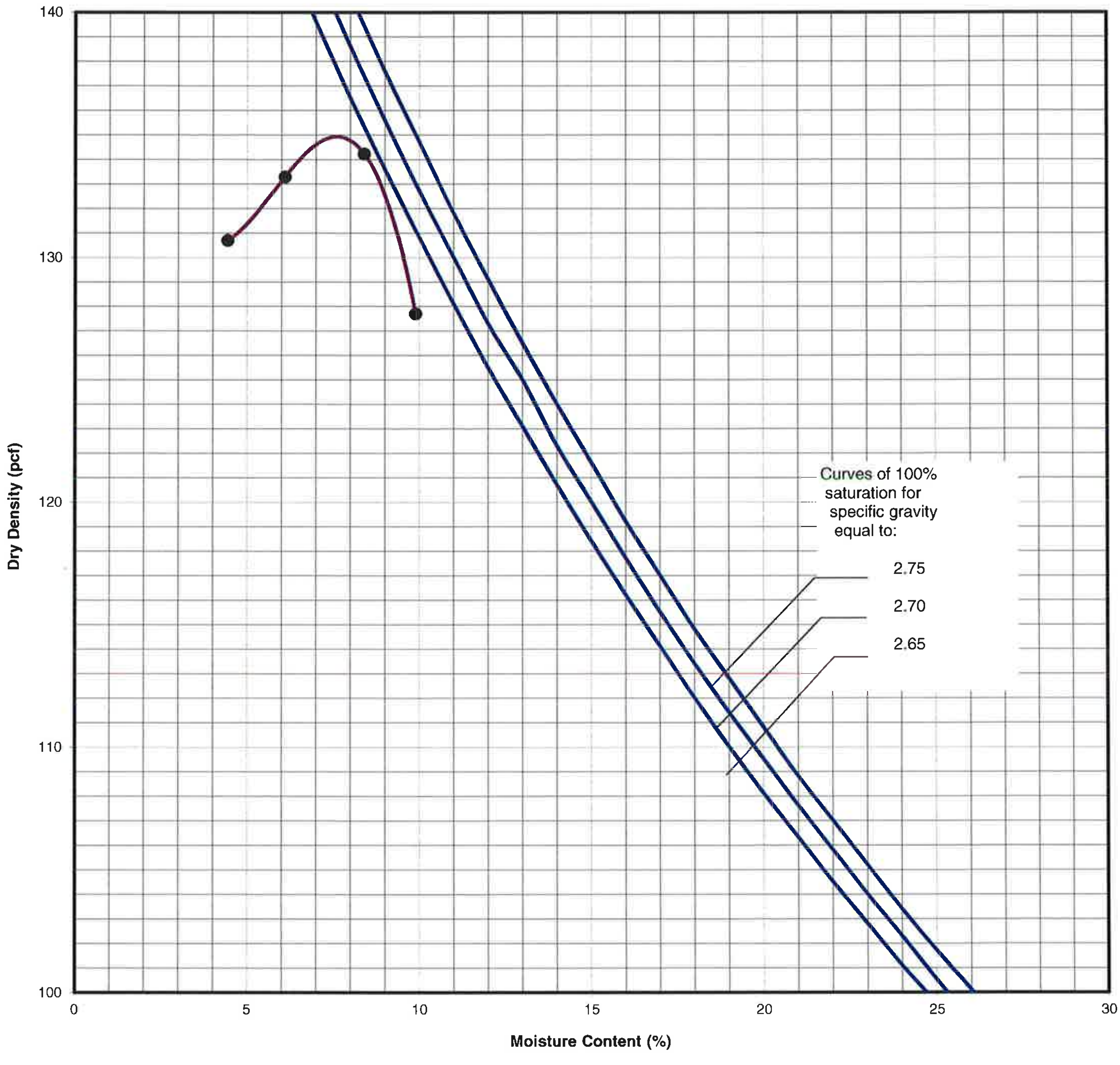
Project No.: LP16027

Grain Size Analysis

Plate C-1

Client: Diocese of San Bernadino
Project: St. Francis of Rome Catholic Church
Project No.: LP16027
Date: 3/23/2016
Lab. No.: N/A

Soil Description: Brown Silty Sand (SM)
Sample Location: B1 @ 0-3'
Test Method: ASTM D-1557 A
Maximum Dry Density (pcf): **135.0**
Optimum Moisture Content (%): **7.5**



LANDMARK
Geo-Engineers and Geologists

Project No.: LP16027

Moisture Density Relationship

Plate C-2

LANDMARK CONSULTANTS, INC.

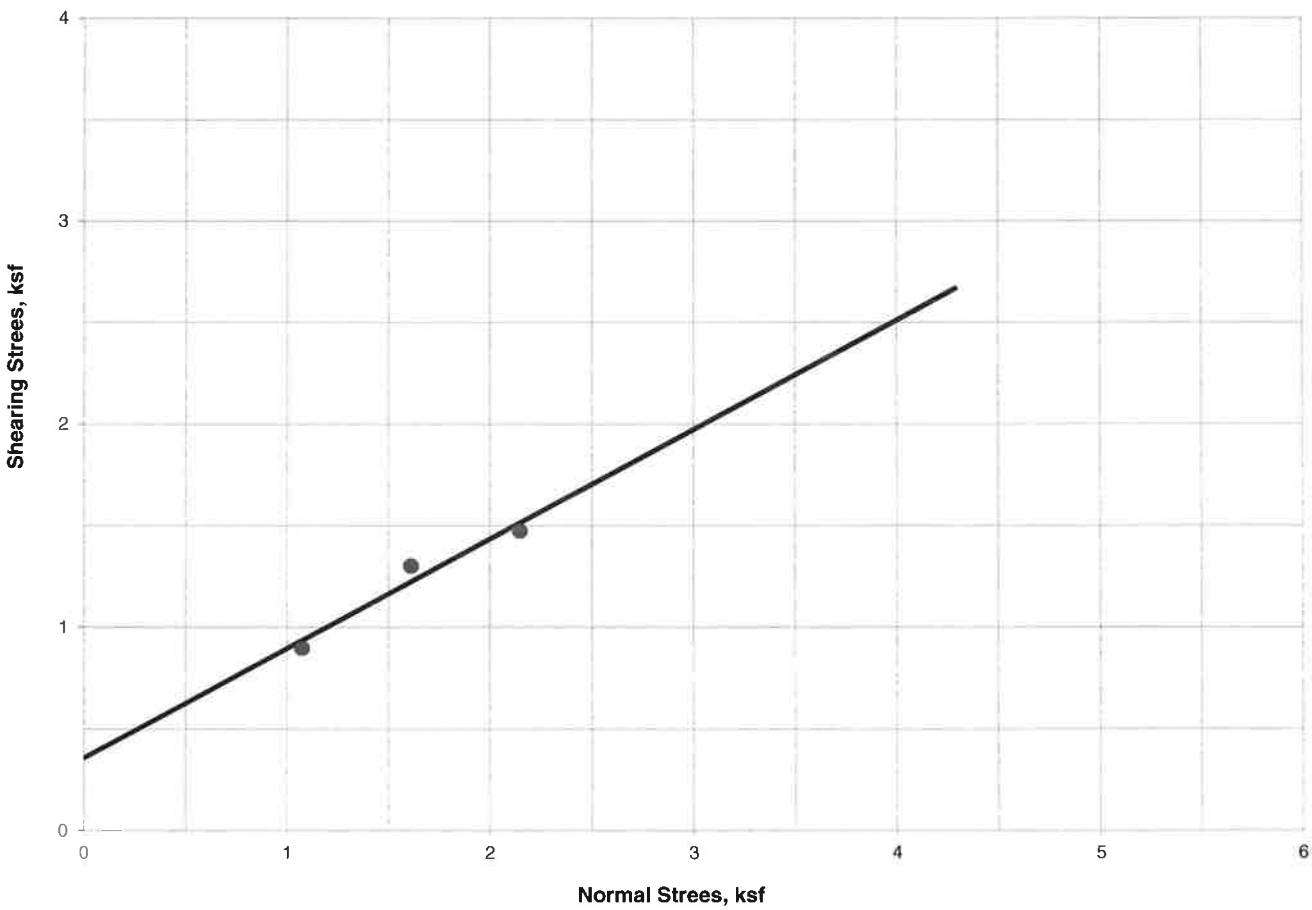
CLIENT: Diocese of San Bernardino
PROJECT: St. Frances of Rome Catholic Church
PROJECT No: LP16027 **DATE:** 3/28/2016

DIRECT SHEAR TEST - REMOLDED (ASTM D3080)

SAMPLE LOCATION: B-1 @ 0 to 3 ft
SAMPLE DESCRIPTION: Brown Silty Sand (SM)

Angle of Internal Friction: 28°
Cohesion: 0.36 ksf
Initial Dry Density: 121.2 pcf
Initial Moisture Content: 7.6%

DIRECT SHEAR TEST RESULTS



LANDMARK Geo-Engineers and Geologists **PROJECT No: LP16027**	**Direct Shear Test Results**	**Plate C-3**

LANDMARK CONSULTANTS, INC.

CLIENT: Diocese Of San Bernardino
PROJECT: St. Frances of Rome Catholic Church
JOB No.: LP16027
DATE: 04/16/16

CHEMICAL ANALYSIS

Boring:	B-1	Caltrans
Sample Depth, ft:	0-3	**Method**
pH:	7.25	643
Electrical Conductivity (mmhos):	---	424
Resistivity (ohm-cm):	1500	643
Chloride (Cl), ppm:	130	422
Sulfate (SO4), ppm:	126	417

General Guidelines for Soil Corrosivity

Material Affected	Chemical Agent	Amount in Soil (ppm)	Degree of Corrosivity
Concrete	Soluble Sulfates	0 - 1,000	Low
		1,000 - 2,000	Moderate
		2,000 - 20,000	Severe
		> 20,000	Very Severe
Normal Grade Steel	Soluble Chlorides	0 - 200	Low
		200 - 700	Moderate
		700 - 1,500	Severe
		> 1,500	Very Severe
Normal Grade Steel	Resistivity	1 - 1,000	Very Severe
		1,000 - 2,000	Severe
		2,000 - 10,000	Moderate
		> 10,000	Low

LANDMARK
Geo-Engineers and Geologists

Project No.: LP16027

Selected Chemical Test Results

Plate C-4

APPENDIX D

Seismic Settlement Calculation

Project Name: St Frances of Rome
Project No.: LP16027
Location: B-1

Maximum Credible Earthquake	6.8	
Design Ground Motion	0.94 g	
Total Unit Weight,	120 pcf	Nc
Water Unit Weight,	62.4 pcf	9.3
Depth to Groundwater	60 ft	
Hammer Effenciency	90	
Rod Length	3	

Mod. Cal	SPT	DEPTH (ft.)	THICKNESS (ft.)	Susceptible	O-PRESS	N1(60)	Fine Content	$N_{1(60)CS}$	p	Gmax	Shear Strain Gam-eff	E15	Enc	Settlement (in.)	TOTAL (in.)
23		5	5	0	0.30	27.7	40	38	0.201	675					
55		10	5	0	0.60	52.3	40	68	0.402	1155					
47		15	5	1	0.90	41.6	40	55	0.603	1320	2.07E-03	6.15E-04	4.97E-04	0.06	
	24	20	5	1	1.20	34.7	40	47	0.804	1443	2.69E-03	9.73E-04	7.86E-04	0.09	
	20	25	5	1	1.50	27.3	34	37	1.005	1498	3.69E-03	1.75E-03	1.41E-03	0.17	
	22	30	5	1	1.80	27.8	24	35	1.206	1606	3.93E-03	2.01E-03	1.62E-03	0.19	
					0.00	#DIV/0!		#DIV/0!	0.000	#DIV/0!					
					0.00	#DIV/0!		#DIV/0!	0.000	#DIV/0!					
					0.00	#DIV/0!		#DIV/0!	0.000	#DIV/0!					
					0.00	#DIV/0!		#DIV/0!	0.000	#DIV/0!					
															0.52

REFERENCES

(1) Tokimatsu and Seed, 1984. Simplified Procedures for the Evaluation of Settlements in Clean Sands.

(2) Seed and Idriss, 1982. Ground Motion and Soil Liquefaction During Earthquakes, EERI Monograph.

(3) Youd, Leslie, 1997. Proceeding of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils

(4) Pradel, Daniel, 1998. JGEE, Vol. 124, No. 4, ASCE

(5) Seed, et.al., 2003, Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework. University of California, Earthquake Engineering Research Center Report 2003-06, 71 p.

Seismic Settlement Calculation

Project Name: St Frances of Rome
Project No.: LP16027
Location: B-2

Maximum Credible Earthquake	6.8
Design Ground Motion	0.94 g
Total Unit Weight,	120 pcf
Water Unit Weight,	62.4 pcf
Depth to Groundwater	60 ft
Hammer Effenciency	90
Rod Length	3

Nc
9.3

Mod. Cal	SPT	DEPTH (ft.)	THICKNESS (ft.)	Susceptible	O-PRESS	N1(60)	Fine Content	$N_{1(60)CS}$	p	Gmax	Shear Strain Gam-eff	E15	Enc	Settlement (in.)	TOTAL (in.)
15		5	5	0	0.30	18.1	30	26	0.201	590					
21		10	5	0	0.60	20.0	30	28	0.402	858					
29		15	5	1	0.90	25.7	30	34	0.603	1128	4.04E-03	2.11E-03	1.71E-03	0.20	
	21	20	5	1	1.20	30.4	24	38	0.804	1345	3.60E-03	1.67E-03	1.35E-03	0.16	
	25	25	5	1	1.50	34.1	31	44	1.005	1587	2.92E-03	1.12E-03	9.07E-04	0.11	
	25	30	5	1	1.80	31.6	21	38	1.206	1652	3.50E-03	1.61E-03	1.30E-03	0.16	
	22	35	5	1	2.10	25.8	41	36	1.407	1749	3.54E-03	1.75E-03	1.42E-03	0.17	
	34	40	5	1	2.40	37.2	27	47	1.608	2039	2.34E-03	8.50E-04	6.87E-04	0.08	
	47	45	5	1	2.70	48.5	15	53	1.809	2264	1.81E-03	5.57E-04	4.50E-04	0.05	
	41	50	5	1	3.00	40.2	13	44	2.010	2230	1.92E-03	7.56E-04	6.11E-04	0.07	
															1.01

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Seismic Settlement Calculation

Project Name: St Frances of Rome
Project No.: LP16027
Location: B-3

Maximum Credible Earthquake	6.8
Design Ground Motion	0.94 g
Total Unit Weight,	120 pcf
Water Unit Weight,	62.4 pcf
Depth to Groundwater	60 ft
Hammer Effenciency	90
Rod Length	3

Nc
9.3

Mod. Cal	SPT	DEPTH (ft.)	THICKNESS (ft.)	Susceptible	O-PRESS	N1(60)	Fine Content	$N_{1(60)CS}$	p	Gmax	Shear Strain Gam-eff	E15	Enc	Settlement (in.)	TOTAL (in.)
23		5	5	0	0.30	27.7	32	37	0.201	669					
15		10	5	0	0.60	14.3	32	22	0.402	788					
49		15	5	1	0.90	43.4	20	50	0.603	1283	2.32E-03	7.63E-04	6.16E-04	0.07	
	23	20	5	1	1.20	33.3	23	41	0.804	1378	3.25E-03	1.38E-03	1.12E-03	0.13	
	22	25	5	1	1.50	30.0	23	37	1.005	1494	3.73E-03	1.78E-03	1.44E-03	0.17	
	21	30	5	1	1.80	26.6	23	33	1.206	1579	4.21E-03	2.28E-03	1.85E-03	0.22	
					0.00	#DIV/0!		#DIV/0!	0.000	#DIV/0!					
					0.00	#DIV/0!		#DIV/0!	0.000	#DIV/0!					
					0.00	#DIV/0!		#DIV/0!	0.000	#DIV/0!					
					0.00	#DIV/0!		#DIV/0!	0.000	#DIV/0!					
															0.60

REFERENCES

(1) Tokimatsu and Seed, 1984. Simplified Procedures for the Evaluation of Settlements in Clean Sands.
(2) Seed and Idriss, 1982. Ground Motion and Soil Liquefaction During Earthquakes, EERI Monograph.
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(4) Pradel, Daniel, 1998. JGEE, Vol. 124, No. 4, ASCE
(5) Seed, et.al., 2003, Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework. University of California, Earthquake Engineering Research Center Report 2003-06, 71 p.

APPENDIX E

LANDMARK CONSULTANTS, INC

Project:	St Francis of Rome		Project No:	LP16027		Date:	3/18/16
Test Hole No:		I-1	Tested By:	Alex A			
Depth of Test Hole, D_T:		5'	USCS Soil Classification:				
Test Hole Dimensions (inches)				Length		Width	
Diameter (if round)=		6"	Sides (if rectangular)=				

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	8:50	9:15	25.00	29.00	55.00	26.00	y
2	9:15	9:40	25.00	30.00	50.00	20.00	y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	9:42	9:52	10.00	18.00	27.00	9.00	1.11
2	9:52	10:02	10.00	27.00	35.00	8.00	1.25
3	10:02	10:12	10.00	35.00	43.00	8.00	1.25
4	10:12	10:22	10.00	19.00	27.00	8.00	1.25
5	10:22	10:32	10.00	27.00	35.00	8.00	1.25
6	10:32	10:42	10.00	20.00	27.00	7.00	1.43
7							
8							
9							
10							
11							
12							

COMMENTS:

LANDMARK
Geo-Engineers and Geologists

Project No.: LP16027

Percolation Test Results

Plate
E-1

PERCOLATION RATE CONVERSION

CLIENT: Diocese of San Bernardino
PROJECT: St Frances of Rome
PROJECT NO.: LP16027
DATE: 3/18/2016

TEST HOLE NO: I-1

Time interval, Δt = 10 minutes

Initial Depth to Water, D_0 = 20 inches

Final Depth to Water, D_f = 27 inches

Total Depth of Test Hole, D_T = 60 inches

²Test Hole Radius, **r** = 3 inches

The conversion equation is used:

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

"H_o" is the initial height of water at the selected time interval

$H_o = D_T - D_0$ = 60 - 20 = 40 inches

"H_f" is the final height of water at the selected time interval

$H_f = D_T - D_f$ = 60 - 27 = 33 inches

"ΔH" is the change in height over the time interval

$\Delta H = \Delta D = H_o - H_f$ = 40 - 33= 7 inches

"H_{avg}" is the average head height over the time interval

$H_{avg} = (H_o + H_f)/2$ = (40 + 33)/2 = 36.5 inches

"I_t" is the tested infiltration rate

$$I_t = \frac{\Delta H \, 60 \, r}{\Delta t\left(r + 2H_{avg}\right)} = \frac{(7 \text{ in})(60\text{min/hr})>3\text{in})}{(10 \text{ min})((3 \text{ in}) + 2\,(36.5 \text{ in}))} = 1.66 \text{ in/hr}$$

LANDMARK Geo-Engineers and Geologists

Project No.: LP16027

Percolation Rate Conversion

Plate E-1A

LANDMARK CONSULTANTS, INC

Project:	St Francis of Rome	Project No:	LP16027	Date:	3/18/16
Test Hole No:	I-2	Tested By:	Alex A		
Depth of Test Hole, D_T:	5'	USCS Soil Classification:			
Test Hole Dimensions (inches)			Length	Width	
Diameter (if round)=	6"	Sides (if rectangular)=			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	8:51	9:16	25.00	20.00	45.00	25.00	y
2	9:16	9:41	25.00	20.00	44.00	24.00	y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	9:43	9:53	10.00	18.00	25.00	7.00	1.43
2	9:53	10:03	10.00	25.00	33.00	8.00	1.25
3	10:03	10:13	10.00	16.00	23.00	7.00	1.43
4	10:13	10:23	10.00	19.00	25.00	6.00	1.67
5	10:23	10:33	10.00	25.00	32.00	7.00	1.43
6	10:33	10:43	10.00	32.00	38.00	6.00	1.67
7							
8							
9							
10							
11							
12							

COMMENTS:

LANDMARK
Geo-Engineers and Geologists

Project No.: LP16027

Percolation Test Results

Plate
E-2

PERCOLATION RATE CONVERSION

CLIENT: Diocese of San Bernardino
PROJECT: St Frances of Rome
PROJECT NO.: LP16027
DATE: 3/18/2016

TEST HOLE NO: I-2

Time interval, Δt = 10 minutes
Initial Depth to Water, D_0 = 32 inches
Final Depth to Water, D_f = 38 inches
Total Depth of Test Hole, D_T = 60 inches
[2]Test Hole Radius, **r** = 3 inches

The conversion equation is used:

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

"H_o" is the initial height of water at the selected time interval

$$H_o = D_T - D_0 \qquad = 60 - 32 = 28 \text{ inches}$$

"H_f" is the final height of water at the selected time interval

$$H_f = D_T - D_f \qquad = 60 - 38 = 22 \text{ inches}$$

"ΔH" is the change in height over the time interval

$$\Delta H = \Delta D = H_o - H_f \qquad = 28 - 22 = 6 \text{ inches}$$

"H_{avg}" is the average head height over the time interval

$$H_{avg} = (H_o + H_f)/2 \qquad = (28 + 22)/2 = 25 \text{ inches}$$

"I_t" is the tested infiltration rate

$$I_t = \frac{\Delta H\ 60\ r}{\Delta t\left(r+2H_{avg}\right)} = \frac{(6\text{ in})(60\text{min/hr})>3\text{in})}{(10\text{ min})((3\text{ in}) + 2\ (25\text{ in}))} = 1.98\text{ in/hr}$$

LANDMARK
Geo-Engineers and Geologists

Project No.: LP16027

Percolation Rate Conversion

Plate E-2A

LANDMARK CONSULTANTS, INC

Project:	St Francis of Rome		Project No:	LP16027		Date:	3/18/16
Test Hole No:		I-3	Tested By:	Alex A			
Depth of Test Hole, D_T:		5'	USCS Soil Classification:				
Test Hole Dimensions (inches)				Length	Width		
Diameter (if round)=		6"	Sides (if rectangular)=				

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	10:51	11:16	25.00	25.00	40.00	15.00	y
2	11:16	11:41	25.00	22.00	34.00	12.00	y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	11:43	11:53	10.00	7.00	13.00	6.00	1.67
2	11:53	12:03	10.00	13.00	18.00	6.00	1.67
3	12:03	12:13	10.00	18.00	23.00	5.00	2.00
4	12:13	12:23	10.00	19.00	25.00	6.00	1.67
5	12:23	12:33	10.00	25.00	31.00	6.00	1.67
6	12:33	12:43	10.00	31.00	36.00	5.00	2.00
7							
8							
9							
10							
11							
12							

COMMENTS:

LANDMARK
Geo-Engineers and Geologists

Project No.: LP16027

Percolation Test Results

Plate
E-3

PERCOLATION RATE CONVERSION

CLIENT: Diocese of San Bernardino
PROJECT: St Frances of Rome
PROJECT NO.: LP16027
DATE: 3/18/2016

TEST HOLE NO: I-3

Time interval, **Δt** = 10 minutes

Initial Depth to Water, D_0 = 31 inches

Final Depth to Water, D_f = 36 inches

Total Depth of Test Hole, D_T = 60 inches

[2]Test Hole Radius, **r** = 3 inches

The conversion equation is used:

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

"H_o" is the initial height of water at the selected time interval

$$H_o = D_T - D_0 \qquad = 60 - 31 = 29\ \underline{\text{inches}}$$

"H_f" is the final height of water at the selected time interval

$$H_f = D_T - D_f \qquad = 60 - 36 = 24\ \underline{\text{inches}}$$

"ΔH" is the change in height over the time interval

$$\Delta H = \Delta D = H_o - H_f \qquad = 29 - 24 = 5\ \underline{\text{inches}}$$

"H_{avg}" is the average head height over the time interval

$$H_{avg} = (H_o + H_f)/2 \qquad = (29 + 24)/2 = \underline{26.5\ \text{inches}}$$

"I_t" is the tested infiltration rate

$$I_t = \frac{\Delta H\ 60\ r}{\Delta t\left(r+2H_{avg}\right)} = \frac{(5\ in)(60 min/hr)>3in)}{(10\ min)((3\ in) + 2\ (26.5\ in))} = \underline{1.61\ in/hr}$$

LANDMARK Geo-Engineers and Geologists **Project No.: LP16027**	**Percolation Rate Conversion**	**Plate E-3A**

LANDMARK CONSULTANTS, INC

Project:	St Francis of Rome		Project No:	LP16027		Date:	3/18/16
Test Hole No:		I-4	Tested By:	Alex A			
Depth of Test Hole, D_T:		5'	USCS Soil Classification:				
Test Hole Dimensions (inches)					Length	Width	
Diameter (if round)=		6"	Sides (if rectangular)=				

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	10:54	11:19	25.00	28.00	38.00	10.00	y
2	11:19	11:44	25.00	25.00	37.00	12.00	y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_0 Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	11:45	11:55	10.00	23.00	30.00	7.00	1.43
2	11:55	12:05	10.00	30.00	38.00	8.00	1.25
3	12:05	12:15	10.00	38.00	45.00	7.00	1.43
4	12:15	12:25	10.00	19.00	25.00	6.00	1.67
5	12:25	12:35	10.00	25.00	31.00	6.00	1.67
6	12:35	12:45	10.00	31.00	37.00	6.00	1.67
7							
8							
9							
10							
11							
12							

COMMENTS:

LANDMARK
Geo-Engineers and Geologists

Project No.: LP16027

Percolation Test Results

Plate
E-4

PERCOLATION RATE CONVERSION

CLIENT: Diocese of San Bernardino
PROJECT: St Frances of Rome
PROJECT NO.: LP16027
DATE: 3/18/2016

TEST HOLE NO: I-4

Time interval, **Δt** = 10 minutes

Final Depth to Water, D_f = 37 inches

[2]Test Hole Radius, **r** = 3 inches

Initial Depth to Water, D_0 = 31 inches

Total Depth of Test Hole, D_T = 60 inches

The conversion equation is used:

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

"H_o" is the initial height of water at the selected time interval

$H_o = D_T - D_0$ = 60 - 31 = 29 inches

"H_f" is the final height of water at the selected time interval

$H_f = D_T - D_f$ = 60 - 37 = 23 inches

"ΔH" is the change in height over the time interval

$\Delta H = \Delta D = H_o - H_f$ = 29 - 23= 6 inches

"H_{avg}" is the average head height over the time interval

$H_{avg} = (H_o + H_f)/2$ = (29 + 23)/2 = 26 inches

"I_t" is the tested infiltration rate

$$I_t = \frac{\Delta H \; 60 \; r}{\Delta t\,(r+2H_{avg})} = \frac{(6\text{ in})(60\text{min/hr})(3\text{in})}{(10\text{ min})((3\text{ in}) + 2\,(26\text{ in}))} = 1.96\text{ in/hr}$$

LANDMARK Geo-Engineers and Geologists **Project No.: LP16027**	**Percolation Rate Conversion**	**Plate E-4A**

APPENDIX F

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Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

Examples of material to provide in Appendix 4 may include but are not limited to the following:

- Environmental Site Assessments conducted for the project,
- Other information on Past Site Use that impacts the feasibility of LID BMP implementation on the site.

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 2.3 of the SMR WQMP and Sections D of this Template.

Appendix 5: LID Feasibility Supplemental Information

Information that supports or supplements the determination of LID technical feasibility documented in Section D

Examples of material to provide in Appendix 5 may include but are not limited to the following:

- Technical feasibility criteria for DMAs
- Site specific analysis of technical infeasibility of all LID BMPs (if Alternative Compliance is needed)
- Documentation of Approval criteria for Proprietary Biofiltration BMPs

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 2.3 of the SMR WQMP and Sections D of this Template.

Appendix 6: LID BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation to supplement Section D

Examples of material to provide in Appendix 6 may include but are not limited to the following:

- DCV calculations,
- LID BMP sizing calculations from Exhibit C of the SMR WQMP
- Design details/drawings from manufacturers for proprietary BMPs

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 3.4 of the SMR WQMP and Sections D.4 of this Template.

WQMP Project Report

County of Riverside Stormwater Program

Santa Ana River Watershed Geodatabase

Wednesday, July 25, 2018

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

Project Site Parcel Number(s):	366170058, 366330013, 366170003, 366330014, RW, 366330011, RW, 366170005
Latitude/Longitude:	33.633, -117.2828
Thomas Brothers Page:	
Project Site Acreage:	11.70
Watershed(s):	SANTA ANA
This Project Site Resides in the following Hydrologic Unit(s) (HUC):	**HUC Name** - HUC Number **Lake Elsinore** - 180702020308
The HUCs Contribute stormwater to the following 303d listed water bodies and TMDLs which may include drainage from your proposed Project Site:	**WBID Name** - WBID Number **Elsinore, Lake** - CAL8023100019990208151100
These 303d listed Water bodies and TMDLs have the following Pollutants of Concern (POC):	**Nutrients** - Nutrients, Organic Enrichment/Low Dissolved Oxygen **Other Organics** - PCBs (Polychlorinated biphenyls) **Toxicity** - Sediment Toxicity, Unknown Toxicity
Is the Site subject to Hydromodification:	Yes
Limitations on Infiltration:	**Project Site Onsite Soils Group(s)** - A **Known Groundwater Contamination Plumes within 1000'** - No **Adjacent Water Supply Wells(s)** - No information available please contact your local water agency for more information. Your local contact agency is ELSINORE VALLEY M.W.D.. Your local wholesaler contact agency is METROPOLITAN WATER DISTRICT.
Environmentally Sensitive Areas within 200'(Fish and Wildlife Habitat/Species):	None
Environmentally Sensitive Areas within 200'(CVMSHCP):	None

Environmentally Sensitive Areas within 200'(WRMSHCP):	None
Groundwater elevation from Mean Sea Level:	1111
85th Percentile Design Storm Depth (in):	0.686
Groundwater Basin:	Elsinore
MSHCP/CVMSHCP Criteria Cell (s):	No Data
Retention Ordinance Information:	No Data
Studies and Reports Related to Project Site:	Comprehensive Nutrient Reduction Plan IBI Scores - Southern Cal ElsinoreBasin bulletin118_4-sc water_fact_3_7.11 8039-SAR-Hydromodification Complete Final GWMP_Mar 2005 Urban Water Management Plan Sedco MDP

Santa Ana Watershed - BMP Design Volume, V_{BMP}	Legend:	Required Entries Calculated Cells

(Note this worksheet shall ***only*** *be used in conjunction with BMP designs from the* ***LID BMP Design Handbook*** *)*

Company Name	McKeever	Date	9/12/2018
Designed by	C. Gabaldon	Case No	
Company Project Number/Name			St. Frances

BMP Identification

BMP NAME / ID Area A (Vbmp) Basin A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.69 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Parking Lot/ Building	*66,172*	*Concrete or Asphalt*	*1*	*0.89*	*59025.4*			
Landscape	*63,824*	*Ornamental Landscaping*	*0.1*	*0.11046*	*7049.9*			
Barren	*2,787*	*Natural (C Soil)*	*0.1*	*0.11046*	*307.8*			
Offsite D	*46253.43*	*Natural (C Soil)*	*0.1*	*0.11046*	*5109.1*			
	179,036	***Total***			**71,492.2**	**0.69**	**4,087.0**	**33748**

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}	Legend:	Required Entries Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	McKeever	Date	9/12/2018
Designed by	C. Gabaldon	Case No	
Company Project Number/Name	St. Frances		

BMP Identification

BMP NAME / ID: Area B (Vbmp) Basin B

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E — D_{85}= 0.69 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Parking Lot/ Building	*117,387*	*Concrete or Asphalt*	*1*	*0.89*	*104709.2*			
Landscape	*98,732*	*Ornamental Landscaping*	*0.1*	*0.11046*	*10905.7*			
Barren	*3,841*	*Natural (C Soil)*	*0.1*	*0.11046*	*424.3*			
	219,960	***Total***			**116,039.2**	**0.69**	**6,633.6**	**35799**

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: McKeever

Date: 9/12/2018

Designed by: C. Gabaldon

Case No:

Company Project Number/Name: St. Frances

BMP Identification

BMP NAME / ID: Area C (Vbmp) Basin C

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.69 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Parking Lot	*77,970*	*Concrete or Asphalt*	*1*	*0.89*	*69549.2*			
Landscape	*23,066*	*Ornamental Landscaping*	*0.1*	*0.110458*	*2547.8*			
	101,036	***Total***			**72,097.0**	**0.69**	**4,121.5**	**12863**

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name McKeever — Date 9/12/2018
Designed by C. Gabaldon — Case No
Company Project Number/Name St. Frances

BMP Identification

BMP NAME / ID Area A (Vhcoc) Basin A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E — D_{85}= 1.30 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Parking Lot/ Building	*66,172*	*Concrete or Asphalt*	*1*	*0.89*	*59025.4*			
Landscape	*63,824*	*Ornamental Landscaping*	*0.1*	*0.11046*	*7049.9*			
Barren	*2,787*	*Natural (C Soil)*	*0.1*	*0.11046*	*307.8*			
Offsite D	*46253.4*	*Natural (C Soil)*	*0.1*	*0.11046*	*5109.1*			
	179,036	**Total**			**71,492.2**	**1.30**	**7,745.0**	**33748**

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: McKeever | Date: 9/12/2018
Designed by: C. Gabaldon | Case No:
Company Project Number/Name: St. Frances

BMP Identification

BMP NAME / ID: Area B (Vhcoc) Basin B

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 1.30 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Parking Lot/ Building	*117,387*	*Concrete or Asphalt*	*1*	*0.89*	*104709.2*			
Landscape	*98,732*	*Ornamental Landscaping*	*0.1*	*0.11046*	*10905.7*			
Barren	*3,841*	*Natural (C Soil)*	*0.1*	*0.11046*	*424.3*			
	219,960.0	***Total***			**116,039.2**	**1.30**	***12,570.9***	***35799***

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	McKeever	Date	9/12/2018
Designed by	C. Gabaldon	Case No	
Company Project Number/Name	St. Frances		

BMP Identification

BMP NAME / ID: Area C (Vhcoc) Basin C

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 1.30 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Parking Lot	*77,970*	*Concrete or Asphalt*	*1*	*0.89*	*69549.2*			
Landscape	*23,066*	*Ornamental Landscaping*	*0.1*	*0.110458*	*2547.8*			
Offisite D	*46253.43*	*Natural (A Soil)*	*0.1*	*0.110458*	*5109.1*			
	147,289	***Total***			**77,206.1**	**1.30**	***8,364.0***	***12863***

Notes:

Infiltration Basin - Design Procedure (Rev. 03-2012)	BMP ID	Legend:	Required Entries
	A -Basin A		Calculated Cells

Company Name:	McKeever	Date:	8/1/2019
Designed by:	C.Gabaldon	County/City Case No.:	

Design Volume

a) Tributary area (BMP subarea) — A_T = 3.05 acres

b) Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 7,192 ft^3

Maximum Depth

a) Infiltration rate — I = 1.61 in/hr

b) Factor of Safety (See Table 1, Appendix A: "Infiltration Testing" from this BMP Handbook) — FS = 2

c) Calculate D_1

$$D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times FS}$$

D_1 = 4.8 ft

d) Enter the depth of freeboard (at least 1 ft) — 1 ft

e) Enter depth to historic high ground water (measured from **top** of basin) — 100 ft

f) Enter depth to top of bedrock or impermeable layer (measured from **top** of basin) — 100 ft

g) D_2 is the smaller of:

Depth to groundwater - (10 ft + freeboard) and
Depth to impermeable layer - (5 ft + freeboard)

D_2 = 89.0 ft

h) D_{MAX} is the smaller value of D_1 and D_2 but shall not exceed 5 feet — D_{MAX} = 4.8 ft

Basin Geometry

a) Basin side slopes (no steeper than 4:1) — z = 4 :1

b) Proposed basin depth (excluding freeboard) — d_B = 4 ft

c) Minimum bottom surface area of basin ($A_S = V_{BMP}/d_B$) — A_S = 1798 ft^2

d) Proposed Design Surface Area — A_D = 5457 ft^2

Forebay

a) Forebay volume (minimum 0.5% V_{BMP}) — Volume = 36 ft^3

b) Forebay depth (height of berm/splashwall. 1 foot min.) — Depth = 1 ft

c) Forebay surface area (minimum) — Area = 36 ft^2

d) Full height notch-type weir — Width (W) = in

Notes:

Infiltration Basin - Design Procedure (Rev. 03-2012)	BMP ID	Legend:	Required Entries
	B - Basin B		Calculated Cells

Company Name: McKeever — Date: 9/20/2018

Designed by: C.Gabaldon — County/City Case No.:

Design Volume

a) Tributary area (BMP subarea)	A_T =	5.05	acres
b) Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	12,571	ft^3

Maximum Depth

a) Infiltration rate	I =	1.61	in/hr
b) Factor of Safety (See Table 1, Appendix A: "Infiltration Testing" from this BMP Handbook)	FS =	2	
c) Calculate D_1 $D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times FS}$	D_1 =	4.8	ft
d) Enter the depth of freeboard (at least 1 ft)		1	ft
e) Enter depth to historic high ground water (measured from **top** of basin)		100	ft
f) Enter depth to top of bedrock or impermeable layer (measured from **top** of basin)		100	ft
g) D_2 is the smaller of: Depth to groundwater - (10 ft + freeboard) and Depth to impermeable layer - (5 ft + freeboard)	D_2 =	89.0	ft
h) D_{MAX} is the smaller value of D_1 and D_2 but shall not exceed 5 feet	D_{MAX} =	4.8	ft

Basin Geometry

a) Basin side slopes (no steeper than 4:1)	z =	4	:1
b) Proposed basin depth (excluding freeboard)	d_B =	2.75	ft
c) Minimum bottom surface area of basin ($A_S = V_{BMP}/d_B$)	A_S =	4571	ft^2
d) Proposed Design Surface Area	A_D =	10254	ft^2

Forebay

a) Forebay volume (minimum 0.5% V_{BMP})	Volume =	63	ft^3
b) Forebay depth (height of berm/splashwall. 1 foot min.)	Depth =	1	ft
c) Forebay surface area (minimum)	Area =	63	ft^2
d) Full height notch-type weir	Width (W) =		in

Notes:

Infiltration Basin - Design Procedure (Rev. 03-2012)	BMP ID: C - Basin C	Legend:	Required Entries / Calculated Cells
Company Name: McKeever		Date:	9/20/2018
Designed by: C.Gabaldon		County/City Case No.:	

Design Volume

a) Tributary area (BMP subarea)	A_T =	2.32	acres
b) Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	7,811	ft^3

Maximum Depth

a) Infiltration rate	I =	1.61	in/hr
b) Factor of Safety (See Table 1, Appendix A: "Infiltration Testing" from this BMP Handbook)	FS =	2	
c) Calculate D_1: $D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times FS}$	D_1 =	4.8	ft
d) Enter the depth of freeboard (at least 1 ft)		2	ft
e) Enter depth to historic high ground water (measured from **top** of basin)		100	ft
f) Enter depth to top of bedrock or impermeable layer (measured from **top** of basin)		100	ft
g) D_2 is the smaller of: Depth to groundwater - (10 ft + freeboard) and Depth to impermeable layer - (5 ft + freeboard)	D_2 =	88.0	ft
h) D_{MAX} is the smaller value of D_1 and D_2 but shall not exceed 5 feet	D_{MAX} =	4.8	ft

Basin Geometry

a) Basin side slopes (no steeper than 4:1)	z =	4	:1
b) Proposed basin depth (excluding freeboard)	d_B =	1.5	ft
c) Minimum bottom surface area of basin ($A_S = V_{BMP}/d_B$)	A_S =	5207	ft^2
d) Proposed Design Surface Area	A_D =	6863	ft^2

Forebay

a) Forebay volume (minimum 0.5% V_{BMP})	Volume =	39	ft^3
b) Forebay depth (height of berm/splashwall. 1 foot min.)	Depth =	1	ft
c) Forebay surface area (minimum)	Area =	39	ft^2
d) Full height notch-type weir	Width (W) =		in

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries | Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: CG Resource Management and Engineering — Date: 8/1/2019

Designed by: C.Gabaldon — Case No:

Company Project Number/Name: St Frances

BMP Identification

BMP NAME / ID: Building Runoff Infiltration Trench - DMA B.1 East

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E — D_{85}= 1.30 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Infil trench1	*8800*	*Roofs*	*1*	*0.89*	*7849.6*			
	3595	*Concrete or Asphalt*	*1*	*0.89*	*3206.7*			
	15239	*Ornamental Landscaping*	*0.1*	*0.11*	*1683.3*			
	27634	***Total***			**12739.6**	**1.30**	**1380.1**	**1538**

Notes:

Infiltration Trench - Design Procedure	BMP ID	Legend:	Required Entries
	East		Calculated Cells

Company Name:	Mc Keever	Date:	8.1.19
Designed by:	CGabaldon	County/City Case No.:	

Design Volume

Enter the area tributary to this feature, Max = 10 acres — A_t= 0 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 1,380 ft^3

Calculate Maximium Depth of the Reservoir Layer

Enter Infiltration rate — I = 1.7 in/hr

Enter Factor of Safety, FS (unitless) — FS = 2

Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook

n = 40 %

Calculate D_1.

$$D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times (n/100) \times FS}$$

D_1 = 12.75 ft

Enter depth to historic high groundwater mark (measured from finished grade) — 50 ft

Enter depth to top of bedrock or impermeable layer (measured from finished grade) — 100 ft

D_2 is the smaller of:

Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft — D_2 = 39.0 ft

D_{MAX} is the smaller value of D_1 and $D_{2,}$ must be less than or equal to 8 feet. — D_{MAX}= 8.0 ft

Trench Sizing

Enter proposed reservoir layer depth D_R, must be $\leq D_{MAX}$ — D_R = 3.75 ft

Calculate the design depth of water, d_W

Design d_W = (D_R) x (n/100) — Design d_W= 1.50 ft

Minimum Surface Area, A_S

$$A_S = \frac{V_{BMP}}{d_W}$$

A_S = 920 ft^2

Proposed Design Surface Area — A_D = 951 ft^2

Minimum Width = D_R + 1 foot pea gravel — 4.75 ft

Sediment Control Provided? (Use pulldown) — Yes

Geotechnical report attached? (Use pulldown) — Yes

If the trench has been designed correctly, there should be no error messages on the spreadsheet.

Santa Ana Watershed - BMP Design Volume, V_{BMP} (Rev. 10-2011)	Legend:	Required Entries
		Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	CG Resource Management and Engineering	Date	8/1/2019
Designed by	C.Gabaldon	Case No	
Company Project Number/Name	St Frances		

BMP Identification

BMP NAME / ID Building Runoff Infiltration Trench - DMA B.1 West

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 1.30 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Infil trench1	*8800*	*Roofs*	*1*	*0.89*	*7849.6*			
	2776	*Concrete or Asphalt*	*1*	*0.89*	*2476.2*			
	17093	*Ornamental Landscaping*	*0.1*	*0.11*	*1888.1*			
	28669	*Total*			**12213.9**	**1.30**	***1323.2***	***1640***

Notes:

Infiltration Trench - Design Procedure	BMP ID	Legend:	Required Entries
	West side		Calculated Cells

Company Name:	Mc Keever	Date:	8.1.19
Designed by:	CGabaldon	County/City Case No.:	

Design Volume

Enter the area tributary to this feature, Max = 10 acres	A_t=	0	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	1,324	ft^3

Calculate Maximium Depth of the Reservoir Layer

Enter Infiltration rate	I =	1.7	in/hr
Enter Factor of Safety, FS (unitless)	FS =	2	
Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook			
	n =	40	%
Calculate D_1. $D_1 = \dfrac{I \text{ (in/hr) x } 72 \text{ hrs}}{12 \text{ (in/ft) x } (n/100) \text{ x FS}}$	D_1 =	12.75	ft
Enter depth to historic high groundwater mark (measured from finished grade)		50	ft
Enter depth to top of bedrock or impermeable layer (measured from finished grade)		100	ft
D_2 is the smaller of: Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft	D_2 =	39.0	ft
D_{MAX} is the smaller value of D_1 and D_2, must be less than or equal to 8 feet.	D_{MAX}=	8.0	ft

Trench Sizing

Enter proposed reservoir layer depth D_R, must be $\leq D_{MAX}$	D_R =	5.00	ft
Calculate the design depth of water, d_W			
Design $d_W = (D_R) \times (n/100)$	Design d_W=	2.00	ft
Minimum Surface Area, A_S $\quad A_S = \dfrac{V_{BMP}}{d_W}$	A_S =	662	ft^2
Proposed Design Surface Area	A_D =	703	ft^2
Minimum Width = D_R + 1 foot pea gravel		6.00	ft

Sediment Control Provided? (Use pulldown)	Yes
Geotechnical report attached? (Use pulldown)	Yes

If the trench has been designed correctly, there should be no error messages on the spreadsheet.

Appendix 7: Hydromodification

Supporting Detail Relating to compliance with the Hydromodification Performance Standards

Examples of material to provide in Appendix 7 may include but are not limited to the following:

- Hydromodification Exemption Exhibit,
- Potential Critical Coarse Sediment Yield Area Mapping
- Hydromodification BMP sizing calculations,
- SMRHM report files,
- Site-Specific Critical Coarse Sediment Analysis,
- Design details/drawings from manufacturers for proprietary BMPs

This information should support the hydromodification exemption (if applicable) and hydrologic control BMP and Sediment Supply BMP sections of this Template. Refer to Section 2.4 and 3.6 of the SMR WQMP and Sections E of this Template.

SITE IS LOCATED WITHIN A HCOC EXEMPTION AREA. SITE DRAINS TO LAKE ELSINORE

The Project is located west of the 15 freeway. Both the existing and proposed site flows, sheet flow off the site to the east side of Lake Elsinore. As presented on this map, there are no sensitive locations between the site and the lake. All areas between are disturbed or managed.

HYDROMODIFICATION MAP

St. Frances of Rome Church Project
21591 Lemon Street
Wildomar, California

CG Resource Management and Engineering

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

Include a copy of the completed Pollutant Sources/Source Control Checklist used to document Source Control BMPs in Section H of this Template.

Appendix 9: O&M

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

Include the completed Operation and Maintenance Plan in this Appendix along with additional documentation of Finance and Maintenance Recording Mechanisms for the site. Refer to Sections 3.10 and 5 of the SMR WQMP and Section J of this Template.

NOT INCLUDED AS PART OF THE PRELIMINARY WQMP. WILL BE INCLUDED IN THE FINAL WQMP SUBMITTAL.

Appendix 10: Educational Materials

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

Examples of material to provide in Appendix 10 may include but are not limited to the following:

- BMP Fact Sheets for proposed BMPs form Exhibit C: LID BMP Design Handbook of the SMR WQMP,
- Source control information and training material for site owners and operators,
- O&M training material,
- Other educational/training material related to site drainage and BMPs.

NOT INCLUDED AS PART OF THE PRELIMINARY WQMP. WILL BE INCLUDED IN THE FINAL WQMP SUBMITTAL.

JRMP	A separate Jurisdictional Runoff Management Plan (JRMP) has been developed by each Copermittee and identifies the local programs and activities that the Copermittee is implementing to meet the Regional MS4 Permit requirements.
LID	Low Impact Development (LID) is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff.
LID BMP	A type of storm water BMP that is based upon Low Impact Development concepts. LID BMPs not only provide highly effective treatment of storm water runoff, but also yield potentially significant reductions in runoff volume – helping to mimic the pre-project hydrologic regime, and also require less ongoing maintenance than Treatment Control BMPs. The applicant may refer to Chapter 2.
LID BMP Design Handbook	The LID BMP Design Handbook was developed by the Copermittees to provide guidance for the planning, design and maintenance of LID BMPs which may be used to mitigate the water quality impacts of PDPs within the County.
LID Bioretention BMP	LID Bioretention BMPs are bioretention areas are vegetated (i.e., landscaped) shallow depressions that provide storage, infiltration, and evapotranspiration, and provide for pollutant removal (e.g., filtration, adsorption, nutrient uptake) by filtering storm water through the vegetation and soils. In bioretention areas, pore spaces and organic material in the soils help to retain water in the form of soil moisture and to promote the adsorption of pollutants (e.g., dissolved metals and petroleum hydrocarbons) into the soil matrix. Plants use soil moisture and promote the drying of the soil through transpiration. The Regional MS4 Permit defines "retain" as to keep or hold in a particular place, condition, or position without discharge to surface waters.
LID Biofiltration BMP	BMPs that reduce stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration, and other biological and chemical processes. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and plants, and collected through an underdrain.
LID Harvest and Reuse BMP	BMPs used to facilitate capturing storm water runoff for later use without negatively impacting downstream water rights or other Beneficial Uses.

LID Infiltration BMP	BMPs to reduce storm water runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Typical LID Infiltration BMPs include infiltration basins, infiltration trenches and pervious pavements.
LID Retention BMP	BMPs to ensure full onsite retention without runoff of the DCV such as infiltration basins, bioretention, chambers, trenches, permeable pavement and pavers, harvest and reuse.
LID Principles	Site design concepts that prevent or minimize the causes (or drivers) of post-construction impacts, and help mimic the pre-development hydrologic regime.
MEP	Maximum Extent Practicable - standard established by the 1987 amendments to the Clean Water Act (CWA) for the reduction of Pollutant discharges from MS4s. Refer to Attachment C of the Regional MS4 Permit for a complete definition of MEP.
MF	Multi-family – zoning classification for parcels having 2 or more living residential units.
MS4	Municipal Separate Storm Sewer System (MS4) is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.
New Development Project	Defined by the Regional MS4 Permit as 'Priority Development Projects' if the project, or a component of the project meets the categories and thresholds described in Section 1.1.1.
NPDES	National Pollution Discharge Elimination System - Federal program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project - Includes New Development and Redevelopment project categories listed in Provision E.3.b of the Regional MS4 Permit.

Priority Pollutants of Concern	Pollutants expected to be present on the project site and for which a downstream water body is also listed as Impaired under the CWA Section 303(d) list or by a TMDL.
Project-Specific WQMP	A plan specifying and documenting permanent LID Principles and storm water BMPs to control post-construction Pollutants and storm water runoff for the life of the PDP, and the plans for operation and maintenance of those BMPs for the life of the project.
Receiving Waters	Waters of the United States.
Redevelopment Project	The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair. Project that meets the criteria described in Section 1.
Runoff Fund	Runoff Funds have not been established by the Copermittees and are not available to the Applicant. If established, a Runoff Fund will develop regional mitigation projects where PDPs will be able to buy mitigation credits if it is determined that implementing onsite controls is infeasible.
San Diego Regional Board	San Diego Regional Water Quality Control Board - The term "Regional Board", as defined in Water Code section 13050(b), is intended to refer to the California Regional Water Quality Control Board for the San Diego Region as specified in Water Code Section 13200. State agency responsible for managing and regulating water quality in the SMR.
SCCWRP	Southern California Coastal Water Research Project
Site Design BMP	Site design BMPs prevent or minimize the causes (or drivers) of post-construction impacts, and help mimic the pre-development hydrologic regime.
SF	Parcels with a zoning classification for a single residential unit.
SMC	Southern California Stormwater Monitoring Coalition
SMR	The Santa Margarita Region (SMR) represents the portion of the Santa Margarita Watershed that is included within the County of Riverside.

Source Control BMP	Source Control BMPs land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between Pollutants and runoff.
Structural BMP	Structures designed to remove pollutants from stormwater runoff and mitigate hydromodification impacts.
SWPPP	Storm Water Pollution Prevention Plan
Tentative Tract Map	Tentative Tract Maps are required for all subdivision creating five (5) or more parcels, five (5) or more condominiums as defined in Section 783 of the California Civil Code, a community apartment project containing five (5) or more parcels, or for the conversion of a dwelling to a stock cooperative containing five (5) or more dwelling units.
TMDL	Total Maximum Daily Load - the maximum amount of a Pollutant that can be discharged into a waterbody from all sources (point and non-point) and still maintain Water Quality Standards. Under CWA Section 303(d), TMDLs must be developed for all waterbodies that do not meet Water Quality Standards after application of technology-based controls.
USEPA	United States Environmental Protection Agency
Volume-Based BMP	Volume-Based BMPs applies to BMPs where the primary mode of pollutant removal depends upon the volumetric capacity such as detention, retention, and infiltration systems.
WQMP	Water Quality Management Plan
Wet Season	The Regional MS4 Permit defines the wet season from October 1 through April 30.