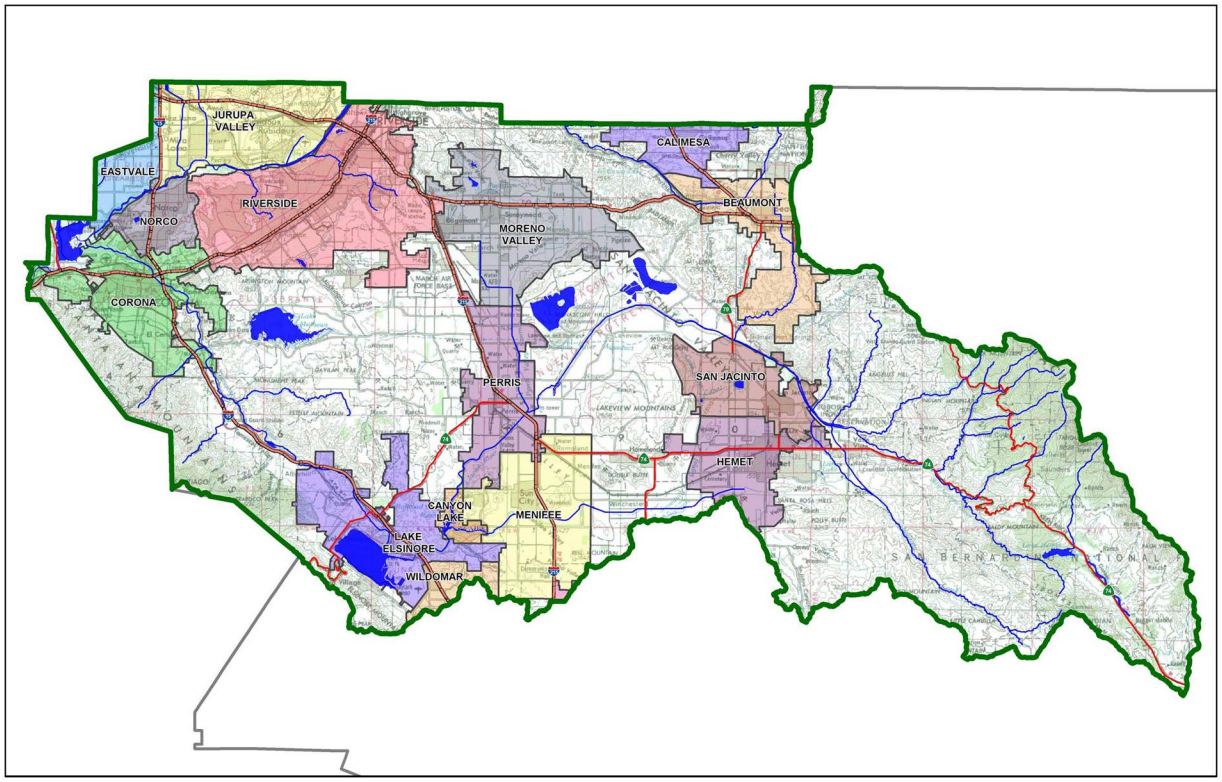
# Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

**Project Title:** 2nd Street 115 Unit Affordable Housing

**Development No:** PP2023-0010

**Design Review/Case No:** PWWQ2024-0002 / WQ24-002P




☒ **Preliminary**
☐ **Final**

**Original Date Prepared**: December 2023

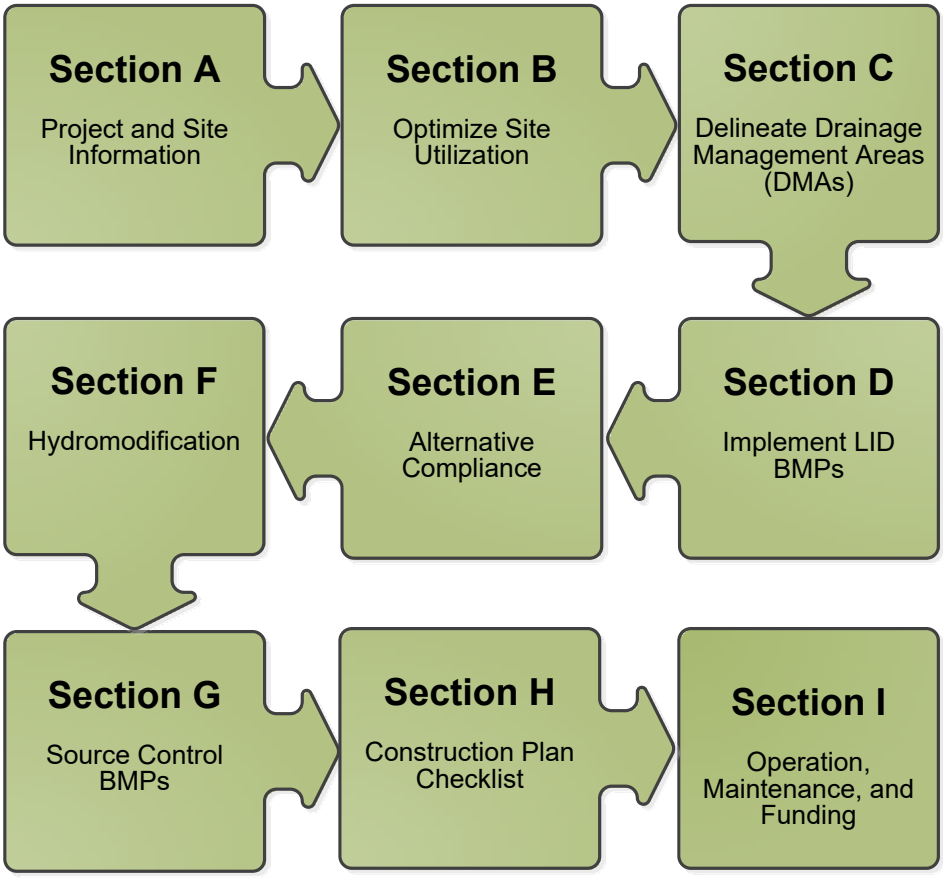
**Revision Date(s)**: February 2024
April 2024

*Prepared for Compliance with*
*Regional Board Order No*. **R8-2010-0033**
**Template revised June 30, 2016**

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Section A
Project and Site Information
Section B
Optimize Site Utilization
Section C
Delineate Drainage Management Areas (DMAs)
Section D
Implement LID BMPs
Section E
Alternative Compliance
Section F
Hydromodification
Section G
Source Control BMPs
Section H
Construction Plan Checklist
Section I
Operation, Maintenance, and Funding

## OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for C&C Development Co., LLC by Fuscoe Engineering, Inc. for the 2nd Street 115 Unit Affordable Housing project.

This WQMP is intended to comply with the requirements of City of Corona for Ordinance No. 2806 & 2568 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 Stormwater BMPs 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 Corona Water Quality Ordinance (Municipal Code Section 15.36).

"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 measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

| | |
|---|---|
| Preparer's Signature | Date: 05/30/2024 |
| Preparer's Printed Name: Shelby Shirlock | Preparer's Title/Position: Senior Project Manager |

Preparer's Licensure:



## Table of Contents

Section A: Project and Site Information ..... 6

A.1 Maps and Site Plans ..... 7
A.2 Identify Receiving Waters ..... 7
A.3 Additional Permits/Approvals required for the Project: ..... 8

Section B: Optimize Site Utilization (LID Principles) ..... 9

Section C: Delineate Drainage Management Areas (DMAs) ..... 11

Section D: Implement LID BMPs ..... 13

D.1 Infiltration Applicability ..... 13
D.2 Harvest and Use Assessment ..... 14
D.3 Bioretention and Biotreatment Assessment ..... 16
D.4 Feasibility Assessment Summaries ..... 17
D.5 LID BMP Sizing ..... 18

Section E: Alternative Compliance (LID Waiver Program) ..... 21

E.1 Identify Pollutants of Concern ..... 22
E.2 Stormwater Credits ..... 23
E.3 Sizing Criteria ..... 23
E.4 Treatment Control BMP Selection ..... 24

Section F: Hydromodification ..... 25

F.1 Hydrologic Conditions of Concern (HCOC) Analysis ..... 25
F.2 HCOC Mitigation ..... 26

Section G: Source Control BMPs ..... 27

Section H: Construction Plan Checklist ..... 30

Section I: Operation, Maintenance and Funding ..... 31

## List of Tables

Table A.1 Identification of Receiving Waters....7
Table A.2 Other Applicable Permits....8
Table C.1 DMA Classifications....11
Table C.2 Type 'A', Self-Treating Areas....11
Table C.3 Type 'B', Self-Retaining Areas....11
Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas....12
Table C.5 Type 'D', Areas Draining to BMPs....12
Table D.1 Infiltration Feasibility....13
Table D.2 LID Prioritization Summary Matrix....17
Table D.3 DCV Calculations for LID BMPs (DMA A)....18
Table D.4 DCV Calculations for LID BMPs (DMA B)....18
Table D.5 DCV Calculations for LID BMPs (DMA C)....19
Table D.6 DCV Calculations for LID BMPs (DMA D)....19
Table E.1 Potential Pollutants by Land Use Type....22
Table E.2 Water Quality Credits....23
Table E.3 Treatment Control BMP Sizing....23
Table E.4 Treatment Control BMP Selection....24
Table F.1 Hydrologic Conditions of Concern Summary....25
Table G.1 Permanent and Operational Source Control Measures....27
Table H.1 Construction Plan Cross-reference....30

## List of Appendices

Appendix 1: Maps and Site Plans....32
Appendix 2: Construction Plans....33
Appendix 3: Soils Information....34
Appendix 4: Historical Site Conditions....35
Appendix 5: LID Infeasibility....36
Appendix 6: BMP Design Details....37
Appendix 7: Hydromodification....38
Appendix 8: Source Control....39
Appendix 9: O&M....40
Appendix 10: Educational Materials....41

# Section A: Project and Site Information

| | |
|---|---|
| **PROJECT INFORMATION** | |
| Type of Project: | Residential |
| Planning Area: | N/A |
| Community Name: | N/A |
| Development Name: | N/A |
| **PROJECT LOCATION** | |
| Latitude & Longitude (DMS): 33.88051, -117.57832 | |
| Project Watershed and Sub-Watershed: Santa Ana River / Temescal | |
| Gross Acres: 3.46 ac<br>APN(s): 118-270-2053 & 118-270-055 | |
| Map Book and Page No.: MB 9/6 | |
| **PROJECT CHARACTERISTICS** | |
| Proposed or Potential Land Use(s) | Residential |
| Proposed or Potential SIC Code(s) | 9531 |
| Area of Impervious Project Footprint (SF) | 123,283 sf |
| Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement | 123,283 sf |
| 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 |
| **EXISTING SITE CHARACTERISTICS** | |
| Total area of existing Impervious Surfaces within the Project limits Footprint (SF) | 330 sf |
| Is the project located within any MSHCP Criteria Cell? | ☐ Y ☒ N |
| If so, identify the Cell number: | N/A |
| 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 NRCS soils type(s) present on the site (A, B, C and/or D) | B |
| What is the Water Quality Design Storm Depth for the project? | 0.8 inches |

*The project site for the West 2nd Apartments project consists of 3.46 acres and is located in the City of Corona, Riverside County, California. The project proposed four multifamily housing buildings, associated parking, laundry room, community space, and pool. The project site is south of the 91 freeway, west of Buena Vista, east of Lincoln Avenue, and north of 6th Street. The project site is bounded by a commercial property to the west, by commercial and Orange Grove High School to the south, 2nd Street to the north, and by Buena Vista Avenue to the east. The project proposes four apartment buildings at 206 S. Buena Vista Avenue, Corona. The existing condition of the property is a vacant lot which was a mobile home park until 2014. All existing onsite runoff joins Buena Vista and 2nd Street runoff and is conveyed northerly via and curb and gutter before being captured by a catch basin at northwest corner of Buena Vista and 2nd Street intersection.*

*The proposed development will maintain the historic discharge point. Proposed onsite stormwater runoff will be captured by localized catch basins and drain inlets, and flows will be diverted into high and low flows. The low flows will be routed first to treatment points with Modular Wetlands Systems (MWS) to treat the proposed runoff, while 10-Yr (high) flows will be directed to the site's drainage outfall. Once the*

*runoff is treated by the MWS, it will either join the 10-Yr (high) flow runoff in the private system or discharge into 2nd Street and Buena Vista through a proposed curb outlet. The private system will be connected to existing 54" RCP storm drain system in Buena Vista. The site will be graded as such to have overland runoff for severe storms and the finish floor is set at least a foot over the 100 year-storm.*

## A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local 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:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

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 Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

## 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.

**Table A.1** Identification of Receiving Waters

| Receiving Waters | EPA Approved 303(d) List Impairments | Designated Beneficial Uses | Proximity to RARE Beneficial Use |
|---|---|---|---|
| Temescal Creek, Reach 1B | 303(d): None | MUN, REC2 WARM, WILD | No RARE designation |
| Temescal Creek, Reach 1A | 303(d): None | MUN, REC2 WARM, WILD | No RARE designation |
| Prado Basin Management Zone | 303(d): pH | REC1, REC2, WARM, WILD, RARE | Approximately 1.5 miles |
| Santa Ana River, Reach 3 | 303(d): Indicator Bacteria, Lead, Copper<br>TMDL: Indicator Bacteria | AGR, GWR, REC1, REC2, WARM, WILD, RARE, SPWN | Approximately 5 miles |
| Santa Ana River, Reach 2 | 303(d): None | AGR, GWR, REC1, REC2, WARM, WILD, RARE | Approximately 10 miles |
| Santa Ana River, Reach 1 | 303(d): None | REC1, REC2, WARM (intermittent), WILD (intermittent) | No RARE designation |

*The project site resides within the jurisdiction of the Santa Ana Regional Water Quality Control Board and the Santa Ana River Watershed (Region 8), Temescal Creek Sub-watershed.*

*The Santa Ana River Watershed encompasses approximately 2,800 square miles (including San Jacinto River Watershed), which includes natural open space, agricultural and ranching areas, and rural and urban*

*development. The watershed includes much of Orange County, the northwestern portion of Riverside County, the southwestern portion of San Bernardino County and a small portion of Los Angeles County.*

*The watershed originates primarily from the San Bernardino and San Gabriel Mountains, which consist mainly of snowmelt and storm runoff from the San Bernardino National Forest, and traverses in a southwesterly direction to the Pacific Ocean.*

*There are no known existing water quality problems associated with the site. Under existing conditions, runoff from the site is conveyed to the storm drain system then to Temescal Creek Channel. All runoff is ultimately conveyed southwestward through public storm drain improvements to the Santa Ana River and into the Pacific Ocean.*

## A.3 Additional Permits/Approvals required for the Project:

**Table A.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 (CWA) Section 401 Water Quality Cert. | ☐ Y | ☒ N |
| US Army Corps of Engineers, CWA 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)* | | |
| City of Corona Conditional Use Permit | ☒ Y | ☐ N |
| City of Corona Design Review | ☒ Y | ☐ N |
| City of Corona Building Permit | ☒ Y | ☐ N |
| City of Corona Grading Permit | ☒ Y | ☐ N |
| City of Corona Construction Permit | ☒ Y | ☐ N |

If yes is answered to any of the questions above, the Co-Permittee 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 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 LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e. no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs.

## Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

*A hydrology report was prepared to identify and preserve existing drainage patterns. Runoff from the site will continue to flow in a manner similar to existing conditions. Low-flows and first-flush runoff will drain to biotreatment units for treatment.*

Did you identify and protect existing vegetation? If so, how? If not, why?

*No, the project site is currently a vacant lot which was a mobile home park until 2014. There is no existing vegetation to protect.*

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

*There is no natural infiltration to preserve due to low infiltration rates per the geotechnical analysis.*

Did you identify and minimize impervious area? If so, how? If not, why?

*Impervious area was minimized by adding vegetation where feasible.*

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

*Runoff is dispersed to adjacent pervious areas where feasible such as in walkways. Areas with limited pervious area are routed to be treated via biofiltration.*

# Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

**Table C.1** DMA Classifications

| DMA Name or ID | Surface Type(s)[1][2] | Area (Sq. Ft.) | DMA Type |
|---|---|---|---|
| A/1 | Ornamental Landscaping | 5,807.8 | D |
| A/2 | Concrete | 24,208.8 | D |
| B/1 | Ornamental Landscaping | 11,148.0 | D |
| B/2 | Concrete | 24,060.0 | D |
| C/1 | Ornamental Landscaping | 6,663.8 | D |
| C/2 | Concrete | 20,615.05 | D |
| D/1 | Ornamental Landscaping | 3,445.9 | D |
| D/2 | Concrete | 54,399.23 | D |

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*
[2]*If multi-surface provide back-up*

**Table C.2** Type 'A', Self-Treating Areas

| DMA Name or ID | Area (Sq. Ft.) | Stabilization Type | Irrigation Type (if any) |
|---|---|---|---|
| N/A | | | |

**Table C.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) [A] | Storm Depth (inches) [B] | DMA Name / ID | [C] from Table C.4 = [C] | Required Retention Depth (inches) [D] |
| N/A | | | | | | |

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

**Table C.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 | Impervious fraction | Product | | Area (square feet) | Ratio |
| | [A] | | [B] | [C] = [A] x [B] | DMA name /ID | [D] | [C]/[D] |
| N/A | | | | | | | |

**Table C.5** Type 'D', Areas Draining to BMPs

| DMA Name or ID | BMP Name or ID |
|---|---|
| A | Modular Wetland Unit #1 MWS-L-4-15 |
| B | Modular Wetland Unit #2 MWS-L-4-8 |
| C | Modular Wetland Unit #3 MWS-L-4-8 |
| D | Modular Wetland Unit #4 MWS-L-8-12 |

*Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.*

# Section D: Implement LID BMPs

## D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site; proceed to section D.3

If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

### 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 Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. 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.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

### Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. 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 D.1** Infiltration Feasibility

| Does the project site… | YES | NO |
|---|---|---|
| …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 of a water supply well? | | X |
| If Yes, list affected DMAs: | | |
| …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: | | |
| …have measured in-situ infiltration rates of less than 1.6 inches / hour? | X | |
| If Yes, list affected DMAs: | | |
| …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: | | |
| …geotechnical report identify other site-specific factors that would preclude effective and safe infiltration? | | X |
| Describe here: | | |

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

*Per the evaluation performed by LOR Geotechnical Group on October 9, 2023, the site soil materials are not conducive to infiltration with a measured infiltration rate of 0.27 in/hr.*

## D.2 Harvest and Use Assessment

Please check what applies*:*

☐ Reclaimed water will be used for the non-potable water demands for the project.

☐Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If none of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

### Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

*Total Area of Irrigated Landscape*: 0.63 ac

*Type of Landscaping (Conservation Design or Active Turf)*: Conservation

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

*Total Area of Impervious Surfaces:* 2.83 ac

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

*Enter your EIATIA factor*: 1.85

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

*Minimum required irrigated area*: 5.24 ac

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

| Minimum required irrigated area (Step 4) | Available Irrigated Landscape (Step 1) |
|---|---|
| 5.24 ac | 0.63 ac |

*The available irrigated landscape is less than the minimum required irrigated area, so harvest and reuse is not feasible for this project.*

## Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

*Projected Number of Daily Toilet Users: 245 persons*

*Project Type: Residential*

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

*Total Area of Impervious Surfaces: 2.83 ac*

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-2 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

*Enter your TUTIA factor: 131*

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

*Minimum number of toilet users: 371 persons*

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

| Minimum required Toilet Users (Step 4) | Projected number of toilet users (Step 1) |
|---|---|
| 371 persons | 245 persons |

*The projected number of toilet users is less than the minimum required toilet users, so harvest and reuse is not feasible for this project.*

## Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

*Average Daily Demand: N/A*

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as

a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

*Total Area of Impervious Surfaces: N/A*

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

*Enter the factor from Table 2-4: N/A*

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of gallons per day of non-potable use that would be required.

*Minimum required use: N/A*

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

| **Minimum required non-potable use (Step 4)** | **Projected average daily use (Step 1)** |
|---|---|
| N/A | N/A |

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment per Section 3.4.2 of the WQMP Guidance Document.

## D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

*Select one of the following:*

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ 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 to discuss this option. Proceed to Section E to document your alternative compliance measures.

## D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

**Table D.2** LID Prioritization Summary Matrix

| DMA Name/ID | LID BMP Hierarchy | | | | No LID (Alternative Compliance) |
|---|---|---|---|---|---|
| | 1. Infiltration | 2. Harvest and use | 3. Bioretention | 4. Biotreatment | |
| A | ☐ | ☐ | ☐ | ☒ | ☐ |
| B | ☐ | ☐ | ☐ | ☒ | ☐ |
| C | ☐ | ☐ | ☐ | ☒ | ☐ |
| D | ☐ | ☐ | ☐ | ☒ | ☐ |

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E 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.

*LID BMPs are applicable and will be employed on the project site. Refer to Section D.5 for details. In order to disconnect impervious areas and allow for some infiltration at natural rates, swales and flowpaths will be graded to direct runoff around the buildings and draining to area drains and outletting to the street, where it will be treated via the proposed biotreatment systems consistent with Section 2.4.8 of the WQMP Guidance Document. Although these areas meet the criteria for Self-Retaining Areas consistent with Section 3.3.3 of the WQMP Guidance Document, no volume credit will be taken for these areas.*

## D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume 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 a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume 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.

**Table D.3** DCV Calculations for LID BMPs (DMA A)

| DMA Type/ID | DMA Area (square feet) | Post-Project Surface Type | Effective Imperious Fraction, $I_f$ | DMA Runoff Factor | DMA Areas x Runoff Factor | *Enter BMP Name / Identifier Here* *DMA A: MWS-L-4-15* | | |
|---|---|---|---|---|---|---|---|---|
| | [A] | | [B] | [C] | [A] x [C] | | | |
| ***A1*** | *5,807.8* | *Ornamental Landscaping* | *0.10* | *0.11* | *641.5* | *Design Rainfall Intensity (in/hr)* | *Design Flow Rate, $Q_{BMP}$ (cfs)* | *Proposed Flow Rate on Plans (cfs)* |
| ***A2*** | *24,208.8* | *Concrete or Asphalt* | *1* | *0.892* | *21,594.2* | | | |
| | 30,016.6 | | | | 22,235.7 | 0.20 | 0.167 | ***0.175*** |

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

**Table D.4** DCV Calculations for LID BMPs (DMA B)

| DMA Type/ID | DMA Area (square feet) | Post-Project Surface Type | Effective Imperious Fraction, $I_f$ | DMA Runoff Factor | DMA Areas x Runoff Factor | *Enter BMP Name / Identifier Here* *DMA B: MWS-L-4-8* | | |
|---|---|---|---|---|---|---|---|---|
| | [A] | | [B] | [C] | [A] x [C] | | | |
| ***B1*** | *11,148.0* | *Ornamental Landscaping* | *0.10* | *0.11* | *1,231.4* | *Design Rainfall Intensity (in/hr)* | *Design Flow Rate, $Q_{BMP}$ (cfs)* | *Proposed Flow Rate on Plans (cfs)* |
| ***B2*** | *24,060.0* | *Concrete or Asphalt* | *1* | *0.892* | *21,461.5* | | | |
| | 35,208.0 | | | | 22,692.9 | 0.20 | 0.104 | ***0.115*** |

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

**Table D.5** DCV Calculations for LID BMPs (DMA C)

| 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* *DMA C: MWS-L-4-8* | | |
|---|---|---|---|---|---|---|---|---|
| | [A] | | [B] | [C] | [A] x [C] | | | |
| ***C1*** | *6,663.8* | *Ornamental Landscaping* | *0.10* | *0.11* | *736.1* | *Design Rainfall Intensity (in/hr)* | *Design Flow Rate, $Q_{BMP}$ (cfs)* | *Proposed Flow Rate on Plans (cfs)* |
| ***C2*** | *20,615.05* | *Concrete or Asphalt* | *1* | *0.892* | *18,388.6* | | | |
| | 27,278.85 | | | | 19,124.7 | 0.20 | 0.088 | ***0.115*** |

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

**Table D.6** DCV Calculations for LID BMPs (DMA D)

| 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* *DMA D: MWS-L-8-12* | | |
|---|---|---|---|---|---|---|---|---|
| | [A] | | [B] | [C] | [A] x [C] | | | |
| ***D1*** | *3,445.9* | *Ornamental Landscaping* | *0.10* | *0.11* | *380.6* | *Design Rainfall Intensity (in/hr)* | *Design Flow Rate, $Q_{BMP}$ (cfs)* | *Proposed Flow Rate on Plans (cfs)* |
| ***D2*** | *54,399.23* | *Concrete or Asphalt* | *1* | *0.892* | *48,524.1* | | | |
| | 57,845.13 | | | | 48,904.7 | 0.20 | 0.225 | ***0.346*** |

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

*Four Modular Wetland Systems (MWS) are proposed for water quality treatment for DMA A, B, C, & D. Modular Wetlands by Modular Wetlands Systems, Inc. are proprietary biotreatment systems that utilize multi-stage treatment processes including screening media filtration, settling, and biofiltration. The pre-treatment chamber contains the first three stages of treatment and includes a catch basin inlet filter to capture trash, debris, gross solids and sediments, a settling chamber for separating out larger solids, and a media filter cartridge for capturing fine TSS, metals, nutrients, and bacteria. Runoff then flows through the wetland chamber where treatment is achieved through a variety of physical, chemical, and biological processes. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants, functioning similar to bioretention systems. The discharge chamber at the end of the unit collects treated flows and discharges back into the storm drain system.*

*The MWS units have been sized based on the worksheets provided in Appendix F of the Riverside County LID BMP Design Handbook for flow-based BMPs. For MWS systems, treatment capacities of each unit are based on wetland media design loading rate (controlled by downstream orifice) and perimeter surface area of wetland media provided. See Appendix 6 for BMP details.*

*Like all stormwater BMPs, Modular Wetland Systems require routine maintenance. Based on the manufacturer's recommendations, the following steps are required:*

- *Remove trash from screening device (5 minute average service time; interval 6-12 months)*
- *Remove sediment from separation chamber (10 minute average service time; interval 12-24 months)*
- *Replace Cartridge Filter Media (10-15 minute average service time; interval 12-24 months)*
- *Replace Drain Down Filter Media (5 minute average service time; interval 12-24 months)*
- *Trim Vegetation (service time varies; interval 6 -12 months)*

*The maintenance of the MWS units are similar to Contech's Filterra Biofiltration units. Both require approximately 2 maintenance visits/year with similar costs and time durations to service the units. Most stormwater maintenance service companies have experience with both systems and service costs are fairly consistent and can be easily incorporated into maintenance budgets and reserves. Further details on the typical maintenance requirements for MWS units, as well as a summary of typical maintenance costs, are included in the attached O&M Plan in Appendix 9 (actual maintenance costs may vary depending on current labor rates, replacement media costs, site pollutant loading rates, etc.).*

# Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

# E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

**Table E.1** 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 |
| ☐ Detached Residential Development | P | N | P | P | N | P | P | P |
| ☒ Attached Residential Development | P | N | P | P | N | P | P | P(2) |
| ☐ Commercial/Industrial Development | P(3) | P | P(1) | P(1) | P(5) | P(1) | P | P |
| ☐ Automotive Repair Shops | N | P | N | N | P(4, 5) | N | P | P |
| ☐ Restaurants (>5,000 ft²) | P | N | N | N | N | N | P | P |
| ☐ Hillside Development (>5,000 ft²) | P | N | P | P | N | P | P | P |
| ☐ Parking Lots (>5,000 ft²) | P(6) | P | P(1) | P(1) | P(4) | P(1) | P | P |
| ☐ Retail Gasoline Outlets | N | P | N | N | P | N | P | P |
| **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*

*(4) Specifically petroleum hydrocarbons*

*(5) Specifically solvents*

*(6) Bacterial indicators are routinely detected in pavement runoff*

## E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

**Table E.2** Water Quality Credits

| Qualifying Project Categories | Credit Percentage[2] |
|---|---|
| N/A | |
| | |
| | |
| *Total Credit Percentage[1]* | |

*[1]Cannot Exceed 50%*

*[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document*

## E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

**Table E.3** Treatment Control BMP Sizing

| **DMA Type/ID** | **DMA Area (square feet)** | **Post-Project Surface Type** | **Effective Impervious Fraction, $I_f$** | **DMA Runoff Factor** | **DMA Area x Runoff Factor** | | ***Enter BMP Name / Identifier Here*** | | |
|---|---|---|---|---|---|---|---|---|---|
| | [A] | | [B] | [C] | [A] x [C] | | | | |
| N/A | | | | | | *Design Storm Depth (in)* | *Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)* | *Total Storm Water Credit % Reduction* | *Proposed Volume or Flow on Plans (cubic feet or cfs)* |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | $A_T$ = Σ[A] | | | | Σ= [D] | [E] | $[F] = \frac{[D]x[E]}{[G]}$ | [F] X (1-[H]) | [I] |

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

## E.4 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 have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, 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.4** Treatment Control BMP Selection

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

*[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 Co-Permittee Approved Study and provided in Appendix 6.*

# Section F: Hydromodification

### F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

**HCOC EXEMPTION 1**: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

**HCOC EXEMPTION 2**: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

**Table F.1** Hydrologic Conditions of Concern Summary

| | **2 year – 24 hour** | | |
|---|---|---|---|
| | **Pre-condition** | **Post-condition** | **% Difference** |
| **Time of Concentration** | N/A | | |
| **Volume (Cubic Feet)** | | | |

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

**HCOC EXEMPTION 3**: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Susceptibility Maps.

Does the project qualify for this HCOC Exemption? ☒ Y ☐ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

*Prado Dam*

*Runoff from the project site will be filtered through Modular Wetland Systems before exiting the project site into an existing storm drain in S Buena Vista Avenue. Flows will then be directed to Reach 1a of the Temescal River before joining the Santa Ana River and the Prado Basin. Per the Riverside County HCOC Applicability Map for Santa Ana River Permittees (updated February 2017), the project site is not located in an area determined to be susceptible. See Appendix 1 for the Applicability Map.*

## F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

# 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 MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

**Table G.1** Permanent and Operational Source Control Measures

| Potential Sources of Runoff pollutants | Permanent Structural Source Control BMPs | Operational Source Control BMPs |
|---|---|---|
| On-site storm drain inlets | Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify. | Maintain and periodically repaint or replace inlet markings.<br>Provide stormwater pollution prevention information to new site owners, lessees, or operators.<br>See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.casqa.org/resources/bmp-handbooks |

| Potential Sources of Runoff pollutants | Permanent Structural Source Control BMPs | Operational Source Control BMPs |
|---|---|---|
| | | Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains. |
| Need for future indoor & structural pest control | Note building design features that discourage entry of pests. | Provide Integrated Pest Management information to owners, lessees, and operators. |
| Landscape/ Outdoor Pesticide Use | Landscape Plans shall:<br>Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.<br>Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.<br>Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.<br>Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions. | Maintain landscaping using minimum or no pesticides.<br>See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at<br>https://rcwatershed.org/about/links-and-resources/outreach-materials-library/<br>Provide IPM information to new owners, lessees and operators. |
| Pools, spas, ponds, decorative fountains, and other water features | If the Co-Permittee requires pools to be plumed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements | See applicable operation BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at https://rcwatershed.org/about/links-and-resources/outreach-materials-library/ |
| Refuse areas | Signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar. | Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep |

| Potential Sources of Runoff pollutants | Permanent Structural Source Control BMPs | Operational Source Control BMPs |
|---|---|---|
| | | spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.casqa.org/resources/bmp-handbooks |
| Fire Sprinkler Test Water | Provide a means to drain fire sprinkler test water to sanitary sewer. | See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.casqa.org/resources/bmp-handbooks |
| Roofing, gutters, and trim | Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. | -- |
| Plazas, sidewalks, and parking lots. | | Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain. |

# Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. 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) | BMP Location (Lat/Long) |
|---|---|---|---|
| #1 | Modular Wetland System #1 | Pending – to be provided in Final WQMP and Precise Grade Plans | 33.880266, -117.578845 |
| #2 | Modular Wetland System #2 | Pending – to be provided in Final WQMP and Precise Grade Plans | 33.880614, -117.577171 |
| #3 | Modular Wetland System #3 | Pending – to be provided in Final WQMP and Precise Grade Plans | 33.880424, -117.577497 |
| #4 | Modular Wetland System #4 | Pending – to be provided in Final WQMP and Precise Grade Plans | 33.880162, -117.577601 |

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. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

# Section I: Operation, Maintenance and Funding

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

1. A means to finance and implement facility maintenance 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 O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater 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 Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

**Maintenance Mechanism:** Owner's Property Management

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

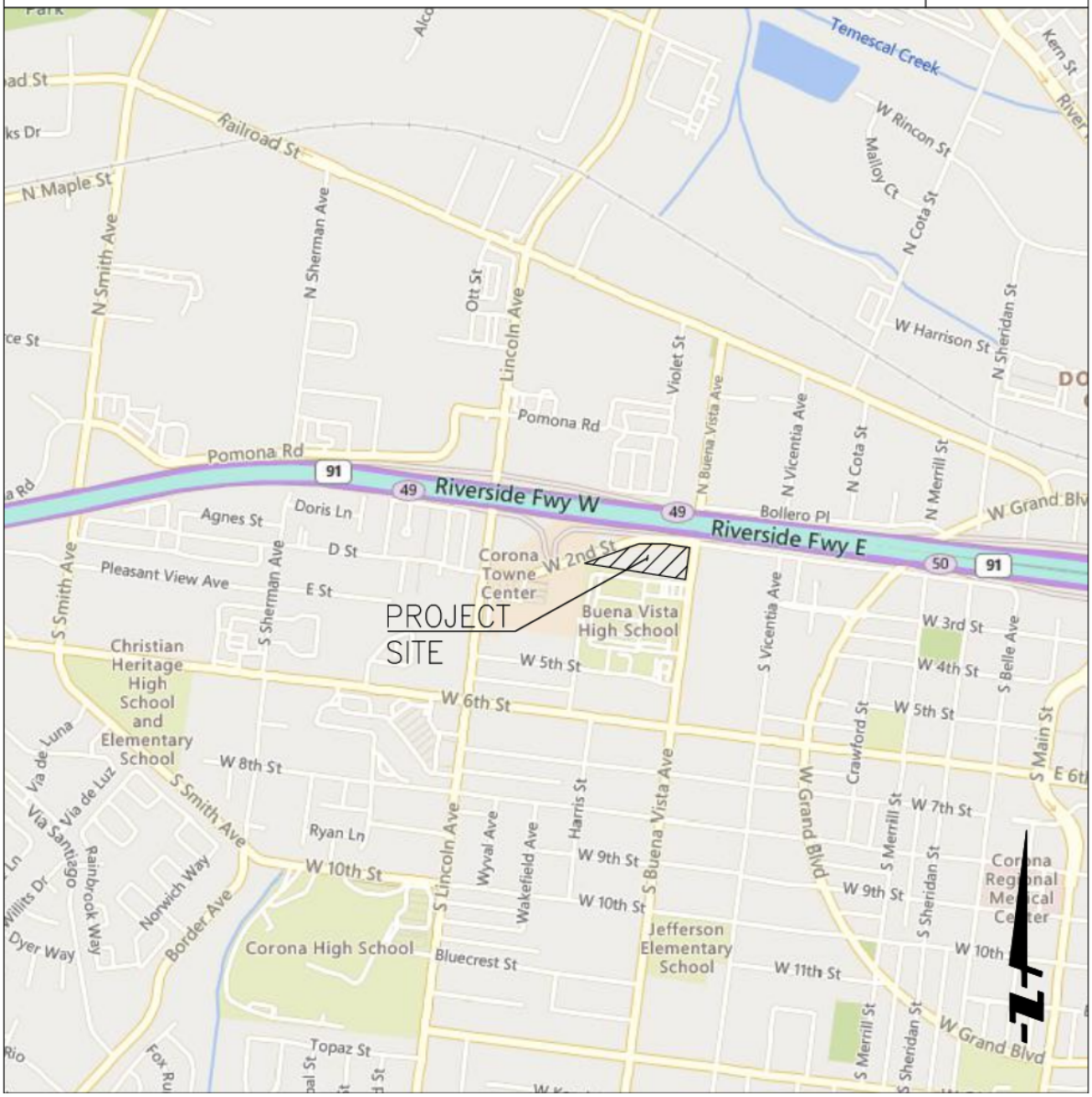
☐ Y ☒ N

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.

# Appendix 1: Maps and Site Plans

*Location Map, WQMP Site Plan and Receiving Waters Map*

| VICINITY MAP | NTS |
| --- | --- |



# PROJECT SUMMARY

**PARKING:**

| | |
|---|---|
| BLDG 1: | 11 GARAGE STALLS (1 ADA) |
| BLDG 4: | 22 GARAGE STALLS (2 ADA) |
| SITE: | 121 STALLS |
| | 90 STANDARD STALLS |
| | 18 ACCESSIBLE |
| | 13 EV |
| TOTAL: | 154 STALLS |
| RATIO: | 1.34:1 |

**UNIT COUNT:**

BLDG 1 (15-PLEX):

| | | | |
|---|---|---|---|
| UNIT 2 (2 BED): | 5 UNITS | | |
| UNIT 3 (3 BED): | 10 UNITS | | |

BLDG 2 (45-PLEX):

| | | | |
|---|---|---|---|
| UNIT 1 (1 BED): | 3 UNITS | UNIT 1 (1 BED): | 18 UNITS |
| UNIT 2 (2 BED): | 15 UNITS | UNIT 2 (2 BED): | 46 UNITS |
| UNIT 3 (3 BED): | 21 UNITS | UNIT 3 (3 BED): | 45 UNITS |
| UNIT 4 (0 BED): | 6 UNITS | UNIT 4 (0 BED): | 6 UNITS |
| | | TOTAL: | 115 UNITS |

BLDG 3 (26-PLEX):

| | | | |
|---|---|---|---|
| UNIT 1 (1 BED): | 15 UNITS | UNIT 1 (1 BED): | 764.4 S.F. |
| UNIT 2 (2 BED): | 5 UNITS | UNIT 2 (2 BED): | 939.3 S.F. |
| UNIT 3 (3 BED): | 6 UNITS | UNIT 3 (3 BED): | 1115.3 S.F. |
| | | UNIT 4 (0 BED): | 601 S.F. |

BLDG 4 (29-PLEX):

| | | | |
|---|---|---|---|
| UNIT 2 (2 BED): | 21 UNITS | | |
| UNIT 3 (3 BED): | 8 UNITS | | |

**AREA CALCULATIONS:**

TOTAL SITE AREA:
150,683.5 SQ FT (3.46 ACRES)
33.24 DU/AC

BLDG AREA:

| | |
|---|---|
| BLDG 1 (15-PLEX): | 23,407.5 S.F. |
| BLDG 2 (45-PLEX): | 53,263.6 S.F. |
| BLDG 3 (26-PLEX): | 32,586.2 S.F. |
| BLDG 4 (29-PLEX): | 43,947.9 S.F. |
| TOTAL: | 153,205.2 S.F. |
| COMMUNITY: | 2,148 S.F. |
| MAIL: | 203 S.F. |
| LEASING: | 1,170 S.F. |
| LAUNDRY: | 942 S.F. |

UNIT 1 (1 BED)
UNIT 2 (2 BED)
UNIT 3 (3 BED)
UNIT 4 (STUDIO - 0 BED)
ACCESSIBLE PATH OF TRAVEL
COMMUNITY ROOM
MAIL
LAUNDRY
LEASE OFFICE
4-FOOT DEDICATION

**PARKING TABULATION**

**ACCESSIBLE SPACE CALCULATIONS**

| PARKING SPACE TYPE | REQUIRED | PROVIDED | NOTES |
|---|---|---|---|
| TOTAL SPACES | 161 | 154 | NOTE: 1.4 STALLS PER DWELLING UNIT |
| COVERED SPACES | 0 | 33 | |
| STANDARD ACCESSIBLE | 16 | 18 | PER 11B-208.2.3 |
| VAN ACCESSIBLE | 4 | 5 | 1/6 OF TOTAL ACCESSIBLE SPACES PER 11B-208.2.4 |
| EVCS STANDARD ACCESSIBLE | 0 | 0 | PER TABLE 11B-228.3.2.1 |
| EVCS VAN ACCESSIBLE | 1 | 1 | PER TABLE 11B-228.3.2.1 |

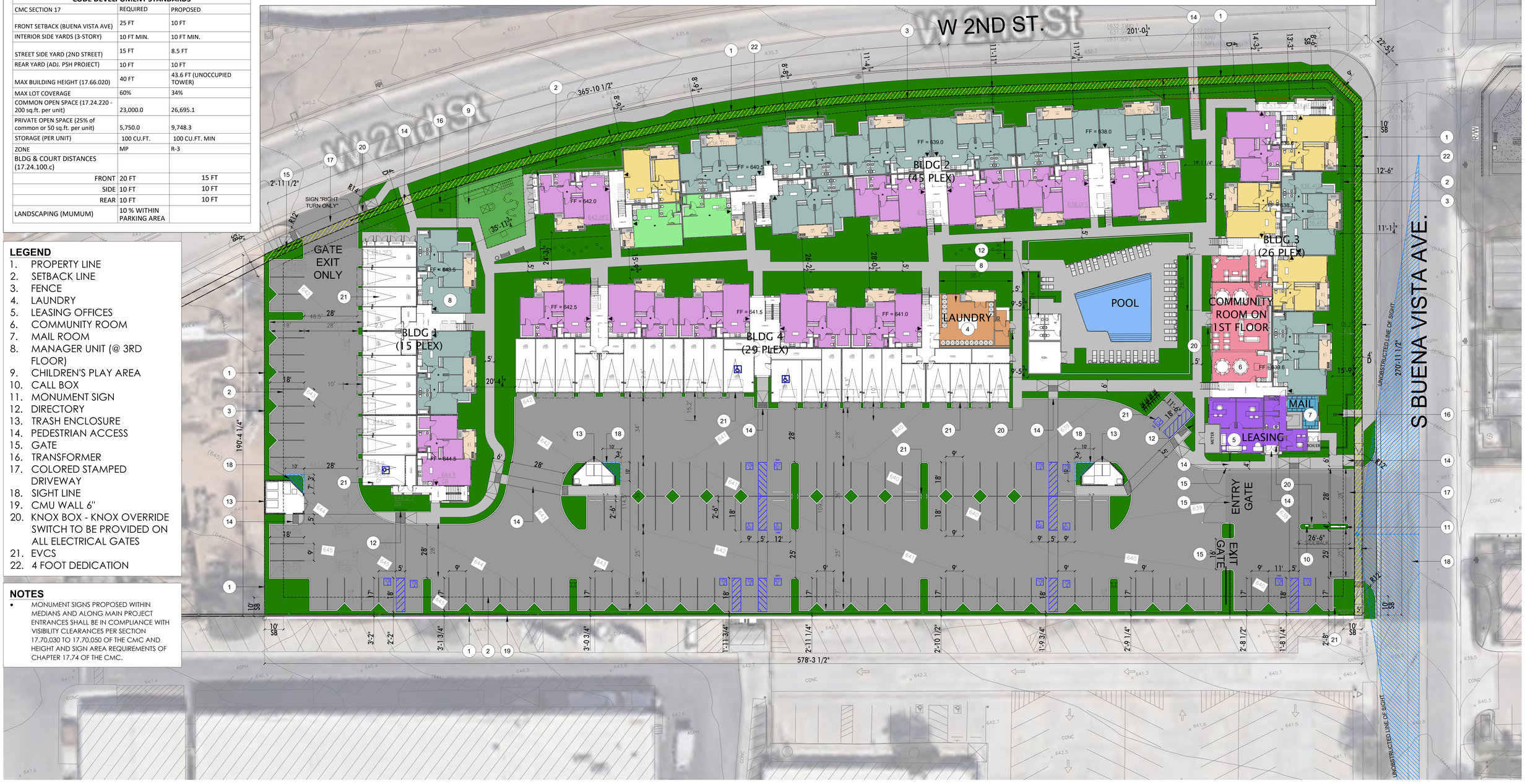
**EV CALCULATIONS**

| EV SPACE TYPE | REQUIRED | PROVIDED | NOTES |
|---|---|---|---|
| EV CAPABLE | 16 | 16 | 10% OF TOTAL SPACES PROVIDED, PER CGBSC 4.106.4.2.1 |
| EV READY | 39 | 39 | 25% OF TOTAL SPACES PROVIDED, PER CGBSC 4.106.4.2.2 |
| EV CHARGER (EVCS) | 8 | 8 | 5% OF TOTAL SPACES PROVIDED, PER CGBSC 4.106.4.2.3 |

| MULTIPLE FAMILY USE | | REQUIRED | PROVIDED |
|---|---|---|---|
| a. Studio/single bed unit | a. 2 covered spaces/unit, + 1 uncovered guest space/5 units | 52.8 | 18 |
| b. Two bed unit | b. 2 covered spaces/unit, + 1 uncovered guest space/5 units | 101.2 | 69 |
| c. Three + bed unit | c. 2 covered + 1 uncovered spaces/unit, + 1 uncovered guest space/5 units | 144 | 67 |
| Total | | 298 | 154 |

**CODE DEVELPOMENT STANDARDS**

| CMC SECTION 17 | REQUIRED | PROPOSED |
|---|---|---|
| FRONT SETBACK (BUENA VISTA AVE) | 25 FT | 10 FT |
| INTERIOR SIDE YARDS (3-STORY) | 10 FT MIN. | 10 FT MIN. |
| STREET SIDE YARD (2ND STREET) | 15 FT | 8.5 FT |
| REAR YARD (ADJ. PSH PROJECT) | 10 FT | 10 FT |
| MAX BUILDING HEIGHT (17.66.020) | 40 FT | 43.6 FT (UNOCCUPIED TOWER) |
| MAX LOT COVERAGE | 60% | 34% |
| COMMON OPEN SPACE (17.24.220 - 200 sq.ft. per unit) | 23,000.0 | 26,695.1 |
| PRIVATE OPEN SPACE (25% of common or 50 sq.ft. per unit) | 5,750.0 | 9,748.3 |
| STORAGE (PER UNIT) | 100 CU.FT. | 100 CU.FT. MIN |
| ZONE | MP | R-3 |
| BLDG & COURT DISTANCES (17.24.100.c) | | |
| FRONT | 20 FT | 15 FT |
| SIDE | 10 FT | 10 FT |
| REAR | 10 FT | 10 FT |
| LANDSCAPING (MUMUM) | 10 % WITHIN PARKING AREA | |




**LEGEND**

1. PROPERTY LINE
2. SETBACK LINE
3. FENCE
4. LAUNDRY
5. LEASING OFFICES
6. COMMUNITY ROOM
7. MAIL ROOM
8. MANAGER UNIT (@ 3RD FLOOR)
9. CHILDREN'S PLAY AREA
10. CALL BOX
11. MONUMENT SIGN
12. DIRECTORY
13. TRASH ENCLOSURE
14. PEDESTRIAN ACCESS
15. GATE
16. TRANSFORMER
17. COLORED STAMPED DRIVEWAY
18. SIGHT LINE
19. CMU WALL 6"
20. KNOX BOX - KNOX OVERRIDE SWITCH TO BE PROVIDED ON ALL ELECTRICAL GATES
21. EVCS
22. 4 FOOT DEDICATION

**NOTES**

- MONUMENT SIGNS PROPOSED WITHIN MEDIANS AND ALONG MAIN PROJECT ENTRANCES SHALL BE IN COMPLIANCE WITH VISIBILITY CLEARANCES PER SECTION 17.70.030 TO 17.70.050 OF THE CMC AND HEIGHT AND SIGN AREA REQUIREMENTS OF CHAPTER 17.74 OF THE CMC.

1" = 20'-0"

# SECOND STREET FAMILY LP

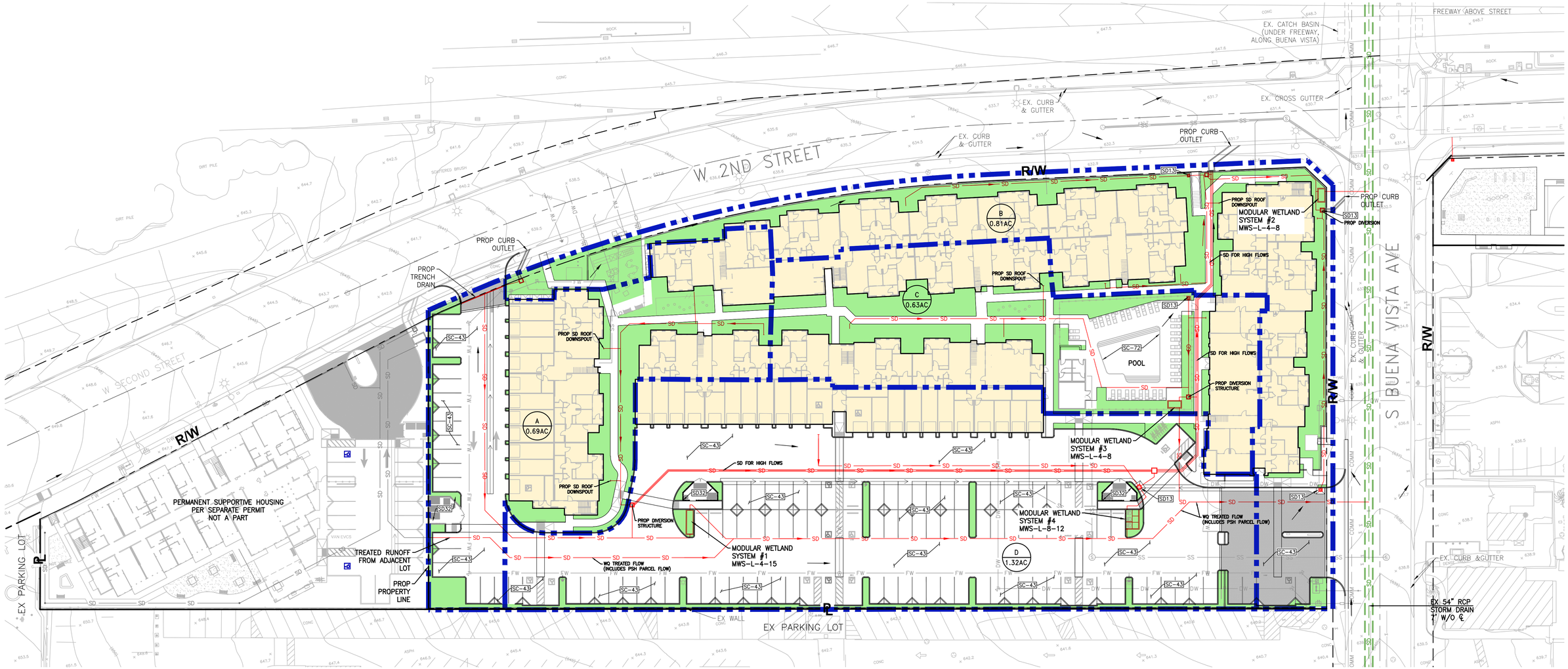
CORONA, CA

March 6, 2024

## ARCHITECTURAL SITE PLAN

A01

ORANGE HOUSING DEVELOPMENT CORPORATION
Improving the Quality of Life
IDEArc ARCHITECTURE + PLANNING
17848 SKY PARK CIRCLE, SUITE D
IRVINE, CA 92614
949.336.6056
C&C Development




## LEGEND

- DMA BOUNDARY
- EXISTING STORM DRAIN
- PROPOSED ONSITE STORM DRAIN (SC-44)
- FUTURE OFFSITE STORM DRAIN (NOT-A-PART)
- X — AREA DESIGNATION
- X.XX AC — AREA (IN ACRES)
- PROPOSED LANDSCAPING EFFICIENT IRRIGATION & LANDSCAPE MAINTENANCE (SD-10, SD-12)
- PROPOSED RESIDENTIAL BUILDING BUILDING & GROUNDS MAINTENANCE (SC-41)
- SURFACE FLOW DIRECTION
- STORM DRAIN FLOW DIRECTION

## SOURCE CONTROL BMP'S

- SD-10 SITE DESIGN & LANDSCAPE PLANNING
- SD-12 EFFICIENT IRRIGATION
- SD-13 STORM DRAIN SIGNAGE
- SD-32 TRASH STORAGE AREAS
- SC-41 BUILDING & GROUNDS MAINTENANCE
- SC-43 PARKING & STORAGE AREA MAINTENANCE
- SC-44 DRAINAGE SYSTEM MAINTENANCE
- SC-72 FOUNTAIN AND POOL MAINTENANCE

| DMA Type/ID | DMA Area (square feet) [A] | Post-Project Surface Type | Effective Impervious Fraction, $I_f$ [B] | DMA Runoff Factor [C] | DMA Areas x Runoff Factor [A] x [C] | Modular Wetland Linear MWS-L-4-15 | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Design Rainfall Intensity (in/hr) | Design Flowrate, $Q_{DES}$ (cfs) | Proposed Flow Rate (cfs) |
| A/1 | 6,037.96 | Ornamental Landscaping | 0.10 | 0.11 | 666.9 | | | |
| A/2 | 40,010 | Concrete or Asphalt | 1 | 0.892 | 35688.9 | | | |
| | 46047.96 | | | | Σ= 36355.8 | 0.20 | 0.167 | 0.175 |

| DMA Type/ID | DMA Area (square feet) [A] | Post-Project Surface Type | Effective Impervious Fraction, $I_f$ [B] | DMA Runoff Factor [C] | DMA Areas x Runoff Factor [A] x [C] | Modular Wetland Linear MWS-L-4-8 | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Design Rainfall Intensity (in/hr) | Design Flowrate, $Q_{DES}$ (cfs) | Proposed Flow Rate (cfs) |
| C/1 | 7,560 | Ornamental Landscaping | 0.10 | 0.11 | 835 | | | |
| C/2 | 19,719 | Concrete or Asphalt | 1 | 0.892 | 17589.6 | | | |
| | 27278.85 | | | | Σ= 18424.6 | 0.20 | 0.085 | 0.115 |

| DMA Type/ID | DMA Area (square feet) [A] | Post-Project Surface Type | Effective Impervious Fraction, $I_f$ [B] | DMA Runoff Factor [C] | DMA Areas x Runoff Factor [A] x [C] | Modular Wetland Linear MWS-L-4-8 | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Design Rainfall Intensity (in/hr) | Design Flowrate, $Q_{DES}$ (cfs) | Proposed Flow Rate (cfs) |
| B/1 | 11,644 | Ornamental Landscaping | 0.10 | 0.11 | 1286.2 | | | |
| B/2 | 23,564 | Concrete or Asphalt | 1 | 0.892 | 21018.8 | | | |
| | 35207.97 | | | | Σ= 22305 | 0.20 | 0.102 | 0.115 |

| DMA Type/ID | DMA Area (square feet) [A] | Post-Project Surface Type | Effective Impervious Fraction, $I_f$ [B] | DMA Runoff Factor [C] | DMA Areas x Runoff Factor [A] x [C] | Modular Wetland Linear MWS-L-8-12 | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Design Rainfall Intensity (in/hr) | Design Flowrate, $Q_{DES}$ (cfs) | Proposed Flow Rate (cfs) |
| D/1 | 1,603 | Ornamental Landscaping | 0.10 | 0.11 | 177.1 | | | |
| D/2 | 56,242 | Concrete or Asphalt | 1 | 0.892 | 50168 | | | |
| | 57845.13 | | | | Σ= 50345.1 | 0.20 | 0.231 | 0.346 |

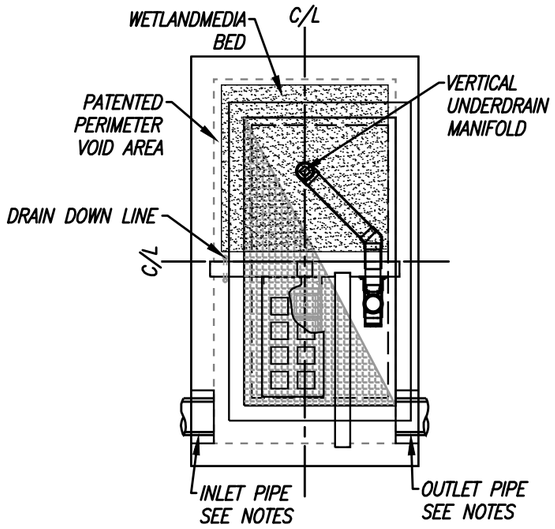

FUSCOE ENGINEERING
FULL CIRCLE THINKING®
600 Wilshire Blvd Suite 1470 Los Angeles, Ca 90017
213.988.8802 fuscoe.com


# PRELIMINARY WATER QUALITY MANAGEMENT PLAN
# WEST 2ND APARTMENTS
## CORONA, CALIFORNIA

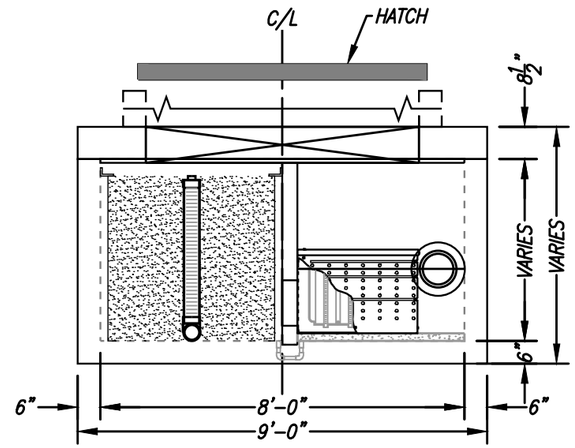
30' 0' 15' 30'
SCALE: 1" = 30'

| SITE SPECIFIC DATA | | | |
|---|---|---|---|
| PROJECT NUMBER | | | |
| PROJECT NAME | | | |
| PROJECT LOCATION | | | |
| STRUCTURE ID | | | |
| TREATMENT REQUIRED | | | |
| FLOW BASED (CFS) | | | |
| 0.115 | | | |
| PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE | | | OFFLINE |
| PIPE DATA | I.E. | MATERIAL | DIAMETER |
| INLET PIPE 1 | | | |
| INLET PIPE 2 | N/A | N/A | N/A |
| OUTLET PIPE | | | |
| | PRETREATMENT | BIOFILTRATION | DISCHARGE |
| RIM ELEVATION | | | |
| SURFACE LOAD | DIRECT TRAFFIC | | |
| NOTES: | | | |

* PRELIMINARY NOT FOR CONSTRUCTION




**PLAN VIEW**



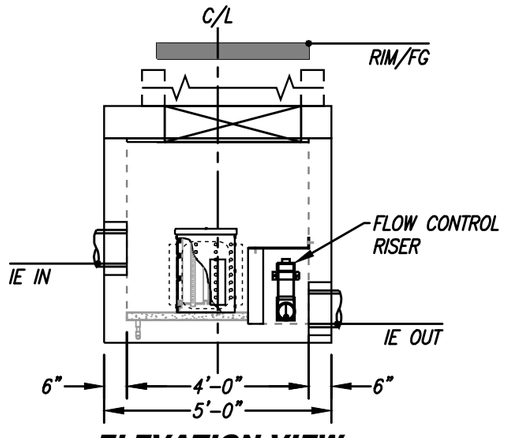

**LEFT END VIEW**

## INSTALLATION NOTES

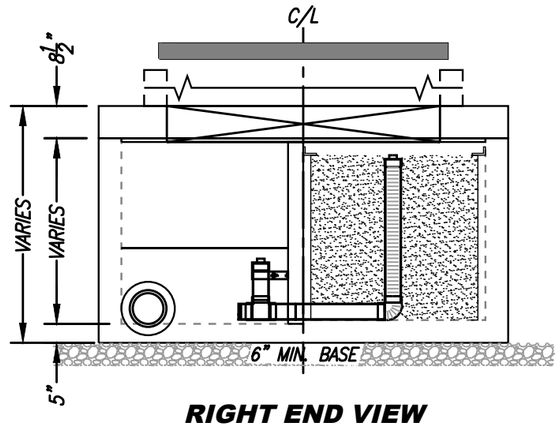
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

## GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.




**ELEVATION VIEW**




**RIGHT END VIEW**

| | |
|---|---|
| TREATMENT FLOW (CFS) | 0.115 |
| OPERATING HEAD (FT) | 3.4 |
| PRETREATMENT LOADING RATE (GPM/SF) | 2.0 |
| WETLAND MEDIA LOADING RATE (GPM/SF) | 1.0 |

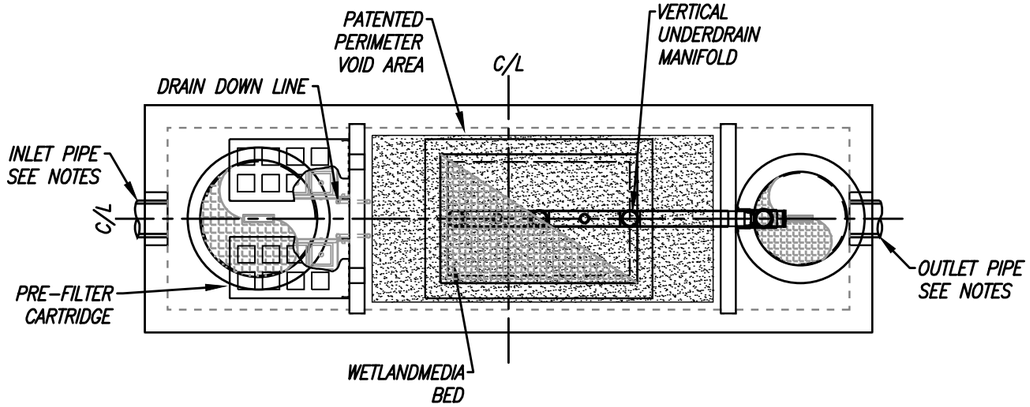
MODULAR WETLANDS
FOR PATENT INFORMATION, GO TO www.ContechES.com/IP

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com

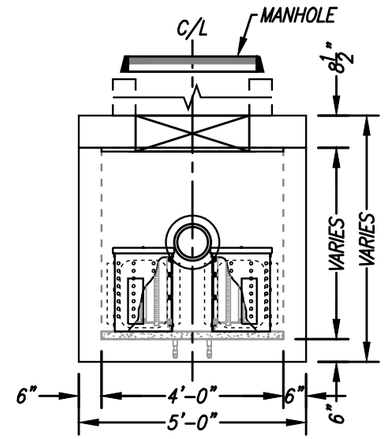
# MWS-L-4-8-V-UG
## STORMWATER BIOFILTRATION SYSTEM
## STANDARD DETAIL

| SITE SPECIFIC DATA | | | |
|---|---|---|---|
| PROJECT NUMBER | | | |
| PROJECT NAME | | | |
| PROJECT LOCATION | | | |
| STRUCTURE ID | | | |
| TREATMENT REQUIRED | | | |
| FLOW BASED (CFS) | | | |
| 0.175 | | | |
| PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE | | | OFFLINE |
| PIPE DATA | I.E. | MATERIAL | DIAMETER |
| INLET PIPE 1 | | | |
| INLET PIPE 2 | N/A | N/A | N/A |
| OUTLET PIPE | | | |
| | PRETREATMENT | BIOFILTRATION | DISCHARGE |
| RIM ELEVATION | | | |
| SURFACE LOAD | DIRECT TRAFFIC | | |
| NOTES: | | | |

* PRELIMINARY NOT FOR CONSTRUCTION




**PLAN VIEW**



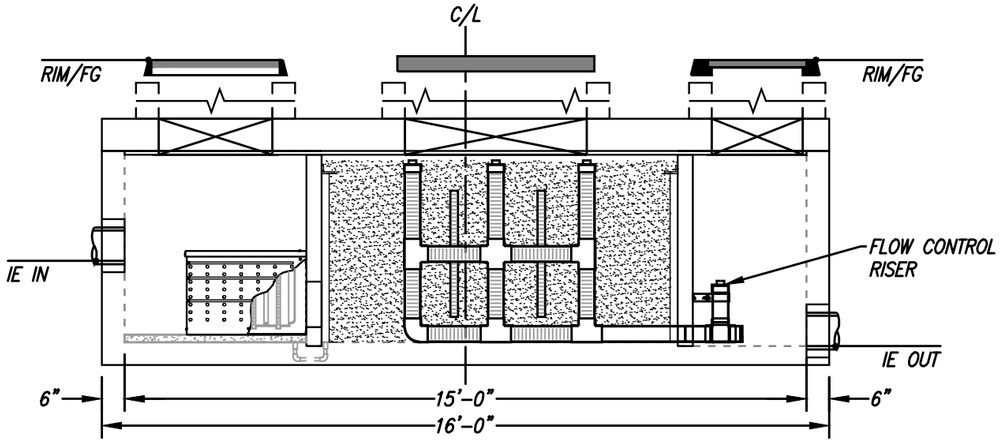

**LEFT END VIEW**

## INSTALLATION NOTES

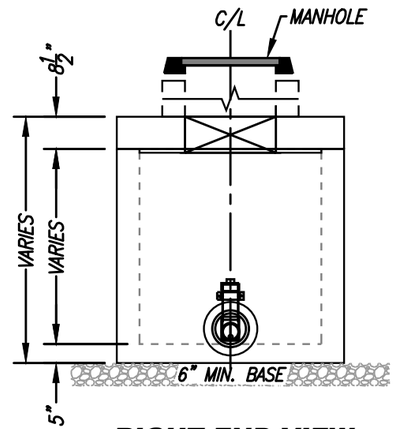
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## GENERAL NOTES

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**ELEVATION VIEW**




**RIGHT END VIEW**

| | |
|---|---|
| TREATMENT FLOW (CFS) | 0.175 |
| OPERATING HEAD (FT) | 3.4 |
| PRETREATMENT LOADING RATE (GPM/SF) | 1.5 |
| WETLAND MEDIA LOADING RATE (GPM/SF) | 1.0 |

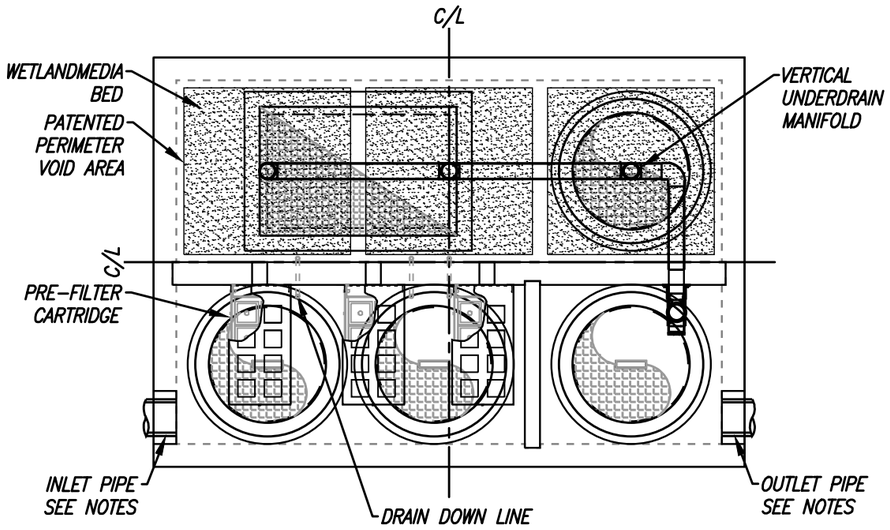
MODULAR WETLANDS
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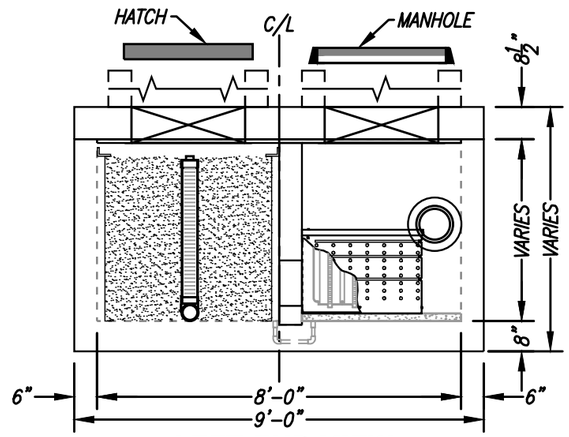
# MWS-L-4-15-V-UG
## STORMWATER BIOFILTRATION SYSTEM
## STANDARD DETAIL

| SITE SPECIFIC DATA | | | |
|---|---|---|---|
| PROJECT NUMBER | | | |
| PROJECT NAME | | | |
| PROJECT LOCATION | | | |
| STRUCTURE ID | | | |
| TREATMENT REQUIRED | | | |
| FLOW BASED (CFS) | | | |
| 0.346 | | | |
| PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE | | | OFFLINE |
| PIPE DATA | I.E. | MATERIAL | DIAMETER |
| INLET PIPE 1 | | | |
| INLET PIPE 2 | N/A | N/A | N/A |
| OUTLET PIPE | | | |
| | PRETREATMENT | BIOFILTRATION | DISCHARGE |
| RIM ELEVATION | | | |
| SURFACE LOAD | DIRECT TRAFFIC | | |
| NOTES: | | | |

* PRELIMINARY NOT FOR CONSTRUCTION




**PLAN VIEW**



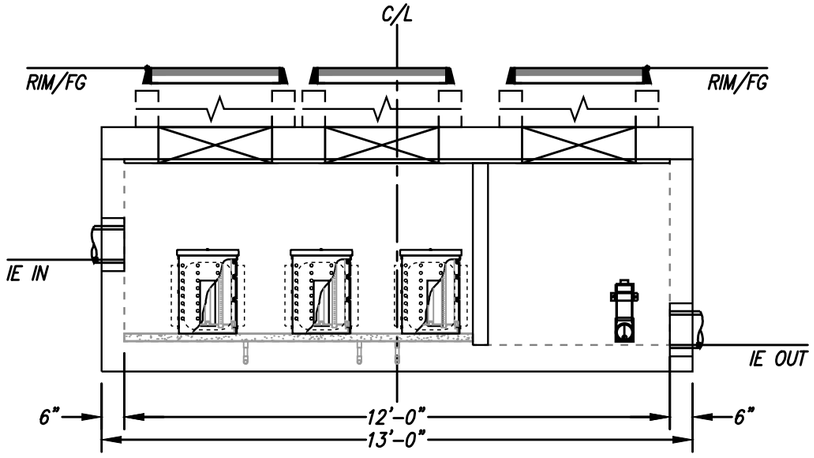

**LEFT END VIEW**

## INSTALLATION NOTES

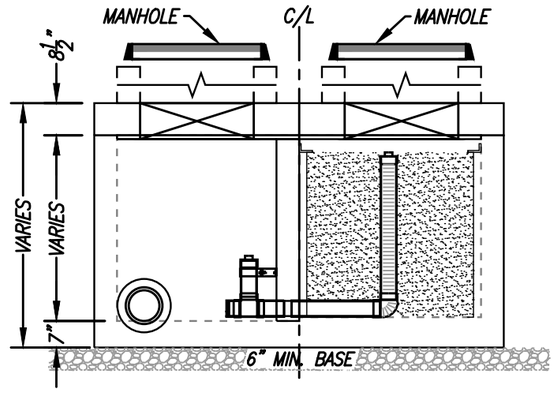
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

## GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.




**ELEVATION VIEW**




**RIGHT END VIEW**

| | |
|---|---|
| TREATMENT FLOW (CFS) | 0.346 |
| OPERATING HEAD (FT) | 3.4 |
| PRETREATMENT LOADING RATE (GPM/SF) | 2.0 |
| WETLAND MEDIA LOADING RATE (GPM/SF) | 1.0 |

MODULAR WETLANDS
FOR PATENT INFORMATION, GO TO www.ContechES.com/IP

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com

# MWS-L-8-12-V-UG
## STORMWATER BIOFILTRATION SYSTEM
## STANDARD DETAIL

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S | T 02 S | T 03 S | T 04 S | T 05 S | T 06 S | T 07 S | T 08 S

Project Site

0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.90 HurkeyCreek
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed

Santa Margarita Watershed

JURUPA VALLEY | EASTVALE | NORCO | CORONA | RIVERSIDE | MORENO VALLEY | CALIMESA | BEAUMONT | SAN JACINTO | PERRIS | HEMET | CANYON LAKE | LAKE ELSINORE | MENIFEE | WILDOMAR | MURRIETA | TEMECULA

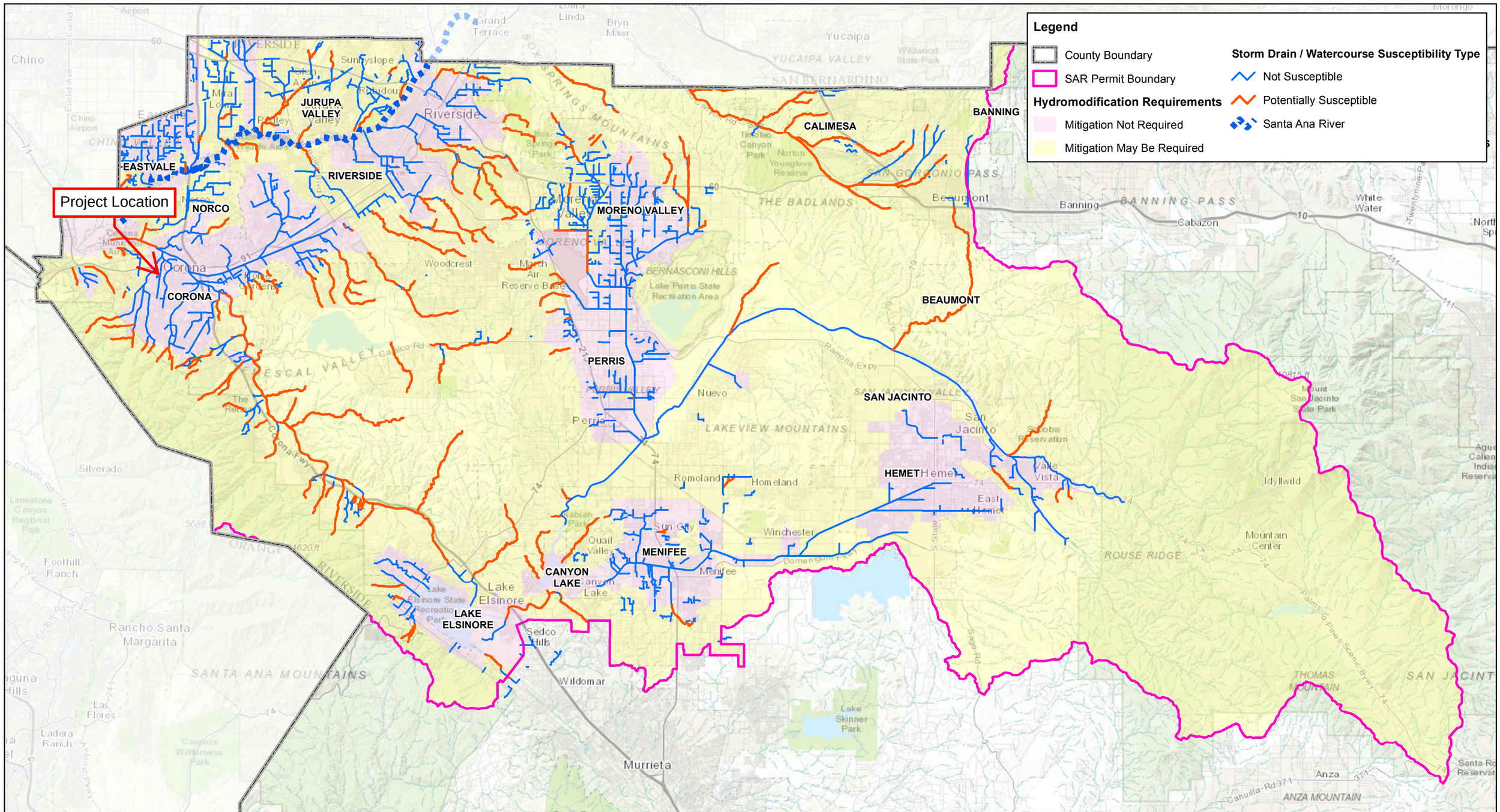
N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

# Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011


Legend
County Boundary
SAR Permit Boundary
Hydromodification Requirements
Mitigation Not Required
Mitigation May Be Required
Storm Drain / Watercourse Susceptibility Type
Not Susceptible
Potentially Susceptible
Santa Ana River
Project Location
EASTVALE
JURUPA VALLEY
RIVERSIDE
NORCO
CORONA
MORENO VALLEY
PERRIS
CALIMESA
BANNING
BEAUMONT
SAN JACINTO
HEMET
MENIFEE
CANYON LAKE
LAKE ELSINORE
Chino
Riverside
Corona
Norco
Moreno Valley
Perris
Calimesa
Banning
Beaumont
San Jacinto
Hemet
Menifee
Canyon Lake
Lake Elsinore
Murrieta
Wildomar
Temecula
Yucaipa
Redlands
Loma Linda
Grand Terrace
Colton
Jurupa Valley
Eastvale
Mira Loma
Woodcrest
Nuevo
Romoland
Homeland
Sun City
Quail Valley
Winchester
Sedco Hills
Foothill Ranch
Rancho Santa Margarita
Las Flores
Ladera Ranch
Silverado
Limestone Canyon Regional Park
Cleveland National Forest
Box Spring Mountains
Bernasconi Hills
Lake Perris State Recreation Area
March Air Reserve Base
Lake Elsinore State Recreation Park
Lake Skinner Park
Lake Perris
Lake Matthews
Mount Jacinto State Park
Idyllwild
Mountain Center
Rouse Ridge
Anza
Anza Mountain
Thomas Mountain
Santa Rosa Reservation
Soboba Reservation
San Gorgonio Pass
Banning Pass
Cabazon
Beaumont
Banning
White Water
Yucaipa Valley
San Bernardino
The Badlands
Lakeview Mountains
Santa Ana Mountains
Escalon Valley
San Jacinto Valley
Perris Valley
Temescal Valley
Orange
Riverside
San Bernardino
Ramona Expy
Cajalco Rd
Corona Fwy
Cahuilla Rd
Palms to Pines Scenic Byway
Scott Rd
Winchester Rd
Domenigoni Pkwy
Antelope Rd
Cabazon
Banning
Beaumont
Hemet
Menifee
Perris
Corona
Norco
Riverside
Eastvale
Jurupa Valley
Calimesa
Yucaipa
Redlands
Loma Linda
Grand Terrace
Colton
Chino
Moreno
Twentynine Palms
Airport
Chino Airport
Eastvale Airport
Riverside Municipal Airport
Hemet-Ryan Airport
Perris Valley Airport
Corona Municipal Airport
Flabob Airport
Box Spring Park
Tinoteo Canyon Park
Norton Younglove Reserve
Sunnyslope
Rubidoux
Mira Loma
Pedley
Valley
Sky Canyon
Kabian Park
Sun City
Quail Valley
Menifee
Canyon Lake
Lake Elsinore
Sedco Hills
Wildomar
Murrieta
Temecula
Romoland
Homeland
Winchester
Nuevo
Perris
Hemet
East Hemet
San Jacinto
Valle Vista
Idyllwild
Mountain Center
Anza
Cahuilla
Rancho Santa Margarita
Foothill Ranch
Ladera Ranch
Las Flores
Silverado
Limestone Canyon Regional Park
Caspers Wilderness Park
Lake Skinner Park
Lake Elsinore State Recreation Park
Lake Perris State Recreation Area
Mount San Jacinto State Park
Soboba Reservation
Santa Rosa Reservation
Box Spring Mountains
Bernasconi Hills
Lakeview Mountains
Rouse Ridge
Thomas Mountain
Anza Mountain
Santa Ana Mountains
Escalon Valley
San Jacinto Valley
Perris Valley
Temescal Valley
San Gorgonio Pass
Banning Pass
The Badlands
Yucaipa Valley

# NPDES MUNICIPAL PERMIT
# SANTA ANA RIVER WATERSHED
# EXHIBIT SA-1
# (EASTVALE, JURUPA VALLEY, RIVERSIDE, CORONA, NORCO AREAS)

- CITY MS4 FACILITIES
- COUNTY MS4 FACILITIES
- RCFC&WCD MS4 FACILITIES
- OTHER FACILITIES
- MAJOR OUTFALL SITES
- SAR CORE MONITORING STATIONS
- SANTA ANA RIVER WATERSHED BOUNDARY
- LANDFILL SITES
- SEWAGE TREATMENT PLANTS
- BLUE LINE STREAMS
- RIVERSIDE COUNTY BOUNDARY
- INCORPORATED AREAS
- FREEWAYS/HIGHWAYS
- PRIMARY STREETS

N

0 0.5 1 1.5 2 MILES

UPDATED NOVEMBER 2015

EASTVALE

JURUPA VALLEY

NORCO

CORONA

RIVERSIDE

MORENO VALLEY

SAN BERNARDINO COUNTY
RIVERSIDE COUNTY

RIVERSIDE COUNTY
ORANGE COUNTY

EASTVALE MASTER DRAINAGE PLAN - LINE A

EASTVALE MASTER DRAINAGE PLAN - LINE E

SAN ANTONIO MASTER DRAINAGE PLAN - LINE J

BLY CHANNEL - MISSION RD

JAMESTOWN STORM DRAIN

RUBIDOUX CHANNEL

HIGHGROVE - CENTER STREET STORM DRAIN

SPRING STREET CHANNEL

UNIVERSITY WASH - SPRUCE STREET STORM DRAIN

BOX SPRINGS STORM DRAIN

MAGNOLIA CENTER STORM DRAIN

PHOENIX AVENUE STORM DRAIN

MAGNOLIA CENTER STORM DRAIN - CENTRAL AVENUE LATERAL

MAGNOLIA CENTER STORM DRAIN - PIERCE STREET LATERAL

MONROE MOFP - VAN BUREN LATERAL

NORTH NORCO CHANNEL - LINE N-1

NORTH NORCO CHANNEL - LINE A

CORONA DRAIN LINE 46

CORONA DRAIN LINE 47

CORONA DRAIN LINE 48

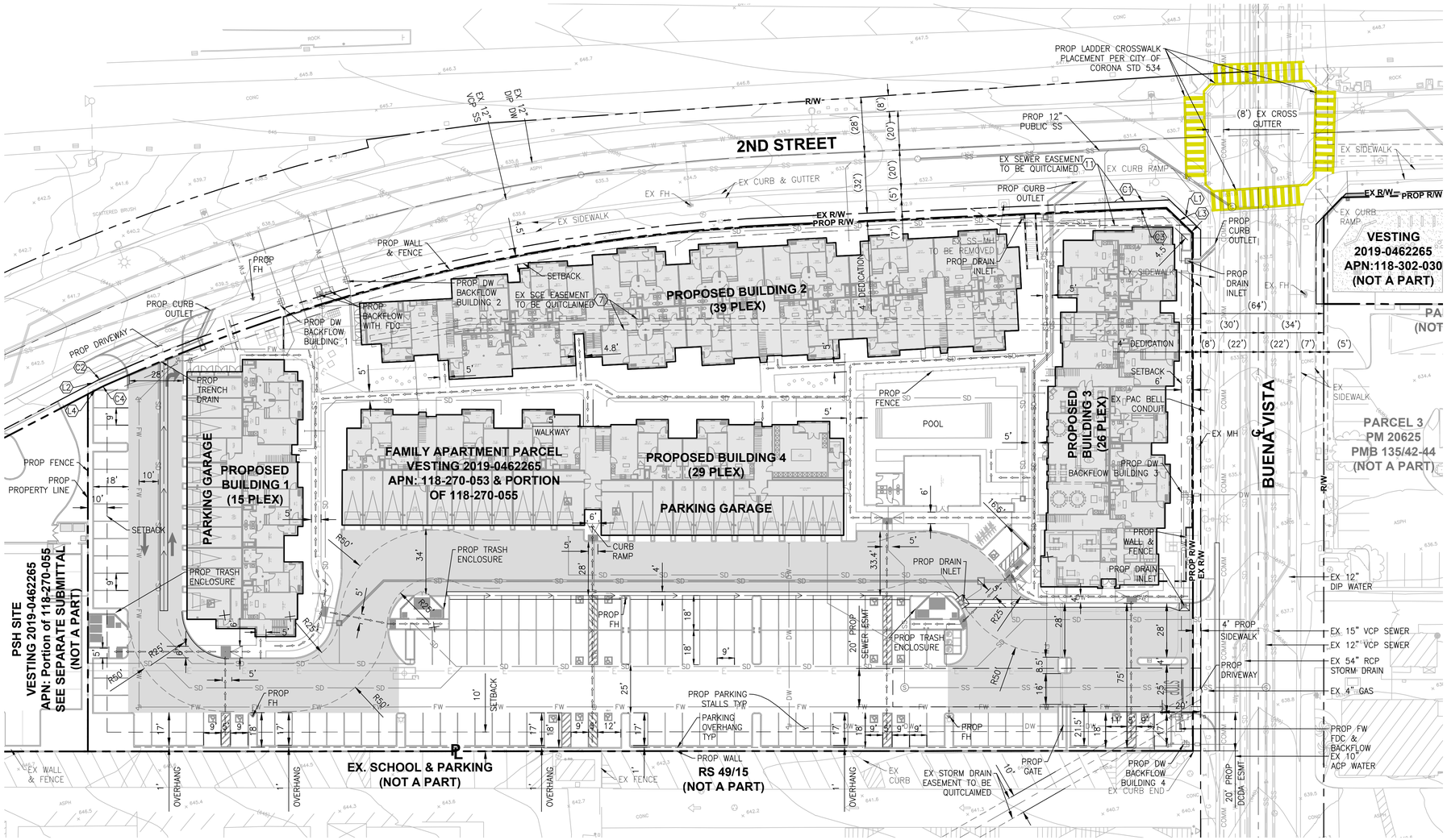
RINCON CHANNEL

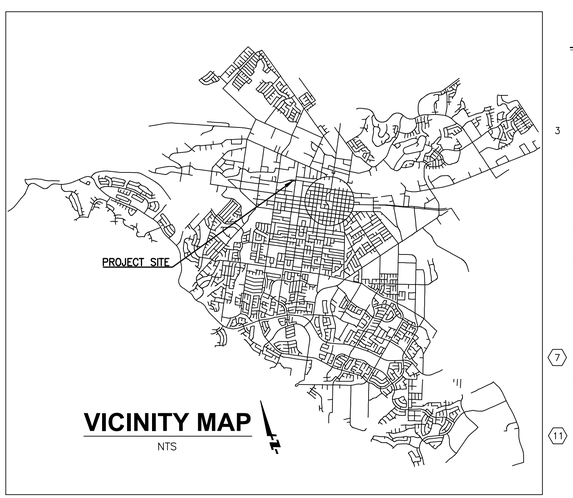
The graphical and tabular information shown on this document may be derived from a variety of public agency and/or private commercial sources such as Riverside County Transportation and Land Management Agency, Thomas Brothers Mapping, the Stephen P. Teale Data Center, GIS Technology Center, State of California, the United States Geologic Survey and the United States National Atlas. These sources may possess varying levels of accuracy and precision and this product is meant only as a guide to the relative position and scale of the depicted features. This GIS document is in no case to be interpreted as fundamental or decisive for purposes of land surveying, field engineering, plan drafting, code enforcement, land boundary determination and/or land acquisition.

SAR 2015 ArcPgt - MS4 Maps - Map1.mxd

# Appendix 2:  Construction Plans

*Grading and Drainage Plans*




## VICINITY MAP

NTS

## EASEMENT NOTES:

TICOR TITLE COMPANY PRELIMINARY TITLE ORDER NO. 00901685-988-DN1 DATED JUNE 13, 2023, AT 7:30 A.M., WAS USED AS A BASIS FOR PREPARING THIS MAP. THE PREPARER OF THE SURVEY AND MAP ASSUMES NO LIABILITY FOR ERRORS OR DISCREPANCIES STATED IN THIS REPORT NOR FOR ANY INFORMATION OR FACTUAL DATA OMITTED BY THE REPORT, EXCEPT AS NOTED BY THIS SURVEY.

3 EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO AS RESERVED IN A DOCUMENT;
RESERVED BY: SOUTH RIVERSIDE LAND AND WATER COMPANY, A CORPORATION
PURPOSE: THE CONSTRUCTION AND MAINTENANCE OF WATER DITCHES, PIPES, FLUMES AND APPURTENANCES AND INCIDENTAL PURPOSES
RECORDING
DATE: JULY 5, 1887
RECORDING NO: BOOK 59, PAGE 361, OF DEEDS, SAN BERNARDINO COUNTY RECORDS AFFECTS: AS DESCRIBED THEREIN.

THE EXACT LOCATION AND EXTENT OF SAID EASEMENT IS NOT DISCLOSED OF RECORD.

A DOCUMENT RECORDED DECEMBER 30, 1895 IN BOOK 28, PAGE 385, OF DEEDS, RIVERSIDE COUNTY RECORDS PROVIDES THAT THE INTEREST OF THE EASEMENT HOLDER WAS TRANSFERRED TO THE TEMESCAL WATER COMPANY, A CORPORATION.

AFFECTS: PARCEL 2

(7) EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: SOUTHERN CALIFORNIA EDISON COMPANY
PURPOSE: PUBLIC UTILITIES, INGRESS EGRESS RECORDING
DATE: AUGUST 18, 1969 RECORDING NO: 84480, OF OFFICIAL RECORDS
AFFECTS: PARCEL 2

(11) EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS RESERVED IN A DOCUMENT:
RESERVED BY: RIVERSIDE COUNTY TRANSPORTATION COMMISSION
PURPOSE: SEWER RECORDING DATE: NOVEMBER 8, 2019 RECORDING NO: 2019-0462265 OF OFFICIAL RECORDS

AFFECTS: PARCEL 2

## PROJECT INFORMATION:

SITE INFORMATION:

APN: 118-270-051, 118-270-053, 118-270-055

GENERAL PLAN:

118-270-051: HIGH DENSITY RESIDENTIAL
118-270-053: HIGH DENSITY RESIDENTIAL
118-270-055: HIGH DENSITY RESIDENTIAL

LAND USE:

118-270-051: VACANT
118-270-053: SINGLE FAMILY RESIDENTIAL (SFR)
118-270-055: MULTI FAMILY RESIDENTIAL (MFR)

ZONING:

118-270-051: R3, MULTI FAMILY PRESIDENTIAL
118-270-053: R3, MULTI FAMILY PRESIDENTIAL
118-270-055: MP, MOBILE HOME PARK

PUBLIC R/W IMPROVEMENTS:

ALL NEW PUBLIC STREET IMPROVEMENTS TO BE BUILT CITY OF CORONA PUBLIC WORKS STANDARDS

IMPROVEMENTS ALONG THE 2ND STREET & BUENA VISTA ARE LIMITED TO THE FOLLOWING:
- 2 PROPOSED DRIVEWAY

UTILITY SERVICES:

1. METHOD OF SEWAGE DISPOSAL:
   THE PROPOSED GRAVITY FLOW ONSITE SEWER SYSTEM WILL DISCHARGE TOWARDS THE PUBLIC SEWER MANHOLE AT THE NORTHEAST CORNER OF THE SEWER MANHOLE WITHIN THE EXISTING SEWER EASEMENT.

2. WATER SERVICE PROVIDED BY CITY OF CORONA WATER AND POWER.

## SHEET INDEX


| | |
|---|---|
| TECHNICAL SITE PLAN | 1 |
| LOT LINE ADJUSTMENT EXHIBIT | 2 |
| CONCEPTUAL GRADING (FAMILY APARTMENT) | 3 |
| CONCEPTUAL UTILITIES | 4 |
| SECTION & DETAILS | 5 |
| SEWER PROFILE | 6 |
| STRIPING PLAN | 7 |
| EXISTING CONDITIONS | 8 |


## LEGEND

- CENTERLINE
- EX EASEMENT LINE
- EX R/W OR PROPERTY LINE
- ACCESSIBLE ROUTE
- PROP FIRE LANE AREA
- CROSSWALK

## PARKING:

| | | |
|---|---|---|
| BUILDING 1: | 11 GARAGE STALLS (1 ADA) | |
| BUILDING 4: | 22 GARAGE STALLS (2 ADA) | |
| SITE: | 121 STALLS | |
| | 90 STANDARD STALLS | |
| | 18 ACCESSIBLE | |
| | 13 EV | |
| TOTAL: | 154 STALLS | |
| RATIO: | 1.34:1 | |

## LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL 2: (APN: 118-270-053 AND APN: 118-270-055) (CALTRANS PARCEL NOS. 22219, 22221, & 22222- REM)

THAT PORTION OF LOT 5, IN BLOCK 66 OF LANDS OF THE SOUTH RIVERSIDE LAND AND WATER COMPANY, IN THE CITY OF CORONA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 9, PAGE 6 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY. BEING A PORTION OF THE LAND DESCRIBED IN THE DEEDS RECORDED MAY 31, 2013 AS INSTRUMENT NO. 2013-0257879, JULY 23, 2013 AS INSTRUMENT NO. 2013-0354239 AND AUGUST 29, 2013 AS INSTRUMENT NO. 2013-0426213, ALL OF OFFICIAL RECORDS OF SAID COUNTY, LYING SOUTHERLY OF THE FOLLOWING DESCRIBED LINE:

BEGINNING AT CENTERLINE INTERSECTION OF BUENA VISTA AVENUE, 60.00 FEET WIDE, AND 6TH STREET, AS SHOWN ON A MAP FILED IN BOOK 143, PAGES 94 THROUGH 113, INCLUSIVE OF RECORDS OF SURVEY, RECORDS OF SAID COUNTY; THENCE ALONG SAID CENTERLINE OF BUENA VISTA AVENUE NORTH 08°02'08" EAST 1479.18 FEET; THENCE NORTH 81°57'52" WEST 30.00 FEET TO THE WESTERLY LINE OF SAID BUENA VISTA AVENUE AND THE TRUE POINT OF BEGINNING; THENCE NORTH 38°05'40" WEST 22.46 FEET TO A NON-TANGENT CURVE CONCAVE SOUTHERLY HAVING A RADIUS OF 9968.00 FEET, A RADIAL LINE TO SAID CURVE BEARS NORTH 05°40'54" EAST; THENCE WESTERLY 28.63 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 00°09'52"; THENCE NORTH 84°28'59" WEST 172.40 FEET TO A CURVE CONCAVE SOUTHERLY HAVING A RADIUS OF 968.00 FEET; THENCE WESTERLY 365.82 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 21°39'11" TO A COMPOUND CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 50.00 FEET; THENCE SOUTHWESTERLY 2.96 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 03°23'25"; THENCE SOUTH 70°28'25" WEST 260.64 FEET; THENCE SOUTH 72°26'28" WEST 262.95 FEET; THENCE SOUTH 73°45'06" WEST 161.04 FEET TO A NON-TANGENT CURVE CONCAVE NORTHERLY HAVING A RADIUS OF 903.00 FEET, A RADIAL LINE TO SAID CURVE BEARS SOUTH 16°14'56" EAST; THENCE WESTERLY 382.42 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 24°15'53" TO A NON- TANGENT CURVE CONCAVE NORTHERLY HAVING A RADIUS OF 1403.00 FEET, A RADIAL LINE TO SAID CURVE BEARS SOUTH 08°02'24" WEST; THENCE WESTERLY 32.47 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 01°19'34"; THENCE SOUTH 54°27'43" WEST 54.64 FEET; THENCE SOUTH 09°15'36" WEST 95.59 FEET; THENCE SOUTH 08°05'21" WEST 34.85 FEET; THENCE SOUTH 09°23'23" WEST 155.22 FEET TO A NON-TANGENT CURVE CONCAVE WESTERLY HAVING A RADIUS OF 95.00 FEET, A RADIAL LINE TO SAID CURVE BEARS SOUTH 79°06'07" EAST; THENCE SOUTHWESTERLY 9.83 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 05°55'39" FEET TO THE EASTERLY LINE OF LINCOLN AVENUE, 88.50 FEET WIDE AS SHOWN ON SAID MAP.

30' 0' 10' 20' 30' 60'

SCALE: 1" = 30'

| LINE TABLE | | |
|---|---|---|
| # | BEARING | DISTANCE |
| (L1) | N38°05'40"E | 22.46' |
| (L2) | N70°28'25"E | 5.43' |
| (L3) | N38°05'40"E | 19.05' |
| (L4) | N70°28'25"E | 7.52' |

| CURVE TABLE | | | |
|---|---|---|---|
| # | RADIUS | LENGTH | DELTA |
| (C1) | 9968.25' | 28.63' | 0°09'52" |
| (C2) | 50.00' | 2.96' | 3°23'25" |
| (C3) | 9964.25' | 26.91' | 0°09'17" |
| (C4) | 46.00' | 2.72' | 3°23'25" |

DPR2023-0027 / PP2023-0010

REGISTERED PROFESSIONAL ENGINEER
SHELBY L. SHIRLOCK
NO. C75912
EXP. 06/30/24
CIVIL
STATE OF CALIFORNIA

SECOND STREET FAMILY HOUSING

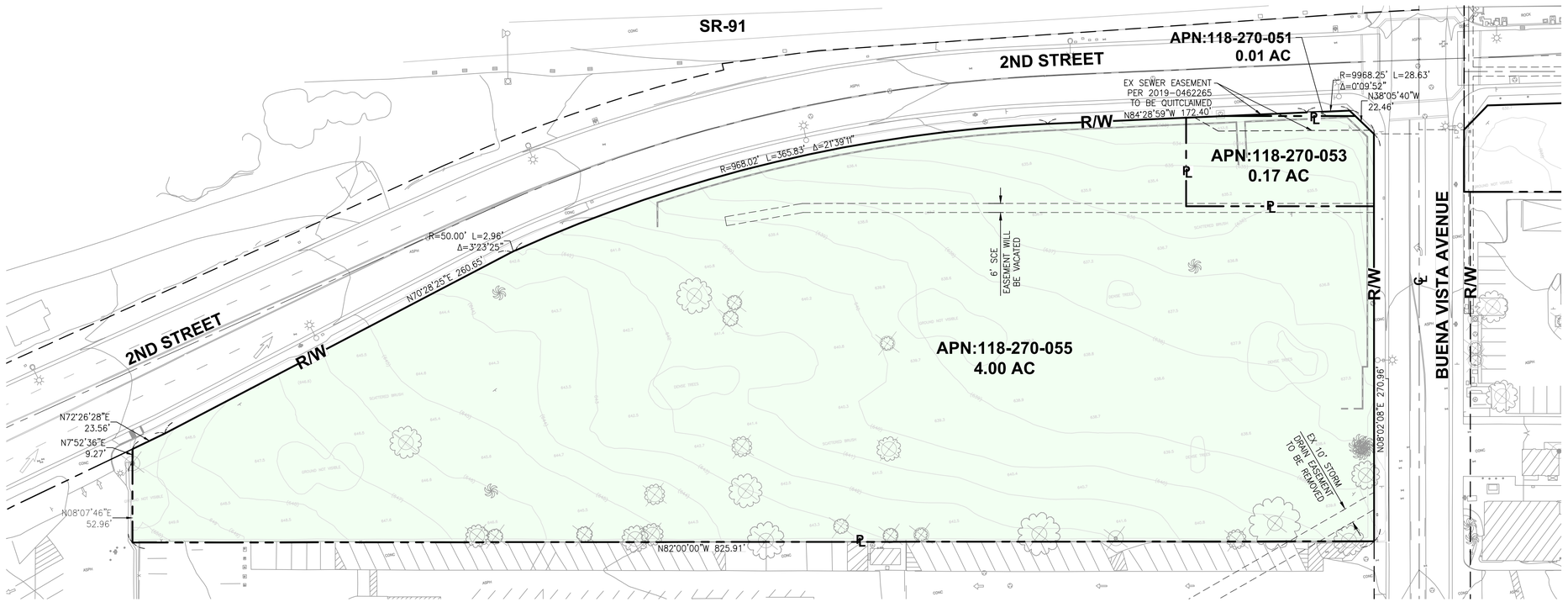
**TECHNICAL SITE PLAN**

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| NO. | INIT. | DATE | DESCRIPTION | APP'D | DATE |
| | | | | | |

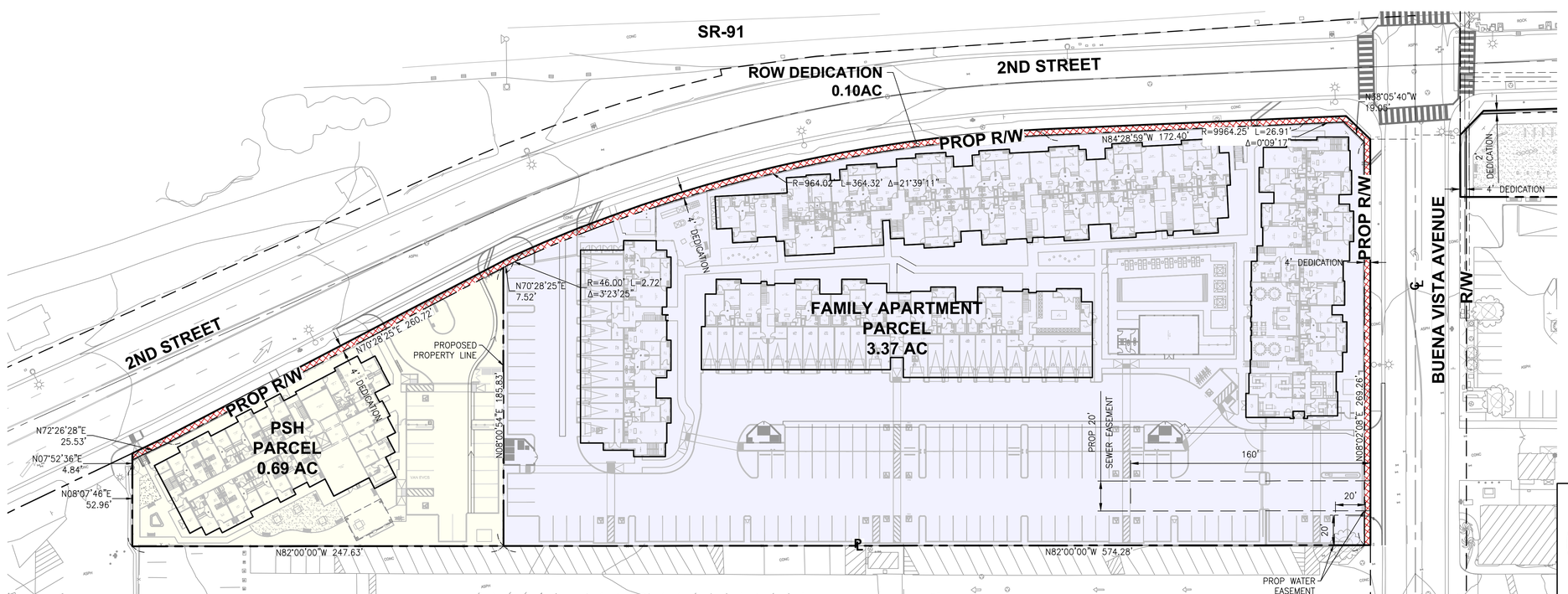

FUSCOE ENGINEERING
FULL CIRCLE THINKING
600 Wilshire Blvd Suite 1470 Los Angeles, Ca 90017
213.988.8802
fuscoe.com


JOB NO. 1339-010
DRAWN BY: FEI
SHEET 1 of 8


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## EXISTING LOT CONFIGURATION




## PROPOSED LOT LINE ADJUSTMENT CONFIGURATION

**LEGEND**

- CENTERLINE
- EX EASEMENT LINE
- EX R/W OR PROPERTY LINE
- EX PARCEL
- PROP FAMILY APARTMENT PARCEL
- PROP PSH PARCEL
- RIGHT OF WAY DEDICATION

40' 0' 20' 40' 80'

SCALE: 1" = 40'

DPR2023-0027 / PP2023-0010

REGISTERED PROFESSIONAL ENGINEER
SHELBY L. SHERLOCK
NO. C75912
EXP. 06/30/24
CIVIL
STATE OF CALIFORNIA

05/30/2024

SECOND STREET FAMILY HOUSING

**LOT LINE ADJUSTMENT EXHIBIT**

REVISIONS

| NO. | INIT. | DATE | DESCRIPTION | APP'D | DATE |
|---|---|---|---|---|---|

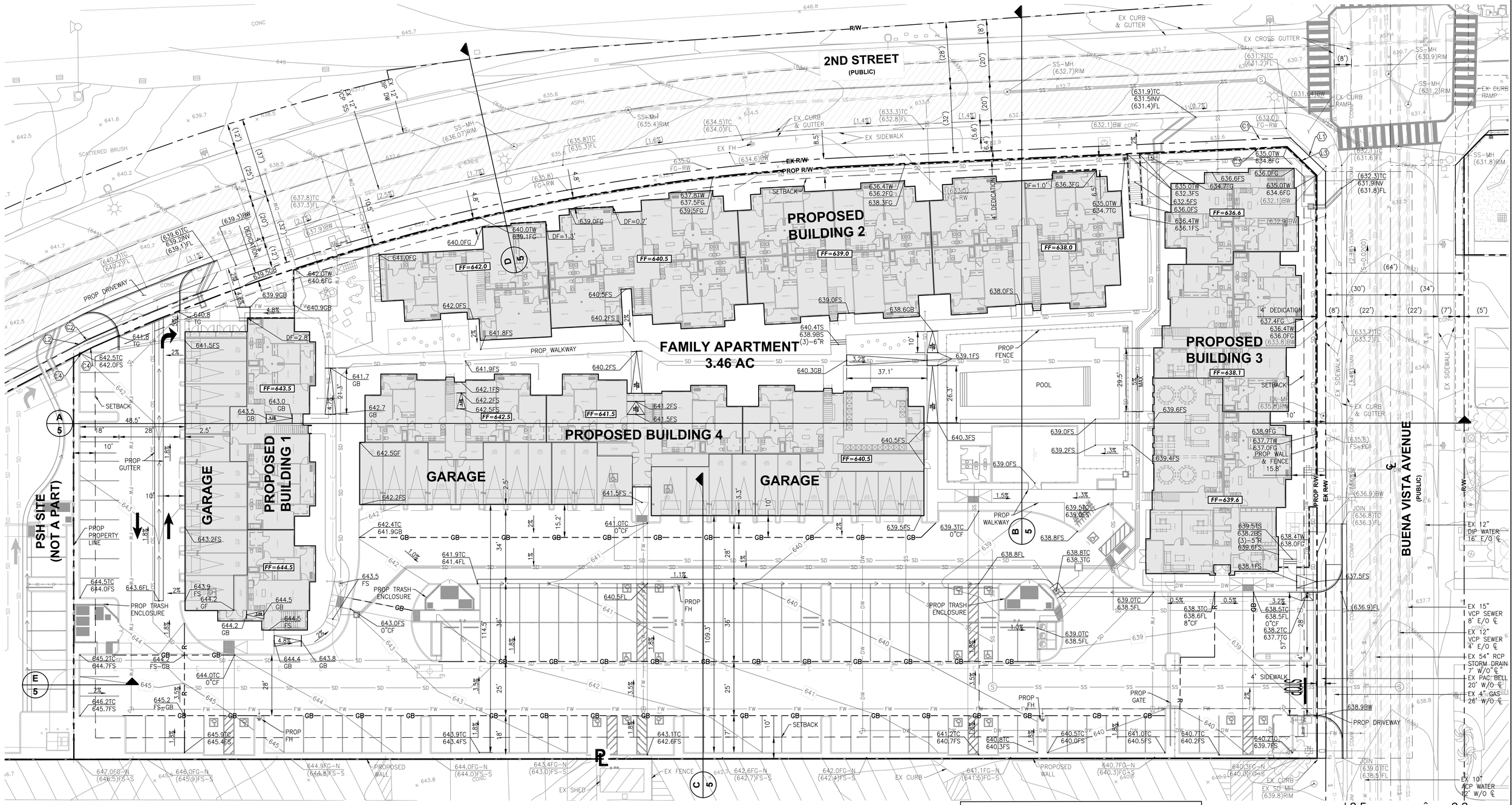
FUSCOE ENGINEERING
FULL CIRCLE THINKING
600 Wilshire Blvd
Suite 1470
Los Angeles, Ca 90017
213.988.8802
fuscoe.com

JOB NO. 1339-010

DRAWN BY: FEI

SHEET 2 of 8

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## LEGEND

- CENTERLINE
- EX EASEMENT LINE
- EX R/W OR PROPERTY LINE

SCALE: 1" = 20'

| LINE TABLE | | |
|---|---|---|
| # | BEARING | DISTANCE |
| L1 | N38°05'40"E | 22.46' |
| L2 | N70°28'25"E | 5.43' |
| L3 | N38°05'40"E | 19.05' |
| L4 | N70°28'25"E | 7.52' |

| CURVE TABLE | | | |
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| C3 | 9964.25' | 26.91' | 0°09'17" |
| C4 | 46.00' | 2.72' | 3°23'25" |

## NOTES

1. CALIFORNIA BUILDING CODE 1804.4 THE GROUND IMMEDIATELY ADJACENT TO THE FOUNDATION SHALL BE SLOPED AWAY FROM THE BUILDING AT A SLOPE OF NOT LESS THAN ONE UNIT VERTICAL IN 20 UNITS HORIZONTAL (5–PERCENT SLOPE) FOR A MINIMUM DISTANCE OF 10 FEET (3048 MM) MEASURED PERPENDICULAR TO THE FACE OF THE WALL. IF PHYSICAL OBSTRUCTIONS OR LOT LINES PROHIBIT 10 FEET (3048 MM) OF HORIZONTAL DISTANCE, A 5–PERCENT SLOPE SHALL BE PROVIDED TO AN APPROVED ALTERNATIVE METHOD OF DIVERTING WATER AWAY FROM THE FOUNDATION. SWALES USED FOR THIS PURPOSE SHALL BE SLOPED NOT LESS THAN 2 PERCENT WHERE LOCATED WITHIN 10 FEET (3048 MM) OF THE BUILDING FOUNDATION. IMPERVIOUS SURFACES WITHIN 10 FEET (3048 MM) OF THE BUILDING FOUNDATION SHALL BE SLOPED NOT LESS THAN 2 PERCENT AWAY FROM THE BUILDING.
2. ALL THE GRADING DESIGN CRITERIA SHALL BE PER CITY OF CORONA STANDARDS, CORONA MUNICIPAL CODE TITLE 15 CHAPTER 15.36 AND CITY COUNCIL ORDINANCE NUMBER 2568, UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER
3. ALL DRAINAGE DESIGN CRITERIA SHALL BE PER CITY OF CORONA STANDARDS AND THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONVERSATION DISTRICT STANDARDS UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER
4. STREET DESIGN CRITERIA AND CROSS SECTIONS SHALL BE PER CITY OF CORONA STANDARDS, APPROVED SPECIFIC PLAN DESIGN GUIDELINES AND THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION HIGHWAY DESIGN MANUAL UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER

## ABBREVIATIONS

| | |
|---|---|
| BW | BACK OF WALK |
| CL | CENTERLINE |
| DW | DOMESTIC WATER |
| EX | EXISTING |
| FF | FINISHED FLOOR |
| FG | FINISHED GRADE |
| FH | FIRE HYDRANT |
| FL | FLOW LINE |
| FS | FINISHED SURFACE |
| FW | FIRE WATER |
| GB | GRADE BREAK |
| INV | INVERT |
| MH | MANHOLE |
| ℄ | PROPERTY LINE |
| PROP | PROPOSED |
| R/W | RIGHT OF WAY |
| SD | STORM DRAIN |
| SS | SANITARY SEWER |
| TC | TOP OF CURB |
| TG | TOP OF GRADE |
| TW | TOP OF WALL |

## ESTIMATED GRADING QUANTITIES

| | CUT (CY) | FILL (CY) | NET (CY) |
|---|---|---|---|
| RAW VOLUMES: | 2,300 | 3,800 | 1,500 |
| SHRINKAGE (10%) | | 380 | |
| OVER–EXCAVATION: | 4,800 | 4,800 | |
| SHRINKAGE (10%) | | 480 | |
| | 7,100 | 9,460 | 2,360(IMPORT) |

DISTURBED AREA: 3.46 AC

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05/30/2024

6(&21' 675((7 )$0,/< +286,1*

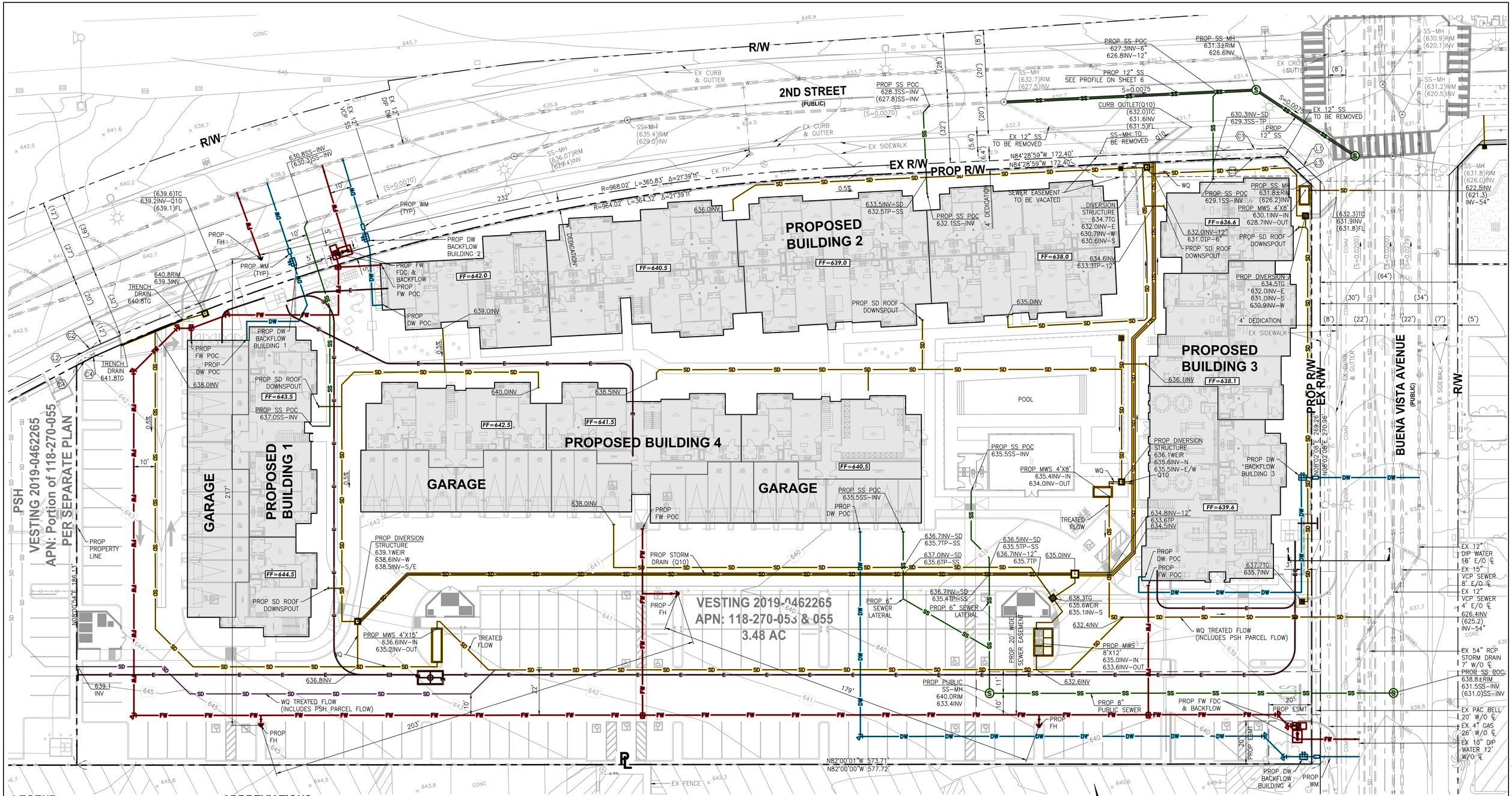
# CONCEPTUAL GRADING (FAMILY APARTMENT)

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## LEGEND

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- EX EASEMENT LINE
- EX R/W OR PROPERTY LINE
- EX SEWER LINE
- EX STORM DRAIN LINE
- EX WATER LINE
- PROP SEWER LINE
- PROP STORM DRAIN LINE
- PROP WATER LINE
- PROP FIRE WATER LINE
- PROP ELECTRICAL LINE
- PROP TRANSFORMER
- PROP ELEC HANDHOLD/PULL BOX

## ABBREVIATIONS

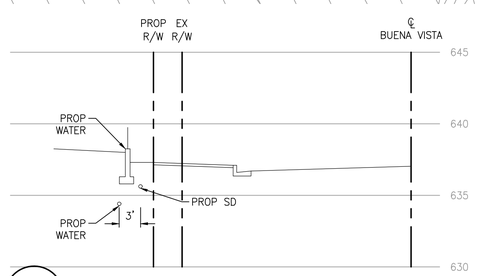
| | |
|---|---|
| BW | BACK OF WALK |
| CL | CENTERLINE |
| DW | DOMESTIC WATER |
| EX | EXISTING |
| FF | FINISHED FLOOR |
| FH | FIRE HYDRANT |
| FL | FLOW LINE |
| FW | FIRE WATER |
| INV | INVERT |
| MH | MANHOLE |
| ℄ | PROPERTY LINE |
| PROP | PROPOSED |
| R/W | RIGHT OF WAY |
| SD | STORM DRAIN |
| SS | SANITARY SEWER |
| TC | TOP OF CURB |
| TG | TOP OF GRADE |

**LINE TABLE**

| # | BEARING | DISTANCE |
|---|---|---|
| L1 | N38°05'40"E | 22.46' |
| L2 | N70°28'25"E | 5.43' |
| L3 | N38°05'40"E | 19.05' |
| L4 | N70°28'25"E | 7.52' |

**CURVE TABLE**

| # | RADIUS | LENGTH | DELTA |
|---|---|---|---|
| C1 | 9968.25' | 28.63' | 0°09'52" |
| C2 | 50.00' | 2.96' | 3°23'25" |
| C3 | 9964.25' | 26.91' | 0°09'17" |
| C4 | 46.00' | 2.72' | 3°23'25" |




1 1 WATER & STORM DRAIN CROSS SECTION
HORIZONTAL SCALE : 1"=10'
VERTICAL SCALE: 1"=5'

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

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05/30/2024

# SECOND STREET FAMILY HOUSING

## CONCEPTUAL UTILITIES

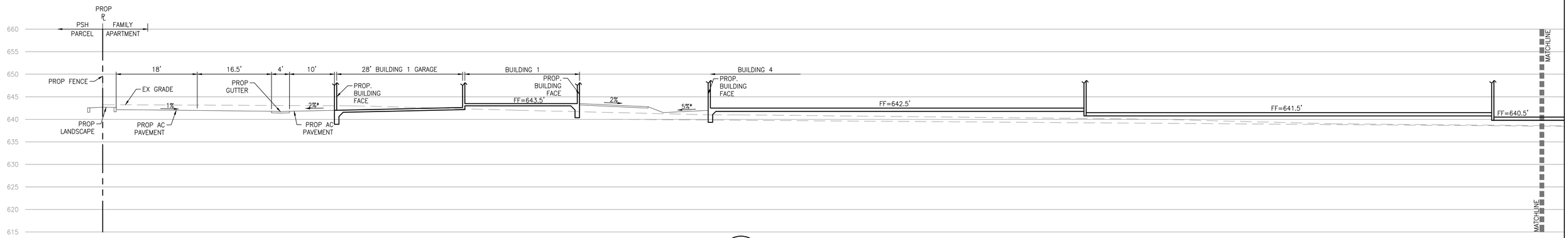
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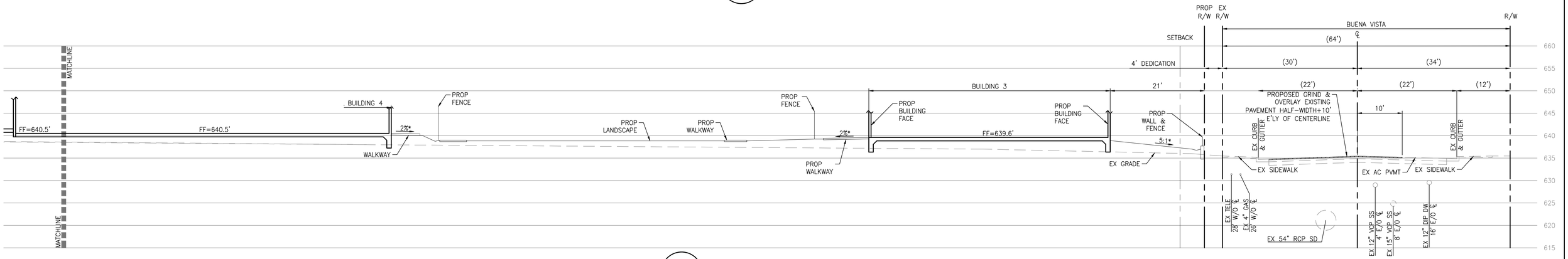

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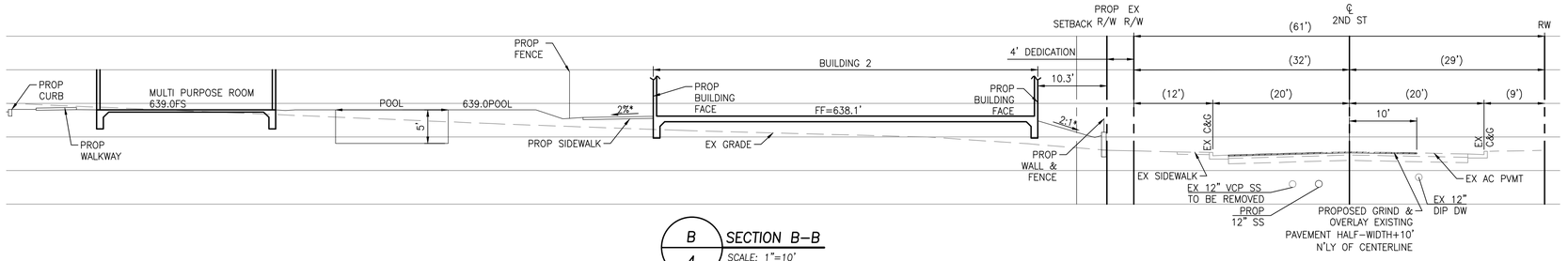
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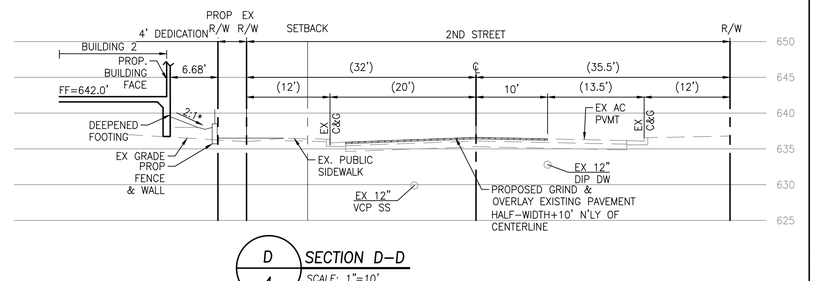

A 4 SECTION A–A
SCALE: 1"=10'



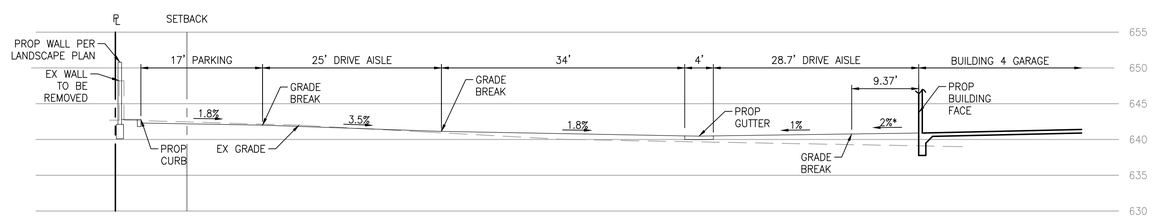

A 4 SECTION A–A
SCALE: 1"=10'



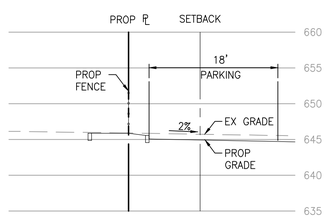

B 4 SECTION B–B
SCALE: 1"=10'




D 4 SECTION D–D
SCALE: 1"=10'




C 4 SECTION C–C
SCALE: 1"=10'




E 4 SECTION E–E
SCALE: 1"=10'

## ABBREVIATIONS

| | |
|---|---|
| CL | CENTERLINE |
| DIP | DUCTILE IRON PIPE |
| DW | DOMESTIC WATER |
| EX | EXISTING |
| ℄ | PROPERTY LINE |
| PROP | PROPOSED |
| RCP | REINFORCED CONCRETE PIPE |
| R/W | RIGHT OF WAY |
| SD | STORM DRAIN |
| SS | SANITARY SEWER |
| VCP | VITRIFIED CLAY PIPE |

## NOTES

* CALIFORNIA BUILDING CODE 1804.4 THE GROUND IMMEDIATELY ADJACENT TO THE FOUNDATION SHALL BE SLOPED AWAY FROM THE BUILDING
- PERVIOUS: 5–PERCENT SLOPE WITHIN 10 FEET
- IMPERVIOUS: 2–PERCENT SLOPE WITHIN 10 FEET

REGISTERED PROFESSIONAL ENGINEER — SHELBY L. SHIRLOCK — NO. C75912 — EXP. 06/30/24 — CIVIL — STATE OF CALIFORNIA

05/30/2024

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# SECOND STREET FAMILY HOUSING

## SECTION & DETAILS

REVISIONS

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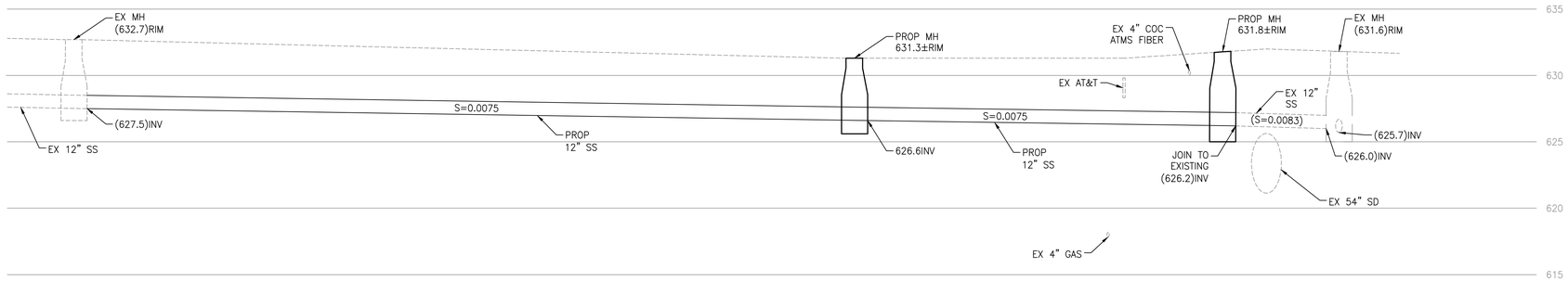
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F/F **SEWER PROFILE**

HORIZONTAL SCALE : 1"=10'
VERTICAL SCALE: 1"=5'

## ABBREVIATIONS

| | |
|---|---|
| EX | EXISTING |
| PROP | PROPOSED |
| INV | INVERT |
| MH | MANHOLE |

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NO. C75912
EXP. 06/30/24
CIVIL
STATE OF CALIFORNIA

05/30/2024

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# SECOND STREET FAMILY HOUSING

## SEWER PROFILE

REVISIONS

| NO. | INIT. | DATE | DESCRIPTION | APP'D | DATE |
|---|---|---|---|---|---|
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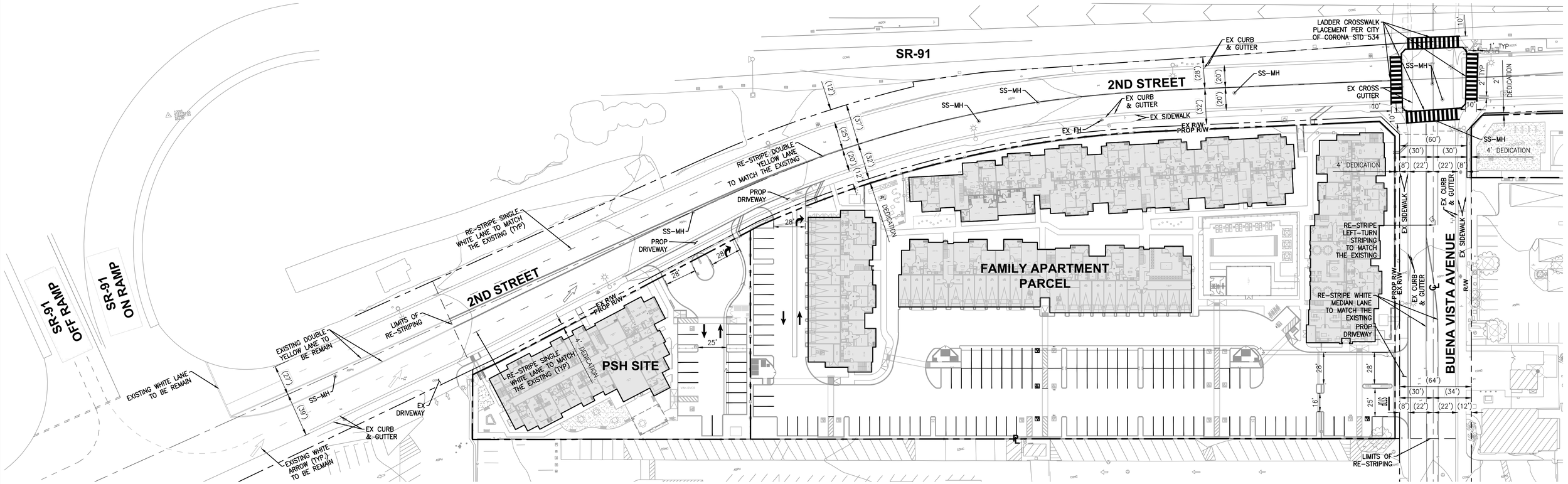
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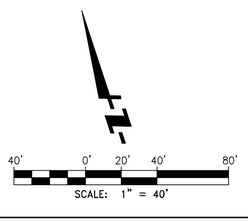



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# SECOND STREET FAMILY HOUSING

## STRIPING PLAN




## ABBREVIATIONS

| | |
|---|---|
| CL | CENTERLINE |
| EX | EXISTING |
| MH | MANHOLE |
| ℄ | PROPERTY LINE |
| R/W | RIGHT OF WAY |
| SS | SEWER |
| PROP | PROPOSED |

## NOTES

1. PRIOR TO ACCEPTANCE OF IMPROVEMENTS, THE CITY ENGINEER MAY DETERMINE THAT AGGREGATE SLURRY, AS DEFINED IN THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, MAY BE REQUIRED ONE YEAR AFTER ACCEPTANCE OF STREET(S) BY THE CITY IF THE CONDITION OF THE STREET(S) WARRANT ITS APPLICATION. ALL STRIPING SHALL BE REPLACED IN KIND. THE APPLICANT IS THE SOLE RESPONSIBLE PARTY FOR THE MAINTENANCE OF ALL THE IMPROVEMENTS UNTIL SAID ACCEPTANCE TAKES PLACE.

## LEGEND

- CENTERLINE
- EX EASEMENT LINE
- EX R/W OR PROPERTY LINE
- EX STRIPING
- PROP STRIPING

| REVISIONS | | | | | |
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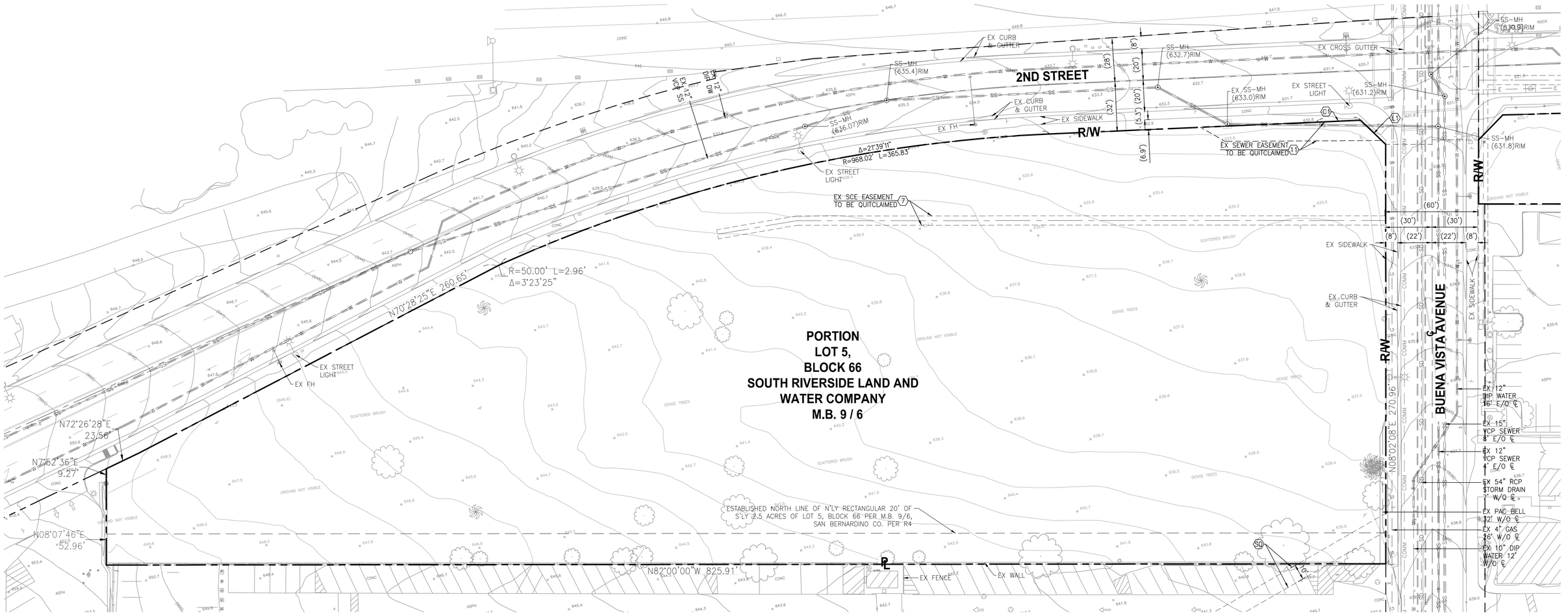
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## LEGEND

- CENTERLINE
- EX EASEMENT LINE
- EX R/W OR PROPERTY LINE
- EX SEWER LINE
- EX STORM DRAIN LINE
- EX WATER LINE

## ABBREVIATIONS

| | |
|---|---|
| BW | BACK OF WALK |
| CL | CENTERLINE |
| DIP | DUCTILE IRON PIPE |
| DW | DOMESTIC WATER |
| EX | EXISTING |
| FH | FIRE HYDRANT |
| MH | MANHOLE |
| ℄ | PROPERTY LINE |
| R/W | RIGHT OF WAY |
| SD | STORM DRAIN |
| SS | SANITARY SEWER |
| TC | TOP OF CURB |
| VCP | VITRIFIED CLAY PIPE |

## EASEMENT NOTES:

(7) EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: SOUTHERN CALIFORNIA EDISON COMPANY
PURPOSE: PUBLIC UTILITIES, INGRESS EGRESS RECORDING
DATE: AUGUST 18, 1969 RECORDING NO: 84480, OF OFFICIAL RECORDS
AFFECTS: PARCEL 2

(11) EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS RESERVED IN A DOCUMENT:
RESERVED BY: RIVERSIDE COUNTY TRANSPORTATION COMMISSION
PURPOSE: SEWER RECORDING DATE: NOVEMBER 8, 2019
RECORDING NO: 2019-0462265 OF OFFICIAL RECORDS

AFFECTS: PARCEL 2

(SD) AN EASEMENT GRANTED TO THE CITY OF CORONA FOR STORM DRAIN RECORDED JANUARY 21, 1953 IN BOOK 1433, PAGE 584 OF OFFICIAL RECORDS,
NOT LISTED IN THE TITLE REPORT. APPROXIMATE LOCATION SHOWN HEREON.

| LINE TABLE | | |
|---|---|---|
| # | BEARING | DISTANCE |
| L1 | N38°05'40"E | 22.46' |

| CURVE TABLE | | | |
|---|---|---|---|
| # | RADIUS | LENGTH | DELTA |
| C1 | 9968.25' | 28.63' | 0°09'52" |

30' 0' 10' 20' 30' 60'
SCALE: 1" = 30'

REGISTERED PROFESSIONAL ENGINEER SHELBY L. SHIRLOCK NO. C75912 EXP. 06/30/24 CIVIL STATE OF CALIFORNIA
05/30/2024

DPR2023-0027 / PP2023-0010

SECOND STREET FAMILY HOUSING

**EXISTING CONDITIONS**

| REVISIONS | | | | | |
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# Appendix 3: Soils Information

*Geotechnical Study and Other Infiltration Testing Data*

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

# PRELIMINARY GEOTECHNICAL AND INFILTRATION FEASIBILITY INVESTIGATION PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT APN 118-270-053, -055, AND 118-302-030 CORONA, CALIFORNIA

**PROJECT NO. 33951.1**
**OCTOBER 9, 2023**

Prepared For:

Second Street Family LP
14211 Yorba Street, Suite 200
Tustin, California 92780

Attention: Mr. Scott Bering

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

October 9, 2023

Second Street Family LP
14211 Yorba Street
Tustin, California 92780

Project No. 33951.1

Attention: Mr. Scott Bering

Subject: Preliminary Geotechnical and Infiltration Feasibility Investigation, Proposed Multi-Family Residential Development, APN 118-270-053, -055, and 118-302-030 Corona, California.

LOR Geotechnical Group, Inc., is pleased to present this report of our geotechnical investigation for the subject project. In summary, it is our opinion that the proposed development is feasible from a geotechnical perspective, provided the recommendations presented in the attached report are incorporated into design and construction. However, the contents of this summary should not be solely relied upon.

To provide adequate support for the proposed structures and structural improvements, we recommend that a compacted fill mat be constructed beneath footings and slabs. The compacted fill mat will provide a dense, high-strength soil layer to uniformly distribute the anticipated foundation loads over the underlying soils. All existing loose, compressible alluvial materials and any undocumented fill material should be removed from structural areas and areas to receive engineered compacted fills. The data developed during this investigation indicates that removals ranging from approximately 5 to 7 feet will be required from currently planned development areas. The given removal depths are preliminary and the actual depths of the removals should be determined during the grading operation by observation and/or in-place density testing.

Very low expansion potential and moderate R-value quality content generally characterize the upper onsite materials. Near completion and/or at the completion of site grading, additional foundation and subgrade soils should be tested, as necessary, to verify their expansion potential, soluble sulfate content, and R-value quality.

Our percolation test result indicates the soils tested are not conducive infiltration.

**LOR Geotechnical Group, Inc.**

# TABLE OF CONTENTS


**Page No.**

**INTRODUCTION.. . . . . 1**

**PROJECT CONSIDERATIONS.. . . . . 1**

**AERIAL PHOTO ANALYSIS.. . . . . 2**

**EXISTING SITE CONDITIONS.. . . . . 2**

**SUBSURFACE FIELD INVESTIGATION. . . . . 3**

**LABORATORY TESTING PROGRAM. . . . . 4**

**GEOLOGIC CONDITIONS. . . . . 4**
Regional Geologic Setting. . . . . 4
Site Geologic Conditions. . . . . 5
Groundwater Hydrology. . . . . 6
Mass Movement. . . . . 6
Faulting. . . . . 6
Historical Seismicity. . . . . 8
Secondary Seismic Hazards. . . . . 9
Liquefaction. . . . . 9
Seiches/Tsunamis. . . . . 9
Flooding (Water Storage Facility Failure). . . . . 9
Seismically-Induced Landsliding. . . . . 9
Rockfalls. . . . . 9
Seismically-Induced Settlement. . . . . 9

**SOILS AND SEISMIC DESIGN CRITERIA (California Building Code 2022). . . . . 9**
Site Classification. . . . . 10
CBC Earthquake Design Summary. . . . . 10

**CONCLUSIONS. . . . . 11**
Foundation Support. . . . . 11
Soil Expansiveness. . . . . 11
Corrosion Screening. . . . . 12
Infiltration. . . . . 12
Geologic Mitigations. . . . . 13
Seismicity. . . . . 13

# TABLE OF CONTENTS


**Page No.**

**RECOMMENDATIONS. . . . . 13**
Geologic Recommendations. . . . . 13
General Site Grading. . . . . 13
Initial Site Preparation. . . . . 14
Preparation of Fill Areas. . . . . 14
Engineered Compacted Fill. . . . . 15
Preparation of Foundation Areas. . . . . 15
Short-Term Excavations. . . . . 15
Slope Construction. . . . . 16
Slope Protection. . . . . 16
Soil Expansiveness. . . . . 16
Foundation Design. . . . . 17
Settlement. . . . . 18
Building Area Slab-On-Grade. . . . . 18
Exterior Flatwork. . . . . 19
Wall Pressures. . . . . 19
Preliminary Pavement Design. . . . . 20
Infiltration. . . . . 21
Corrosion Protection. . . . . 21
Construction Monitoring. . . . . 22

**LIMITATIONS. . . . . 23**

**TIME LIMITATIONS. . . . . 23**

**CLOSURE. . . . . 24**

**REFERENCES. . . . . 25**

# TABLE OF CONTENTS

**Page No.**

**APPENDICES**

**Appendix A**
Index Map. . . . . A-1
Site Plan. . . . . A-2a and A-2b
Regional Geologic Map.. . . . . A-3
Historical Seismicity Maps. . . . . A-4 and A-5

**Appendix B**
Field Investigation Program. . . . . B
Boring Log Legend. . . . . B-i
Soil Classification Chart. . . . . B-ii
Boring Logs. . . . . B-1 through B-6

**Appendix C**
Borehole Percolation Testing Program. . . . . C
Infiltration Rate Test Results. . . . . C-1

**Appendix D**
Laboratory Testing Program. . . . . D
Laboratory Test Results.. . . . . D-1 and D-2
Project X Corrosion Engineering Test Results

**Appendix E**
Seismic Design Spectra. . . . . E

## INTRODUCTION

During September and October of 2023, a Preliminary Geotechnical and Infiltration Feasibility Investigation was performed by LOR Geotechnical Group, Inc., for the proposed residential development within Assessor's Parcel Number (APN) 118-280-053, -055, and 118-302-030 in the city of Corona, California. The purpose of this investigation was to provide a technical evaluation of the geologic setting of the site and to provide geotechnical design recommendations for the proposed development. The scope of our services included:

- Review of available geotechnical literature, reports, maps, and agency information pertinent to the study area;
- Interpretation of aerial photographs of the site and surrounding regions dated 1948 through 2023;
- Geologic field reconnaissance mapping to verify the areal distribution of earth units and significance of surficial features as compiled from documents, literature, and reports reviewed;
- A subsurface field investigation to determine the physical soil conditions pertinent to the proposed development;
- Percolation testing via the borehole test method to determine Infiltration characteristics;
- Laboratory testing of selected soil samples obtained during the field investigation;
- Development of geotechnical recommendations for site grading and foundation design; and
- Preparation of this report summarizing our findings, and providing conclusions and recommendations for site development.

The approximate location of the site is shown on the attached Index Map, Enclosure A-1, within Appendix A.

## PROJECT CONSIDERATIONS

To orient our investigation at the site, a Site Plan prepared by IDEArc, dated September 7, 2023, was furnished for our use. The proposed building configurations and associated driveway, parking, and landscape areas were indicated on this plan. The Site Plan was

utilized as a base map for our field investigation and is presented as Enclosure A-2b, within Appendix A.

As noted on the site plan, development of the site will include a several two- and three-story multi-family residential structures, a swimming pool, play area, and new driveway, parking, and landscape areas. In addition, infiltration of on-site storm waters is proposed. The buildings are anticipated to be of wood frame and stucco or similar type construction and light to moderate foundation loads are anticipated with these types of structures.

Grading plans have not yet been developed. However, based on the current topography of the site and adjacent areas, very minor cuts and fills are anticipated to create level surfaces for the proposed improvements.

## AERIAL PHOTO ANALYSIS

The aerial photographs reviewed consisted of vertical aerial photograph images of varying scales. We reviewed imagery available from Google Earth Pro (2023) computer software and from online Historic Aerials (2023).

To summarize briefly, parcels-053 and -055 were a part of the properties to the north and west and appeared to be used as a storage yard/salvage yard for vehicles from prior to 1948 through the late 1970's. As observed in the 1980 photograph, the site then contained a mobile home park. By 2016, the mobile home park was removed and W. 2nd Street as well as various improvements to the 91 Freeway to the north had been built. At this time, the site contained numerous stockpiles of materials including soils and construction materials and equipment. By 2018, the nearby roadway improvements were complete and the site was cleared of the previously noted stockpiles and construction related items.

Parcel 118-302-030 was vacant land prior to 1948. By 1959, a single family residence and detached garage were present. The structures were gone by 2014. Similar to parcels -003 and -055 in early 2016, W. 2nd Street is now present, as well as various improvements to the 91 Freeway to the north and the site contained numerous stockpiles of materials including soils and construction materials and equipment. By late 2016, the nearby roadway improvements were complete and the site was cleared of the previously noted stockpiles and construction related items and has remained so.

No evidence for the presence of faults traversing the site area or mass movement features was noted during our review of the photographs covering the parcels and nearby vicinity.

## EXISTING SITE CONDITIONS

APN 418-270-053 and -055 consist of 3.5± acres of roughly rectangular shaped vacant land, located along the south side of W. 2nd Street and along the west side of S. Buena Vista Avenue and APN 118-302-030 consist of 0.2± acres of land located along the south side of W. 2nd Street and along the east side of S. Buena Vista Avenue in the city of Corona. The topography of the parcels consists of a very gentle gradient to the east. The parcels are currently vacant and contain some trees and light annual grasses and weeds. Some minor wind blown trash and debris is also present.

W. 2nd Street, a fully improved roadway, bounds all parcels on the north with the 91 Freeway beyond. Commercial properties lie to the south of APN 418-270-053 and -055 and residential properties lie to the south of APN 118-302-030. East of parcels -053 and -055 is vacant land, similar to the site. S. Buena Vista Avenue, a fully improved roadway, bounds parcels -053 and -055 on the east and bounds parcel 118-302-030 on the west. Residential properties lie to the east of parcel 118-302-030.

## SUBSURFACE FIELD INVESTIGATION

Our subsurface field exploration program was conducted on September 19 and 21, 2023. The work consisted of advancing a total of 6 exploratory borings using a truck-mounted drill rig equipped with 8-inch diameter hollow stem augers. In addition, one borehole percolation test was conducted in general accordance with the Deep Percolation Test procedure as outlined in the Technical Guidance Document for Water Quality Management Plans (CDM Smith, 2013). The approximate locations of our exploratory borings and percolation test are presented on Enclosures A-2a and A-2b, within Appendix A.

The subsurface conditions encountered in the exploratory borings were logged by a licensed geologist from this firm. The borings were drilled to depths ranging from approximately 11.5 to 51.5 feet below the existing ground surface. Refusal was experienced at a depth of approximately 27 feet in one of our borings due to abundant gravel and cobbles. Relatively undisturbed and bulk samples were obtained at a maximum depth interval of 5 feet, and returned to our geotechnical laboratory in sealed containers for further testing and evaluation.

A percolation test boring was drilled to the requested depth of approximately 15 feet below the existing ground surface at the requested location and tested on August 20, 2023.

A detailed description of the subsurface field exploration program and the boring logs are presented in Appendix B, while a detailed description of our borehole percolation testing program and the test results are presented in Appendix C.

## LABORATORY TESTING PROGRAM

Selected soil samples obtained during the field investigation were subjected to geotechnical laboratory testing to evaluate their physical and engineering properties. Laboratory testing included in-place moisture content and dry density, laboratory compaction characteristics, direct shear, sieve analysis, sand equivalent, R-value, expansion index, Atterberg limits, and corrosion screening. Physical testing was conducted in our geotechnical laboratory and chemical testing was conducted by our subconsultant, Project X Corrosion Engineering. A detailed description of the geotechnical laboratory testing program and the test results are presented in Appendix D.

## GEOLOGIC CONDITIONS

### Regional Geologic Setting

The proposed residential development site is located within the far northern portion of the Perris Block. The Perris Block lies within the larger Peninsular Ranges geomorphic province of southern California. The Peninsular Ranges geomorphic province is characterized by the presence of numerous, northwestern trending, small mountain ranges and intervening plains and valleys. The Peninsular Ranges province abuts to the north against a series of east-west trending mountain ranges, collectively referred to as the Transverse Ranges and extends southeastward into the Baja California Peninsula. The nearest of which are the Santa Ana Mountains to the west and the San Jacinto Mountains to the east. The intervening valley between the Santa Ana and San Jacinto Mountains is the Perris Plain, a mass of igneous rocks consisting of island-like hills of plutonic rocks surrounded by valleys, filled with various ages of alluvium.

The plutonic rocks of the Perris Plain consist of predominately tonalite, granodiorite, and quartz diorite, with many similar igneous rock varieties and lesser amounts of metamorphic and volcanic rocks. Long term erosion of the Perris Plain has resulted in more resistant rock types elevated above the remaining elevation, and the infilling of these areas with various types and ages of alluvium. The Perris Plain is considered to be internally stable, however, it is bounded on the north, west, and east by active faults. These are the Cucamonga fault, on the north, the San Jacinto fault on the east, and the Whittier-Elsinore fault on the southwestern margin.

The site is situated just south of the Temescal Wash on an area of alluvial deposits derived from the hills which lie southeast of the site. This alluvial material is composed of younger, alluvial channel sediments eroded from the area and deposited over non-marine sedimentary rocks at depths.

The nearest known active earthquake fault in relation to the site is the Chino-Central Avenue fault located approximately 0.5 kilometers (0.3 miles) to the northeast. However, as noted by past authors (Morton and Gray, 2002), the exact location of this feature in the site region is not precisely known. A more detailed explanation and a complete list of nearby faults is presented in the Faulting section of this report.

The regional geology of the site and immediate surrounding region as mapped by the U.S.G.S. (Morton and Gray, 2002) is shown on Enclosure A-3, within Appendix A.

Site Geologic Conditions

The site lies along a series of coalescing alluvial fans emanating from the hills to the southeast falling northeasterly to the Temescal Wash. Past authors have mapped the units at the site to consist of the deposition of young, unconsolidated alluvial fan deposits of gray-hued sand and cobble- and gravel-sand deposits (Morton and Gray, 2002). According to a soil survey conducted by the United States Department of Agriculture, the site is underlain by soils of the Garretson Series. These consist of gravelly very fine sandy loam developed in alluvium made primarily of metasedimentary materials. In addition to these materials, exposed across the surface of the site, a layer of fill materials are present overlying the alluvial materials. These units are described in further detail in the following sections:

Fill: Fill materials were encountered within both of our exploratory borings to depths of approximately 2 to 5 feet. These materials were typically comprised of silty sand with gravel and contained some asphalt and rebar debris. The fill materials are believed to be associated with past site development and use as a construction yard and are considered to be non-engineered fill.

Alluvium: Alluvial materials were encountered within all of our exploratory borings to the maximum depths explored. These units were noted to mainly consist of well graded sand with silt and gravel and sandy silt, with some silty sand clayey sand units encountered. These materials were red brown to brown in color. Some thin calcite stringers and pinhole porosity were observed within the finer grained units. The alluvial materials were in a medium dense/stiff state upon first encounter, generally becoming increasingly dense with

increasing depth based on our equivalent Standard Penetration Test (SPT) data and in-place density testing. Refusal was experienced at a depth of approximately 27 feet due to abundant gravel and cobbles.

A detailed description of the subsurface soil conditions as encountered within our exploratory borings is presented on the Boring Logs within Appendix B.

Groundwater Hydrology

Groundwater was not encountered within any of our exploratory borings as advanced to a maximum depth of approximately 51.5 feet below the existing ground surface.

Local groundwater level measurements were researched at the California Department of Water Resources (CDWR) online Water Data Library (CDWR, 2023). The closest groundwater well found in this search was State Well Number 03S07W26J004S located approximately 700 feet east of the site. This well has groundwater measurements available from 2022 back to 2013 and ranged from approximately 105 to 123 feet below the existing ground surface elevation of approximately 642 feet above mean sea level.

Data from a groundwater contour map prepared by Carson and Matti (1985) indicates that from the time period of 1973 to 1979, groundwater was approximately 100 feet beneath the existing ground surface.

Based on this information and our nearby boring, the depth to groundwater beneath the subject property is likely on the order of 100+ feet.

Mass Movement

The site lies on a relatively flat surface. The occurrence of mass movement failures such as landslides, rockfalls, or debris flows within such areas is generally not considered common, and no evidence of mass movement was observed on the site.

Faulting

No active or potentially active faults are known to exist at the subject site. In addition, the subject site does not lie within a current State of California Earthquake Fault Zone (Hart and Bryant, 2003) nor does the site lie within a County of Riverside fault zone (TLMA, 2023).

As previously mentioned, the nearest known active earthquake fault in relation to the site is the Chino-Central Avenue fault located approximately 0.5 kilometers (0.3 miles) to the northeast. As previously mentioned and noted on the attached Regional Geologic Map, Enclosure A-3, the exact location of this feature in the site region is not precisely known and, therefore, queried by the USGS (Morton and Gray, 2002). This is due to a lack of surface expression, but it is believed to be buried under the recent alluvial deposits.

Other faults in the region include the Whittier-Elsinore fault zone located approximately 3.2 kilometers (2.0 miles) to the southwest, the Cucamonga fault located approximately 30.5 kilometers (19 miles) to the north, the San Jacinto fault located approximately 32.5 kilometers (20 miles) to the northeast, and the San Andreas fault located approximately 43.5 kilometers (27 miles) to the northeast.

The Elsinore fault zone is one of the largest in southern California. At its northern end it splays into two segments, the Whittier and Chino faults and at its southern end it is cut by the Yuba Wells fault. The primary sense of slip along the Elsinore fault is right lateral strike-slip. It is believed that the Elsinore fault zone is capable of producing an earthquake magnitude on the order of 6.5 to 7.5.

The Cucamonga fault is considered to be part of the Sierra Madre fault system which marks the southern boundary of the San Gabriel Mountains. This is a north dipping thrust fault which is believed to be responsible for the uplift of the San Gabriel Mountains. It is believed that the Cucamonga fault is capable of producing an earthquake magnitude on the order of 7.0 or greater.

The San Jacinto fault is a sub-parallel branch of the San Andreas fault extending from the northwestern San Bernardino area southward into the El Centro region. This fault has been active in recent times with several large magnitude events. The average slip rate on this fault is thought to be on the order of 6 to 12 mm per year, and, like the San Andreas fault, is thought to be capable of generating large magnitude events, on the order of 6.5 or greater.

The San Andreas fault is considered to be the major tectonic feature of California, separating the Pacific plate from the North American Plate. While estimates vary, the San Andreas fault is generally thought to have an average slip rate on the order of 24 mm per year and capable of generating large magnitude events on the order of 7.5 or greater.

Current standards of practice included a discussion of all potential earthquake sources within a 100 kilometer (62 mile) radius. However, while there are other large earthquake

faults within a 100 kilometer (62 mile) radius of the site, none of these are considered as relevant to the site as the faults described above, due to their greater distance and/or smaller anticipated magnitudes.

Historical Seismicity

In order to obtain a general perspective of the historical seismicity of the site and surrounding region a search was conducted for seismic events at and around the area within various radii. This search was conducted utilizing the historical seismic search website of the U.S.G.S. (2022). This website conducts a search of a user selected cataloged seismic events database, within a specified radius and selected magnitudes, and then plots the events onto a map. At the time of our search, the database contained data from January 1, 1932 through October 5, 2023.

In our first search, the general seismicity of the region was analyzed by selecting an epicenter map listing all events of magnitude 4.0 and greater, recorded since 1932, within a 100 kilometer (62 mile) radius of the site, in accordance with guidelines of the California Division of Mines and Geology. This map illustrates the regional seismic history of moderate to large events. As depicted on Enclosure A-4, within Appendix A, the site lies within a relatively active region associated with the San Jacinto and Elsinore fault zones trending northwest-southeast.

In the second search, the micro seismicity of the area lying within a 10 kilometer (6.2 mile) radius of the site was examined by selecting an epicenter map listing events on the order of 1.0 and greater since 1978. The results of this search is a map that presents the seismic history around the area of the site with much greater detail, not permitted on the larger map. The reason for limiting the time period for the events on the detail map is to enhance the accuracy of the map. Events recorded prior to the mid to late1970's are generally considered to be less accurate due to advancements in technology. As depicted on this map, Enclosure A-5, the Whittier-Elsinore fault is conspicuous as a northwest trending lineation of small seismic events located southwest of the site.

In summary, the historical seismicity of the site entails numerous small to medium magnitude earthquake events occurring in the region around the subject site. Any future developments at the subject site should anticipate that moderate to large seismic events could occur very near the site.

Secondary Seismic Hazards

Other secondary seismic hazards generally associated with severe ground shaking during an earthquake include liquefaction, seismic-induced settlement, seiches and tsunamis, earthquake induced flooding, landsliding, and rockfalls.

Liquefaction: The potential for liquefaction generally occurs during strong ground shaking within granular loose sediments where the groundwater is usually less than 50 feet below the ground surface. As groundwater is anticipated to lie greater than 50 feet beneath the site and the site is underlain by relatively dense alluvial materials, the possibility of liquefaction at the site is considered nil.

Seiches/Tsunamis: The potential for the site to be affected by a seiche or tsunami (earthquake generated wave) is considered nil due to absence of any large bodies of water near the site.

Flooding (Water Storage Facility Failure): There are no large water storage facilities located on or near the site which could possibly rupture during in earthquake and affect the site by flooding.

Seismically-Induced Landsliding: Due to the low relief of the site and surrounding region, the potential for landslides to occur at the site is considered nil.

Rockfalls: No large, exposed, loose or unrooted boulders are present above the site that could affect the integrity of the site.

Seismically-Induced Settlement: Settlement generally occurs within areas of loose, granular soils with relatively low density. Since the site is underlain by relatively dense alluvial materials, the potential for settlement is considered very low. In addition, the recommended earthwork operations to be conducted during the development of the site should mitigate any near surface loose soil conditions.

**SOILS AND SEISMIC DESIGN CRITERIA (California Building Code 2022)**

Design requirements for structures can be found within Chapter 16 of the 2022 California Building Code (CBC) based on building type, use, and/or occupancy. The classification of use and occupancy of all proposed structures at the site, shall be the responsibility of the building official.

Site Classification

Chapter 20 of the ASCE 7-16 defines six possible site classes for earth materials that underlie any given site. Bedrock is assigned one of three of these six site classes and these are: A, B, or C. Soil is assigned as C, D, E, or F. Per ASCE 7-16, Site Class A and Site Class B shall be measured on-site or estimated by a geotechnical engineer, engineering geologist or seismologist for competent rock with moderate fracturing and weathering. Site Class A and Site Class B shall not be used if more than 10 feet of soil is between the rock surface and bottom of the spread footing or mat foundation. Site Class C can be used for very dense soil and soft rock with Ñ values greater than 50 blows per foot. Site Class D can be used for stiff soil with Ñ values ranging from 15 to 50 blows per foot. Site Class E is for soft clay soils with Ñ values less than 15 blows per foot. Our investigation, mapping by others, and our experience in the site region indicates that the materials beneath the site are considered Site Class D stiff soils.

CBC Earthquake Design Summary

Earthquake design criteria have been formulated in accordance with the 2022 CBC and ASCE 7-16 for the site based on the results of our investigation to determine the Site Class and an assumed Risk Category II. However, these values should be reviewed and the final design should be performed by a qualified structural engineer familiar with the region. In addition, the building official should confirm the Risk Category utilized in our design (Risk Category II). Our design values are provided below:

| **CBC 2022/ASCE 7-16 SEISMIC DESIGN SUMMARY*** Site Location (USGS WGS84) 33.8803, -117.5795, Risk Category II | |
|---|---|
| Site Class Definition Chapter 20 ASCE 7 | D |
| **$S_s$** Mapped Spectral Response Acceleration at 0.2s Period | 2.07 |
| **$S_1$** Mapped Spectral Response Acceleration at 1s Period | 0.777 |
| **$S_{MS}$** Adjusted Spectral Response Acceleration at 0.2s Period | 2.317 |
| **$S_{M1}$** Adjusted Spectral Response Acceleration at 1s Period | 1.862 |
| **$S_{DS}$** Design Spectral Response Acceleration at 0.2s Period | 1.544 |
| **$S_{D1}$** Design Spectral Response Acceleration at 1s Period | 1.242 |
| **$F_a$** Short Period Site Coefficient at 0.2s Period | 1.0 |
| **$F_v$** Long Period Site Coefficient at 1s Period | 1.7 |

| CBC 2022/ASCE 7-16 SEISMIC DESIGN SUMMARY*<br>Site Location (USGS WGS84) 33.8803, -117.5795, Risk Category II | |
|---|---|
| **$PGA_M$** Site Modified Peak Ground Acceleration | 0.897 |
| Seismic Design Category | E |
| *See Appendix E for detailed calculations | |

## CONCLUSIONS

This investigation provides a broad overview of the geotechnical and geologic factors which are expected to influence future site planning and development. On the basis of our field investigation and testing program, it is the opinion of LOR Geotechnical Group, Inc., that the proposed development of the site for the proposed use is feasible from a geotechnical standpoint, provided the recommendations presented in this report are incorporated into design and implemented during grading and construction.

It should be noted that the subsurface conditions encountered in our exploratory borings are indicative of the locations explored and the subsurface conditions may vary. If conditions are encountered during the construction of the project that differ significantly from those presented in this report, this firm should be notified immediately so we may assess the impact to the recommendations provided.

### Foundation Support

To provide adequate support for the proposed structures, we recommend that a compacted fill mat be constructed beneath footings and slabs. The compacted fill mat will provide a dense, high-strength soil layer to uniformly distribute the anticipated foundation loads over the underlying soils.

Conventional foundation systems utilizing either individual spread footings and/or continuous wall footings will provide adequate support for the anticipated downward and lateral loads when utilized in conjunction with the recommended fill mat.

### Soil Expansiveness

The upper, granular materials encountered during this investigation were tested and found to have a very low expansion potential. Therefore, specialized construction procedures to specifically resist expansive soil activity for this type of soil is not anticipated at this time. However, the upper, silty materials encountered during this investigation were tested and

found to have a low expansion potential. It is anticipated, based on the recommended removals within, that the on-site soils will be mixed and blended during site grading and that the expansion potential of the on-site soils may change. However, for preliminary design purposes, typical reinforcement for slabs-on-grade support by low expansive soils is presented below. The final design should be based on additional evaluation of the on-site and any imported soil for their expansion potential and plasticity limits during rough grading operations.

Corrosion Screening

Select representative samples from our borings were taken to Project X Corrosion Engineering for full corrosion series testing. Results from soil corrosivity testing completed by Project X Corrosion Engineering are presented within Appendix D.

The corrosivity test results indicate that soluble sulfate concentrations in the samples were less than 0.10 percent by weight. These concentrations indicate an exposure class S0 for sulfate (ACI 318). No special mitigation methods are considered necessary.

The corrosivity test results indicate that chloride concentrations were below 500 ppm. This concentration indicates an exposure class C1 for chloride (ACI 318). Special mitigation measures are not considered necessary.

Soil pH for the samples was 7.1, neutral. Therefore, the need for specialized design is not anticipated.

Concentrations of ammonium and nitrate indicate the soil may be aggressive towards copper.

Resistivity results for the samples were in the corrosive to ferrous metals.

LOR Geotechnical does not practice corrosion engineering. If further information concerning the corrosion characteristics, or interpretation of the results submitted herein, is required, then a competent corrosion engineer should be consulted.

Infiltration

The results of our field investigation and percolation test data indicate that the site soil materials at the depth and location tested are not conducive to infiltration.

Geologic Mitigations

No special mitigation methods are deemed necessary at this time, other than the geotechnical recommendations provided in the following sections.

Seismicity

Seismic ground rupture is generally considered most likely to occur along pre-existing active faults. Since no known faults are known to exist at, or project into the site, the probability of ground surface rupture occurring at the site is considered nil.

Due to the site's close proximity to the faults described above, it is reasonable to expect a relatively strong ground motion seismic event to occur during the lifetime of the proposed development on the site. Large earthquakes could occur on other faults in the general area, but because of their lesser anticipated magnitude and/or greater distance, they are considered less significant than the faults described above from a ground motion standpoint.

The effects of ground shaking anticipated at the subject site should be mitigated by the seismic design requirements and procedures outlined in Chapter 16 of the California Building Code. However, it should be noted that the current building code requires the minimum design to allow a structure to remain standing after a seismic event, in order to allow for safe evacuation. A structure built to code may still sustain damage which might ultimately result in the demolishing of the structure (Larson and Slosson, 1992).

No secondary seismic hazards are anticipated to impact the proposed development.

## RECOMMENDATIONS

Geologic Recommendations

No special geologic recommendations are deemed necessary at this time, other than the geotechnical recommendations provided in the following sections.

General Site Grading

It is imperative that no clearing and/or grading operations be performed without the presence of a qualified geotechnical engineer. An onsite, pre-job meeting with the developer, the contractor, the jurisdictional agency, and the geotechnical engineer should

occur prior to all grading related operations. Operations undertaken at the site without the geotechnical engineer present may result in exclusions of affected areas from the final compaction report for the project.

Grading of the subject site should be performed in accordance with the following recommendations as well as applicable portions of the California Building Code, and/or applicable local ordinances.

All areas to be graded should be stripped of significant vegetation and other deleterious materials. Any undocumented fill encountered during grading should be completely removed, cleaned of significant deleterious materials and may then be reused as compacted fill. It is our recommendation that any existing fills under any proposed flatwork and paved areas be removed and replaced with engineered compacted fill. If this is not done, premature structural distress (settlement) of the flatwork and pavement may occur.

Cavities created by the removal of any subsurface obstructions that could be encountered, such as foundations, utilities, and septic systems associated with the previous on-site development, should be thoroughly cleaned of loose soil, organic matter and other deleterious materials, shaped to provide access for construction equipment, and backfilled as recommended in the following Engineered Compacted Fill section of this report.

Initial Site Preparation

The existing loose alluvial soils and existing fill materials should be removed from all proposed structural and/or fill areas. The data developed during this investigation indicates that removals on the order of 5 to 7 feet deep will be required from proposed development areas in order to encounter competent alluvium upon which engineered compacted fill can be placed. This will allow for the removal of the undocumented fill and any subsurface features associated with the past site use. The given removal depths are preliminary. Deeper fills may be present locally. Removals should expose alluvial materials with an in-situ relative compaction of at least 85 percent (ASTM D 1557). The actual depths of the removals should be determined during the grading operation by observation and/or in-place density testing.

Preparation of Fill Areas

Prior to placing fill, the surfaces of all areas to receive fill should be scarified to a minimum depth of 12 inches. The scarified soil should be brought to near optimum moisture content and compacted to a relative compaction of at least 90 percent (ASTM D 1557).

Engineered Compacted Fill

The onsite soils should provide adequate quality fill material, provided they are free from oversized and/or organic matter and other deleterious materials. Unless approved by the geotechnical engineer, rock or similar irreducible material with a maximum dimension greater than 6 inches should not be buried or placed in fills.

If required, import fill should be inorganic, non-expansive granular soils free from rocks or lumps greater than 6 inches in maximum dimension. Sources for import fill should be approved by the geotechnical engineer prior to their use. Fill should be spread in maximum 8-inch uniform, loose lifts, each lift brought to near optimum moisture content, and compacted to a relative compaction of at least 90 percent in accordance with ASTM D 1557.

Preparation of Foundation Areas

All footings should rest upon at least 24 inches of properly compacted fill material placed over competent alluvium. In areas where the required fill thickness is not accomplished by the recommended removals or by site rough grading, the footing areas should be further subexcavated to a depth of at least 24 inches below the proposed footing base grade, with the subexcavation extending at least 5 feet beyond the footing lines. The bottom of all excavations should be scarified to a depth of 12 inches, brought to near optimum moisture content, and recompacted to at least 90 percent relative compaction (ASTM D 1557) prior to the placement of compacted fill.

It should be noted that no structure should be placed across any areas where the maximum depth of fill to minimum depth of fill is greater than a 3 to 1 ratio as measured from the bottom of the footing.

Concrete floor slabs should bear on a minimum of 24 inches of compacted soil. This should be accomplished by the recommendations provided above. The final pad surfaces should be rolled to provide smooth, dense surfaces upon which to place the concrete.

Short-Term Excavations

Following the California Occupational and Safety Health Act (CAL-OSHA) requirements, excavations 5 feet deep and greater should be sloped or shored. All excavations and shoring should conform to CAL-OSHA requirements. Short-term excavations of 5 feet deep

and greater will conform to Title 8 of the California Code of Regulations, Construction Safety Orders, Section 1504 and 1539 through 1547. Based on the findings from our exploratory borings, it appears that Type C soils are the predominant type of soil on the project and all short-term excavations should be based on this type of soil.

Deviation from the standard short-term slopes are permitted using option four, Design by a Registered Professional Engineer (Section 1541.1).

Short-term excavation construction and maintenance are the responsibility of the contractor and should be a consideration of his methods of operation and the actual soil conditions encountered.

Slope Construction

Preliminary data indicates that cut and fill slopes should be constructed no steeper than two horizontal to one vertical. Fill slopes should be overfilled during construction and then cut back to expose fully compacted soil. A suitable alternative would be to compact the slopes during construction, then roll the final slopes to provide dense, erosion-resistant surfaces.

Slope Protection

Since the site soil materials are susceptible to erosion by running water, measures should be provided to prevent surface water from flowing over slope faces. Slopes at the project should be planted with a deep rooted ground cover as soon as possible after the completion of grading. The use of succulent ground covers such as iceplant or sedum is not recommended. If watering is necessary to sustain plant growth on slopes, then the watering operation should be monitored to assure proper operation of the irrigation system and to prevent over watering.

Soil Expansiveness

The upper materials encountered during this investigation were found to be relatively granular and are considered to have a very low expansion potential with some minor on-site materials having a low expansion potential. Therefore, specialized construction procedures to specifically resist expansive soil activity are anticipated at this time and are provided within the following sections of this report.

Additional evaluation of on-site and any imported soils for their expansion potential should be conducted following completion of the grading operation.

Foundation Design

If the site is prepared as recommended, the proposed structures may be safely supported on conventional shallow foundations, either individual spread footings and/or continuous wall footings, bearing entirely on a minimum of 24 inches of engineered compacted fill placed over competent alluvial materials. All foundations should have a minimum width of 12 inches and should be established a minimum of 12 inches below lowest adjacent grade.

For the minimum width and depth, spread foundations may be designed using an allowable bearing pressure of 2,000 psf. This bearing pressure may be increased by 200 psf for each additional foot of width, and by 500 psf for each additional foot of depth, up to a maximum of 4,000 psf. For example, a footing 2 feet wide and embedded 2 feet will have an allowable bearing pressure of 2,700 psf.

The above values are net pressures; therefore, the weight of the foundations and the backfill over the foundations may be neglected when computing dead loads. The values apply to the maximum edge pressure for foundations subjected to eccentric loads or overturning. The recommended pressures apply for the total of dead plus frequently applied live loads, and incorporate a factor of safety of at least 3.0. The allowable bearing pressures may be increased by one-third for temporary wind or seismic loading.

The resultant of the combined vertical and lateral seismic loads should act within the middle one-third of the footing width. The maximum calculated edge pressure under the toe of foundations subjected to eccentric loads or overturning should not exceed the increased allowable pressure.

Resistance to lateral loads will be provided by passive earth pressure and base friction. For footings bearing against compacted fill, passive earth pressure may be considered to be developed at a rate of 300 pounds per square foot per foot of depth. Base friction may be computed at 0.30 times the normal load. Base friction and passive earth pressure may be combined without reduction. These values are for dead load plus live load and may be increased by one-third for wind or seismic loading.

Footings on low expansive soils should be reinforced with a minimum of four # 4 rebars, two near the top and two near the bottom of the footings.

The preceding recommendations to counteract low expansive soil activity should be considered preliminary and should be revised upon the completion of the site grading. More stringent parameters for design of foundations on expansive soils can be specified by a structural engineer experienced in these matters.

Settlement

Total settlement of individual foundations will vary depending on the width of the foundation and the actual load supported. Maximum settlement of shallow foundations designed and constructed in accordance with the preceding recommendations are estimated to be on the order of 0.5 inch. Differential settlements between adjacent footings should be about one-half of the total settlement. Settlement of all foundations is expected to occur rapidly, primarily as a result of elastic compression of supporting soils as the loads are applied, and should be essentially completed shortly after initial application of the loads.

Building Area Slab-on-Grade

To provide adequate support, concrete floor slabs-on-grade should bear on a minimum of 24 inches of engineered fill compacted soil. The final pad surfaces should be rolled to provide smooth, dense surfaces.

The minimum reinforcement for slabs-on-grade supported by low expansive soil is #3 reinforcing bars at 18-inches on center, each way. The slab thickness shall be a minimum of 4-inches. Slab-on-grade supported by soils with expansion potential above low should be designed by a structural engineer experienced in such design. Special design of slabs-on-grade supported by very low expansion potential soils is not required.

Prior to placing concrete, the upper 12-inches of the subgrade soil should be pre-saturated to 2 to 4 percent over optimum moisture content.

Slabs to receive moisture-sensitive coverings should be provided with a moisture vapor retarder/barrier. We recommend that a vapor retarder/barrier be designed and constructed according to the American Concrete Institute 302.1R, Concrete Floor and Slab Construction, which addresses moisture vapor retarder/barrier construction. At a minimum, the vapor retarder/barrier should comply with ASTM E1745 and have a nominal thickness of at least 10 mils. The vapor retarder/barrier should be properly sealed, per the manufacturer's recommendations, and protected from punctures and other damage.

For slabs in humidity-controlled areas, a layer of dry, granular material (sand) should be placed above the vapor retarder/barrier.

The slabs should be protected from rapid and excessive moisture loss which could result in slab curling. Careful attention should be given to slab curing procedures, as the site area is subject to large temperature extremes, humidity, and strong winds.

Exterior Flatwork

To provide adequate support, exterior flatwork improvements should rest on a minimum of 12 inches of soil compacted to at least 90 percent (ASTM D 1557).

To resist expansive soil forces, flatwork supported by low expansive soils should be reinforced with a minimum of # 3 rebar at 18 inches each way. Flatwork areas should be pre-saturated to 2 to 4 percent over optimum prior to placing concrete.

Flatwork surface should be sloped a minimum of 1 percent away from buildings and slopes, to approved drainage structures.

Wall Pressures

The design of footings for retaining walls should be performed in accordance with the recommendations described earlier under Preparation of Foundation Areas and Foundation Design. For design of retaining wall footings, the resultant of the applied loads should act in the middle one-third of the footing, and the maximum edge pressure should not exceed the basic allowable value without increase.

For design of retaining walls unrestrained against movement at the top, we recommend an active pressure of 50 pounds per square foot (psf) per foot of depth be used. This assumes level backfill consisting of compacted, non-expansive, on-site soils placed against the structures and within the back cut slope extending upward from the base of the stem at 35 degrees from the vertical or flatter.

Retaining structures subject to uniform surcharge loads within a horizontal distance behind the structures equal to the structural height should be designed to resist additional lateral loads equal to 0.45 times the surcharge load. Any isolated or line loads from adjacent foundations or vehicular loading will impose additional wall loads and should be considered individually.

To avoid over stressing or excessive tilting during placement of backfill behind walls, heavy compaction equipment should not be allowed within the zone delineated by a 45-degree line extending from the base of the wall to the fill surface. The backfill directly behind the walls should be compacted using light equipment such as hand operated vibrating plates and rollers. No material larger than three inches in diameter should be placed in direct contact with the wall.

Wall pressures should be verified prior to construction, when the actual backfill materials and conditions have been determined. Recommended pressures are applicable only to level, non-expansive, properly drained backfill with no additional surcharge loadings. If inclined backfills are proposed, this firm should be contacted to develop appropriate active earth pressure parameters.

Preliminary Pavement Design

Testing and design for preliminary onsite pavement was conducted in accordance with the California Highway Design Manual and the Guide for the Design and Construction of Concrete Parking Lots (ACI33OR).

Based upon our preliminary sampling and testing, and upon an assumed Traffic Index generally used for similar projects, it appears that the structural sections tabulated below should provide satisfactory pavements for the subject on-site pavement improvements:

| AREA | T.I.[1] | DESIGN R-VALUE | PRELIMINARY SECTION |
|---|---|---|---|
| On site vehicular parking with occasional truck traffic (ADTT=1) | 5.0 | 30 | 0.25’ AC / 0.45' AB or 4.5" PCC / 4.0" AB |
| On site vehicular parking with occasional truck traffic (ADTT=10) | 6.0 | 30 | 0.25’ AC / 0.70' AB or 5.0" PCC / 4.0" AB |

AC - Asphalt Concrete
AB - Class 2 Aggregate Base
PCC - Portland Cement Concrete
[1] to be determined by project engineer

The above structural sections are predicated upon 90 percent relative compaction (ASTM D 1557) of all utility trench backfills and 95 percent relative compaction (ASTM D 1557) of the upper 12 inches of pavement subgrade soils and of any aggregate base utilized. In addition, the aggregate base should meet Caltrans specifications for Class 2 Aggregate Base.

In areas of the pavement which will receive high abrasion loads due to start-ups and stops, or where trucks will move on a tight turning radius, consideration should be given to installing concrete pads. Such pads should be a minimum of 4.5 inch thick concrete, with a 4 inch thick aggregate base. Concrete pads are also recommended in areas adjacent to trash storage areas where heavier loads will occur due to operation of trucks lifting trash dumpsters.

The recommended Portland Cement (PCC) concrete pavement should have a minimum modulus of rupture (MR) of 550 pounds per square inch (psi). Transverse joints should be sawcut in the pavement at approximately 12 to 15-foot intervals within 4 to 6 hours of concrete placement, or preferably sooner. Sawcut depth should be equal to approximately one quarter of slab thickness. Construction joints should be constructed such that adjacent sections butt directly against each other and are keyed into each other. Parallel pavement sections should also be keyed into each other.

It should be noted that all of the above pavement design was based upon the results of preliminary sampling and testing, and should be verified by additional sampling and testing during construction when the actual subgrade soils are exposed.

Infiltration

The results of our field investigation and percolation test data indicates the site earth materials at the depth and location tested are not conducive to acceptable infiltration. Therefore, water quality storm water systems should not incorporate on-site infiltration when determining storm water treatment capacity.

Corrosion Protection

Based on the test results, this soil is classified as corrosive to ferrous metals and potentially aggressive towards copper. The laboratory data above should be reviewed and corrosion design should be completed by a qualified corrosion engineer.

In lieu of corrosion design for metal piping, ABS/PVC may be used. Soil corrosion is not considered a factor with ABS/PVC materials. ABS/PVC is considered suitable for use due to the corrosion potential of the on-site soils with respect to metals.

LOR Geotechnical does not practice corrosion engineering. If further information concerning the corrosion characteristics, or interpretation of the results submitted herein, is required, then a competent corrosion engineer should be consulted.

Construction Monitoring

Post investigative services are an important and necessary continuation of this investigation. Project plans and specifications should be reviewed by the project geotechnical consultant prior to construction to confirm that the intent of the recommendations presented in this report have been incorporated into the design.

Additional R-value, expansion, and soluble sulfate content testing should be conducted after/during site rough grading.

During construction, sufficient and timely geotechnical observation and testing should be provided to correlate the findings of this investigation with the actual subsurface conditions exposed during construction. Items requiring observation and testing include, but are not necessarily limited to, the following:

1. Site preparation-stripping and removals.

2. Excavations, including approval of the bottom of excavations prior to the processing and preparation of the bottom areas for fill placement.

3. Scarifying and compacting prior to fill placement.

4. Foundation excavations.

5. Subgrade preparation for pavements and slabs-on-grade.

6. Placement of engineered compacted fill and backfill, including approval of fill materials and the performance of sufficient density tests to evaluate the degree of compaction being achieved.

## LIMITATIONS

This report contains geotechnical conclusions and recommendations developed solely for use by Second Street Family, LP, and their design consultants, for the purposes described earlier. It may not contain sufficient information for other uses or the purposes of other parties. The contents should not be extrapolated to other areas or used for other facilities without consulting LOR Geotechnical Group, Inc.

The recommendations are based on interpretations of the subsurface conditions concluded from information gained from subsurface explorations and a surficial site reconnaissance.

The interpretations may differ from actual subsurface conditions, which can vary horizontally and vertically across the site. If conditions are encountered during the construction of the project, which differ significantly from those presented in this report, this firm should be notified immediately so we may assess the impact to the recommendations provided. Due to possible subsurface variations, all aspects of field construction addressed in this report should be observed and tested by the project geotechnical consultant.

If parties other than LOR Geotechnical Group, Inc., provide construction monitoring services, they must be notified that they will be required to assume responsibility for the geotechnical phase of the project being completed by concurring with the recommendations provided in this report or by providing alternative recommendations.

The report was prepared using generally accepted geotechnical engineering practices under the direction of a state licensed geotechnical engineer. No warranty, expressed or implied, is made as to conclusions and professional advice included in this report. Any persons using this report for bidding or construction purposes should perform such independent investigations as deemed necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project.

## TIME LIMITATIONS

The findings of this report are valid as of this date. Changes in the condition of a property can, however, occur with the passage of time, whether they be due to natural processes or the work of man on this or adjacent properties. In addition, changes in the Standards-of-Practice and/or Governmental Codes may occur. Due to such changes, the findings of this report may be invalidated wholly or in part by changes beyond our control. Therefore, this report should not be relied upon after a significant amount of time without a review by LOR Geotechnical Group, Inc., verifying the suitability of the conclusions and recommendations.

## CLOSURE

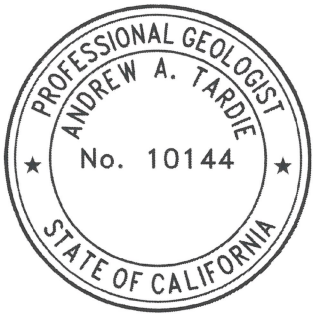
It has been a pleasure to assist you with this project. We look forward to being of further assistance to you as construction begins. Should conditions be encountered during construction that appear to be different than indicated by this report, please contact this office immediately in order that we might evaluate their effect.

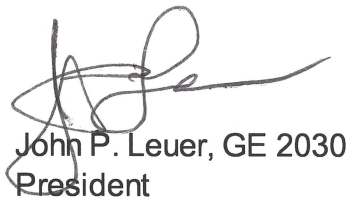
Should you have any questions regarding this report, please do not hesitate to contact our office at your convenience.

Respectfully submitted,
**LOR Geotechnical Group, Inc.**



Andrew A. Tardie, PG 10144
Vice President



John P. Leuer, GE 2030
President




AAT:RMM:JPL:ss

Distribution: Addressee via email sbering@c-cdevcom

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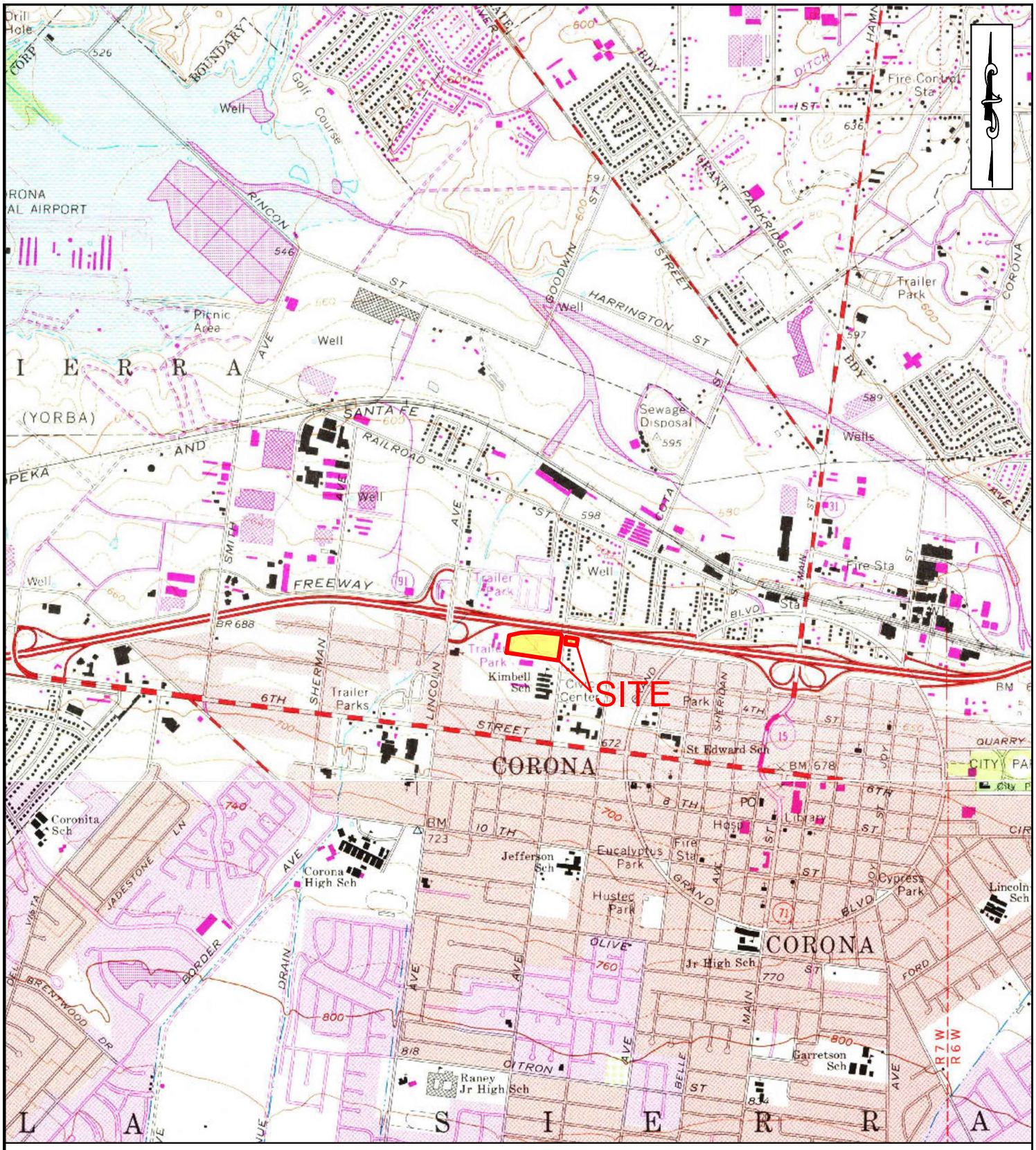
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# APPENDIX A

## Index Map, Site Plan, Regional Geologic Map, and Historical Seismicity Maps




# INDEX MAP

| | | | |
|---|---|---|---|
| **PROJECT:** | Proposed Multi-Family Residential Development, Corona, California | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **ENCLOSURE:** | A-1 |
| **LOR** GEOTECHNICAL GROUP, INC. | | **DATE:** | October 2023 |
| | | **SCALE:** | 1" ≈ 2,000' |

# Legend

(Locations Approximate)

Map Symbols

- **B-6** - Exploratory Boring
- **P-1** - Percolation Test

California 91 Express Lanes (Toll road)

Riverside Fwy

91

W 2nd St

SITE BOUNDARY

B-1

B-2

B-3

B-4

B-5

B-6

P-1

Tacos katri
Mexican

Citrus Circle
Apartment Homes

Corona-Norco
Adult Education

Corona Sc Child
Nutrition Services

S Buena Vista Ave

40

## SITE PLAN

| | |
|---|---|
| **PROJECT NO.:** | 33951.1 |
| **ENCLOSURE:** | A-2a |
| **DATE:** | October 2023 |
| **SCALE:** | 1" ≈ 100' |

**PROJECT:** Proposed Multi-Family Residential Development, Corona, California

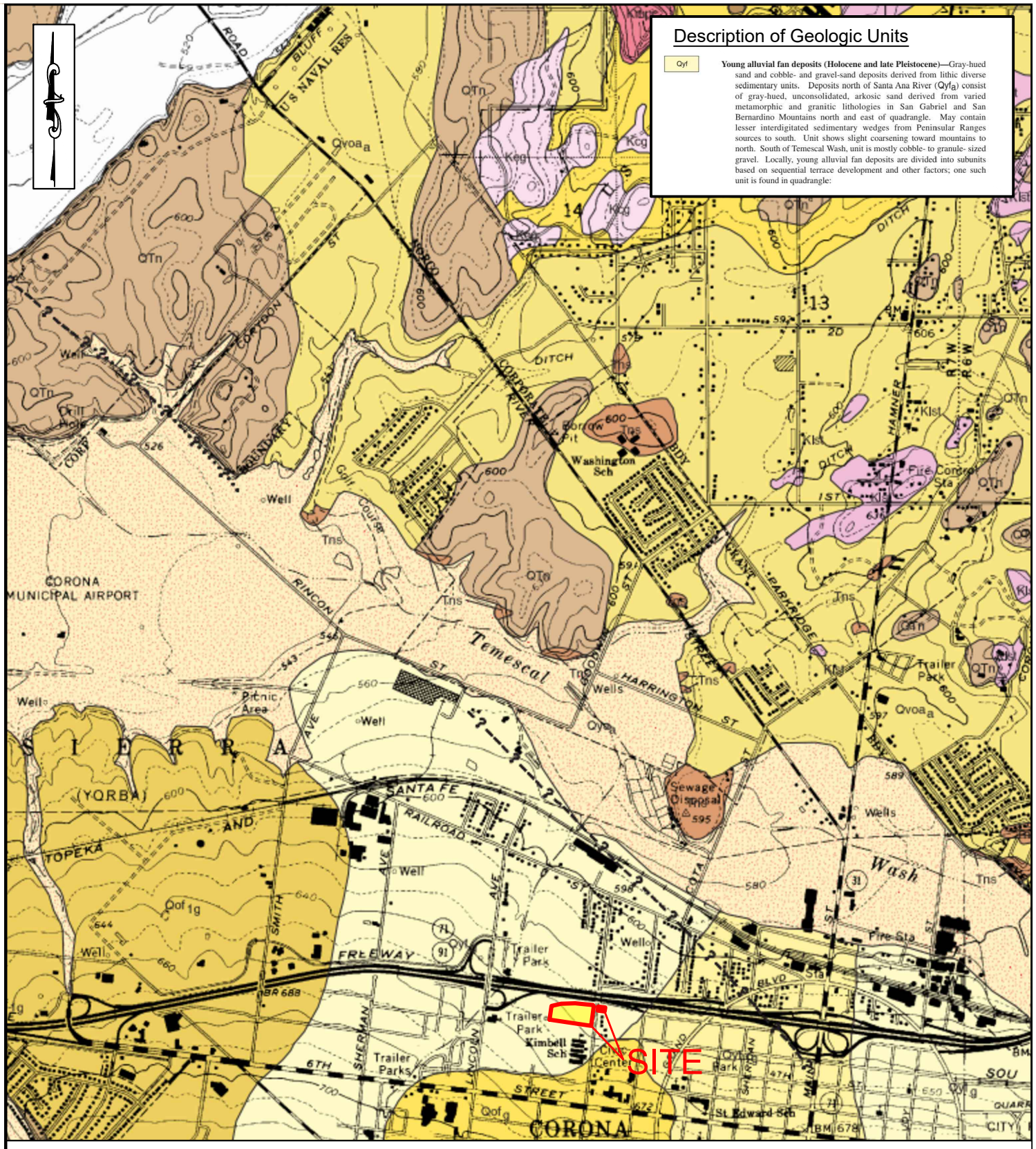
**CLIENT:** Second Street Family LP

LOR GEOTECHNICAL GROUP, INC.




# SITE PLAN

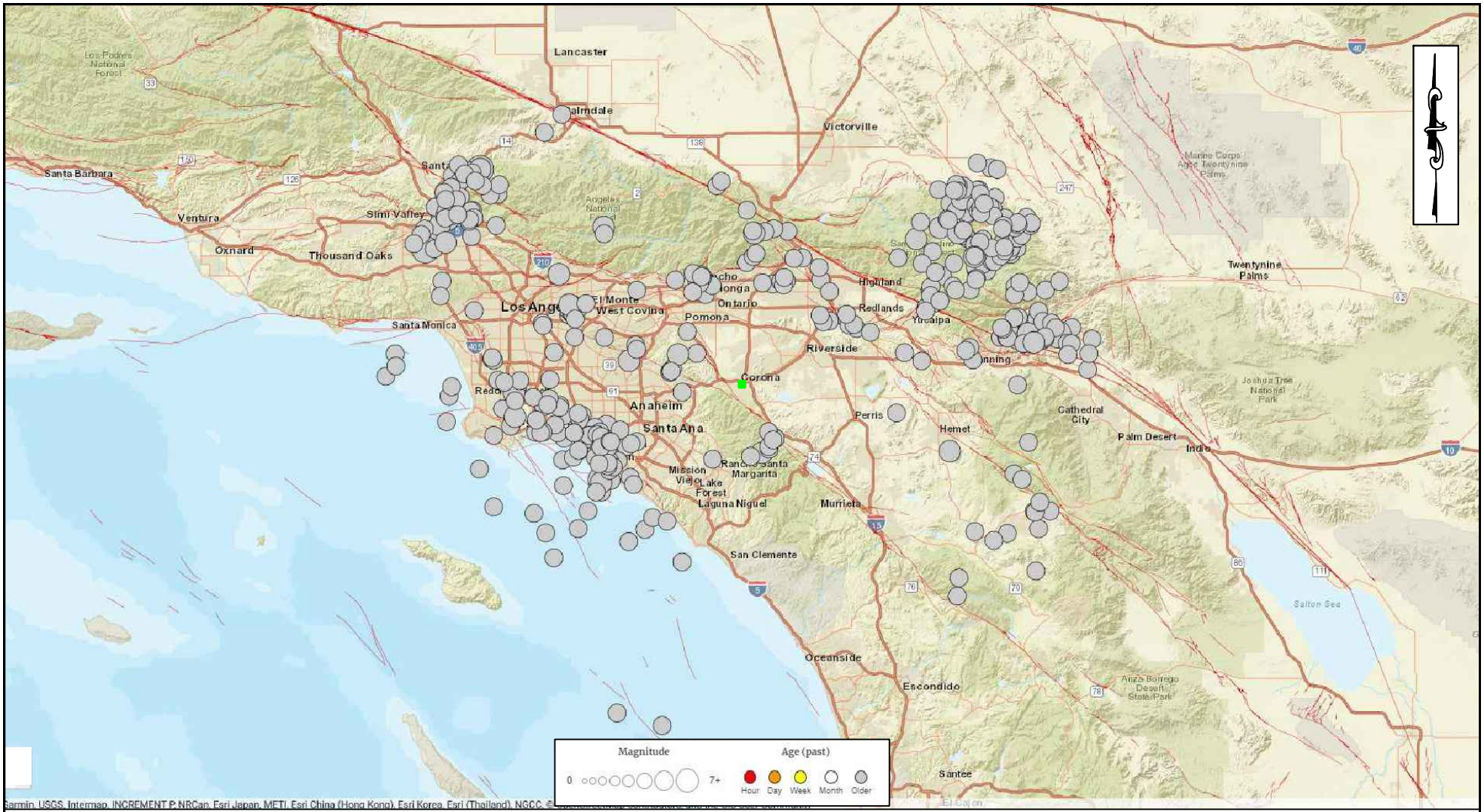
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|---|---|---|---|
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| **CLIENT:** | Second Street Family LP | **ENCLOSURE:** | A-2b |
| **LOR** GEOTECHNICAL GROUP, INC. | | **DATE:** | October 2023 |
| | | **SCALE:** | 1" ≈ 42' |




# REGIONAL GEOLOGIC MAP

(Morton and Gray, 2002)

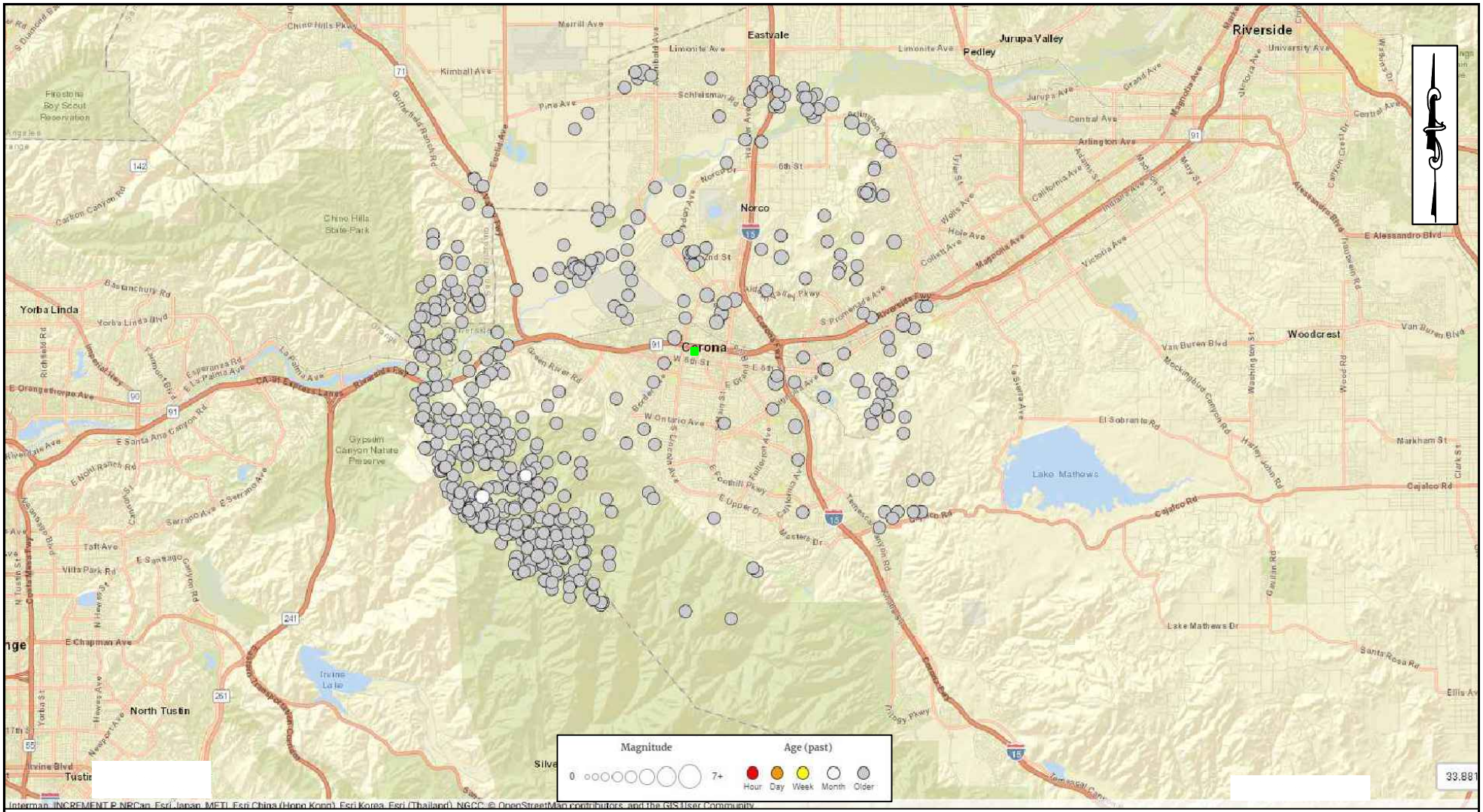
| | | | |
|---|---|---|---|
| **PROJECT:** | Proposed Multi-Family Residential Development, Corona, California | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **ENCLOSURE:** | A-3 |
| **LOR** GEOTECHNICAL GROUP, INC. | | **DATE:** | October 2023 |
| | | **SCALE:** | 1" ≈ 2,000' |




U.S. Geologic Survey (2023) real-time earthquake epicenter map. Plotted are 437 epicenters of instrument-recorded events from 01/01/32 to present (10/05/23) of local magnitude 4+ within a radius of ~62 miles (100 kilometers) of the site. Location accuracy varies. The site is indicated by the green square (■). The selected magnitude corresponds to a threshold intensity value where very light damage potential begins. These events are also generally widely felt by persons. Red lines mark the surface traces of known Quaternary-age faults.

# HISTORICAL SEISMICITY MAP - 100km Radius

| | | | |
|---|---|---|---|
| **PROJECT:** | Proposed Multi-Family Residential Development, Corona, California | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **ENCLOSURE:** | A-4 |
| **LOR** GEOTECHNICAL GROUP, INC. | | **DATE:** | October 2023 |
| | | **SCALE:** | 1" ≈ 40km |




U.S. Geologic Survey (2023) real-time earthquake epicenter map. Plotted are 501 epicenters of instrument-recorded events from 01/01/78 to present (10/05/23) of local magnitude 2+ within a radius of ~6.2 miles (10 kilometers) of the site. Location accuracy varies. The site is indicated by the green square (■). The selected magnitude corresponds to a threshold intensity value where very light damage potential begins. These events are also generally widely felt by persons. Red lines mark the surface traces of known Quaternary-age faults.

# HISTORICAL SEISMICITY MAP - 10km Radius

| | | | |
|---|---|---|---|
| **PROJECT:** | Proposed Multi-Family Residential Development, Corona, California | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **ENCLOSURE:** | A-5 |
| **LOR GEOTECHNICAL GROUP, INC.** | | **DATE:** | October 2023 |
| | | **SCALE:** | 1" ≈ 10km |

# APPENDIX B

## Field Investigation Program and Boring Logs

## APPENDIX B
## FIELD INVESTIGATION

Subsurface Exploration

Our subsurface exploration of the site consisted of drilling 6 exploratory borings to depths of approximately 11.5 and 51.5 feet below the existing ground surface using a Mobile B-61 drill rig on September 19 and 21, 2023. The approximate locations of the borings are shown on Enclosures A-2a and A-2b within Appendix A.

The drilling exploration was conducted using a Mobile B-61 drill rig equipped with 8-inch diameter hollow stem augers. The soils were continuously logged by a geologist from this firm who inspected the site, created detailed logs of the borings, obtained undisturbed, as well as disturbed, soil samples for evaluation and testing, and classified the soils by visual examination in accordance with the Unified Soil Classification System.

Relatively undisturbed samples of the subsoils were obtained at a maximum interval of 5 feet. The samples were recovered by using a California split barrel sampler of 2.50 inch inside diameter and 3.25 inch outside diameter or a Standard Penetration Sampler (SPT) from the ground surface to the total depth explored. The samplers were driven by a 140 pound automatic trip hammer dropped from a height of 30 inches. The number of hammer blows required to drive the sampler into the ground the final 12 inches were recorded and further converted to an equivalent SPT N-value. Factors such as efficiency of the automatic trip hammer used during this investigation (80%), borehole diameter (8"), and rod length at the test depth were considered for further computing of equivalent SPT N-values corrected for field procedures (N60) which are included in the boring logs, Enclosures B-1 through B-6.

The undisturbed soil samples were retained in brass sample rings of 2.42 inches in diameter and 1.00 inch in height, and placed in sealed plastic containers. Disturbed soil samples were obtained at selected levels within the borings and placed in sealed containers for transport to our geotechnical laboratory.

All samples obtained were taken to our geotechnical laboratory for storage and testing. Detailed logs of the borings are presented on the enclosed Boring Logs, Enclosures B-1 through B-6. A Boring Log Legend is presented on Enclosure B-i. A Soil Classification Chart is presented as Enclosure B-ii.

## CONSISTENCY OF SOIL

### SANDS

| SPT BLOWS | CONSISTENCY |
|---|---|
| 0-4 | Very Loose |
| 4-10 | Loose |
| 10-30 | Medium Dense |
| 30-50 | Dense |
| Over 50 | Very Dense |

### COHESIVE SOILS

| SPT BLOWS | CONSISTENCY |
|---|---|
| 0-2 | Very Soft |
| 2-4 | Soft |
| 4-8 | Medium |
| 8-15 | Stiff |
| 15-30 | Very Stiff |
| 30-60 | Hard |
| Over 60 | Very Hard |

## SAMPLE KEY

| Symbol | Description |
|---|---|
|  | INDICATES CALIFORNIA SPLIT SPOON SOIL SAMPLE<br><br>INDICATES BULK SAMPLE<br><br>INDICATES SAND CONE OR NUCLEAR DENSITY TEST<br><br>INDICATES STANDARD PENETRATION TEST (SPT) SOIL SAMPLE |

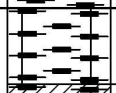
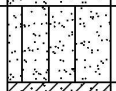
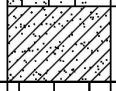
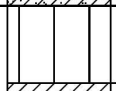
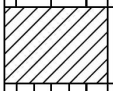
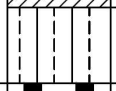
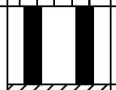
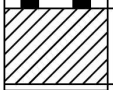
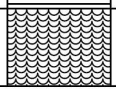
## TYPES OF LABORATORY TESTS

| | |
|---|---|
| 1 | Atterberg Limits |
| 2 | Consolidation |
| 3 | Direct Shear (undisturbed or remolded) |
| 4 | Expansion Index |
| 5 | Hydrometer |
| 6 | Organic Content |
| 7 | Proctor (4", 6", or Cal216) |
| 8 | R-value |
| 9 | Sand Equivalent |
| 10 | Sieve Analysis |
| 11 | Soluble Sulfate Content |
| 12 | Swell |
| 13 | Wash 200 Sieve |

# BORING LOG LEGEND

| | | | |
|---|---|---|---|
| **PROJECT:** | Multi-Family Residential Development, Corona, California | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **ENCLOSURE:** | B-i |
| **LOR** GEOTECHNICAL GROUP, INC. | | **DATE:** | October 2023 |

# SOIL CLASSIFICATION CHART

| MAJOR DIVISIONS | | | SYMBOLS GRAPH | SYMBOLS LETTER | TYPICAL DESCRIPTIONS |
|---|---|---|---|---|---|
| COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE | GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE | CLEAN GRAVELS (LITTLE OR NO FINES) |  | GW | WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES |
| | | |  | GP | POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES |
| | | GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES) |  | GM | SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES |
| | | |  | GC | CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES |
| | SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE | CLEAN SANDS (LITTLE OR NO FINES) |  | SW | WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES |
| | | |  | SP | POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES |
| | | SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES) |  | SM | SILTY SANDS, SAND - SILT MIXTURES |
| | | |  | SC | CLAYEY SANDS, SAND - CLAY MIXTURES |
| FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO.200 SIEVE SIZE | SILTS AND CLAYS | LIQUID LIMIT LESS THAN 50 |  | ML | INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY |
| | | |  | CL | INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS |
| | | |  | OL | ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY |
| | SILTS AND CLAYS | LIQUID LIMIT GREATER THAN 50 |  | MH | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS |
| | | |  | CH | INORGANIC CLAYS OF HIGH PLASTICITY |
| | | |  | OH | ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS |
| HIGHLY ORGANIC SOILS | | |  | PT | PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS |

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

## PARTICLE SIZE LIMITS

| BOULDERS | COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | |
| 12" | 3" | 3/4" | No. 4 | No. 10 | No. 40 | 200 | |

(U.S. STANDARD SIEVE SIZE)

# SOIL CLASSIFICATION CHART

| | | | |
|---|---|---|---|
| **PROJECT:** | Multi-Family Residential Development, Corona, California | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **ENCLOSURE:** | B-ii |
| **LOR GEOTECHNICAL GROUP, INC.** | | **DATE:** | October 2023 |

# LOG OF BORING B-1

| DEPTH IN FEET | SPT BLOW COUNTS | LABORATORY TESTS | MOISTURE CONTENT (%) | | DRY DENSITY (PCF) | SAMPLE TYPE | LITHOLOGY | U.S.C.S. | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| | TEST DATA | | | | | | | | |
| 0 | 11 | 3, 7, 9, 10 | 3.9 | | 110.0 | | | | @ 0 feet, FILL: SILTY SAND with GRAVEL, approximately 40% gravel to 1 1/2", 10% coarse grained sand, 15% medium grained sand, 15% fine grained sand, and 20% silty fines, brown, dry.<br>@ 1 foot, some asphalt and rebar debris. |
| 5 | 10 | | 6.0 | | 106.8 | | | ML | @ 5 feet, ALLUVIUM: SANDY SILT, approximately 5% gravel to 1/2", 5% coarse grained sand, 15% medium grained sand, 20% fine grained sand, and 55% silty fines with trace clay, red brown, dry. |
| | 32 | | 2.0 | | 128.7 | | | SM | @ 7 feet, SILTY SAND, approximately 10% gravel to 2", 25% coarse grained sand, 25% medium grained sand, 25% fine grained sand, and 15% silty fines, brown, dry to damp. |
| 10 | 30 | | 5.5 | | 120.0 | | | | @ 10 feet, slight increase in gravel percentage. |
| 15 | 67 | | 4.0 | | 118.7 | | | SW SM | @ 15 feet, WELL GRADED SAND with SILT and GRAVEL, approximately 20% gravel to 2", 20% coarse grained sand, 25% medium grained sand, 25% fine grained sand, and 10% silty fines, red brown, damp. |
| 20 | 60 | | 3.6 | | | | | | |
| 25 | 55 | | 5.1 | | | | | | @ 27 feet, refusal, boring moved; refusal at 17' during second boring attempt, boring moved; refusal at 7' during third boring attempt, boring moved; refusal at 20' during fourth boring attempt. |
| 30 | | | | | | | | | END OF BORING @ 27' (due to refusal)<br><br>Fill to 5'<br>No groundwater<br>No bedrock |

| | | | |
|---|---|---|---|
| **PROJECT:** | Multi-Family Residential Development | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **ELEVATION:** | -- |
| LOR GEOTECHNICAL GROUP, INC. | | **DATE DRILLED:** | September 19, 2023 |
| | | **EQUIPMENT:** | Mobile B-61 |
| | | **HOLE DIA.:** 8" | **ENCLOSURE:** B-1 |

# LOG OF BORING B-2

| DEPTH IN FEET | SPT BLOW COUNTS | LABORATORY TESTS | MOISTURE CONTENT (%) | | DRY DENSITY (PCF) | SAMPLE TYPE | LITHOLOGY | U.S.C.S. | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | TEST DATA |
| 0 | | | | | | | | SM | @ 0 feet, FILL: SILTY SAND, approximately 10% gravel to 1/2", 15% coarse grained sand, 25% medium grained sand, 25% fine grained sand, and 25% silty fines, brown, dry. |
| | 21 | | 1.8 | | 116.9 | | | SW | @ 2 feet, WELL GRADED SAND with GRAVEL, approximately 20% gravel to 1", 25% coarse grained sand, 25% medium grained sand, 25% fine grained sand, and 5% silty fines, light brown, dry. |
| 5 | 13 | | 4.8 | | 95.5 | | | ML | @ 5 feet, ALLUVIUM: SANDY SILT, approximately 10% medium grained sand, 20% fine grained sand, and 70% silty fines, brown, dry, some pinhole porosity. |
| | 27 | | 4.8 | | 92.1 | | | | @ 7 feet, slightly coarser grained, trace clay, and thin calcite stringers. |
| 10 | 42 | | 4.6 | | 120.9 | | | SW SM | @ 10 feet, WELL GRADED SAND with SILT and GRAVEL, approximately 20% gravel to 2", 20% coarse grained sand, 25% medium grained sand, 25% fine grained sand, and 10% silty fines, brown, dry. |
| 15 | 70 | | 4.2 | | 121.7 | | | | |
| 20 | 83 | | 1.1 | | 114.0 | | | | END OF BORING @ 21' |
| | | | | | | | | | Fill to 5' |
| | | | | | | | | | No groundwater |
| | | | | | | | | | No bedrock |

| | | | |
|---|---|---|---|
| **PROJECT:** | Multi-Family Residential Development | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **ELEVATION:** | -- |
| LOR GEOTECHNICAL GROUP, INC. | | **DATE DRILLED:** | September 21, 2023 |
| | | **EQUIPMENT:** | Mobile B-61 |
| | | **HOLE DIA.:** 8" | **ENCLOSURE:** B-2 |

# LOG OF BORING B-3

| DEPTH IN FEET | SPT BLOW COUNTS | LABORATORY TESTS | MOISTURE CONTENT (%) | | DRY DENSITY (PCF) | SAMPLE TYPE | LITHOLOGY | U.S.C.S. | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 9, 10 | | | | | | | @ 0 feet, FILL: SILTY SAND with GRAVEL, approximately 25% gravel to 1 1/2", 10% coarse grained sand, 20% medium grained sand, 20% fine grained sand, and 25% silty fines, brown, dry. |
| | 26 | | 8.8 | | 116.2 | | | | @ 2 feet, contains trace clay. |
| 5 | 19 | | 9.0 | | 119.2 | | | ML | @ 5 feet, ALLUVIUM SANDY SILT, approximately 5% gravel to 1/2", 5% coarse grained sand, 10% medium grained sand, 15% fine grained sand, and 65% silty fines, red brown, trace thin calcite stringers. |
| | 21 | | 4.3 | | 106.8 | | | | @ 7 feet, SILTY SAND with GRAVEL, approximately 20% gravel to 2", 20% coarse grained sand, 20% medium grained sand, 20% fine grained sand, and 20% silty fines, red brown, damp. |
| 10 | 26 | | | | | | | | @ 10 feet, no sample recovery. |
| 15 | bounce | | | | | | | | @ 15 to 16 feet, increasing gravel (and possibly cobbles), difficult drilling, no sample recovery. |
| 20 | 65 | | 5.7 | | 119.5 | | | SW SM | @ 20 feet, WELL GRADED SAND with SILT and GRAVEL, approximately 25% gravel to 2", 20% coarse grained sand, 20% medium grained sand, 25% fine grained sand, and 10% silty fines with trace clay, damp. |
| 25 | 92 for 11" | | 4.7 | | 121.1 | | | | END OF BORING @ 26.42' |
| | | | | | | | | | Fill to 5' |
| | | | | | | | | | No groundwater |
| | | | | | | | | | No bedrock |

| | | | |
|---|---|---|---|
| **PROJECT:** | Multi-Family Residential Development | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **ELEVATION:** | -- |
| LOR GEOTECHNICAL GROUP, INC. | | **DATE DRILLED:** | September 21, 2023 |
| | | **EQUIPMENT:** | Mobile B-61 |
| | | **HOLE DIA.:** 8" | **ENCLOSURE:** B-3 |

# LOG OF BORING B-4

| DEPTH IN FEET | SPT BLOW COUNTS | LABORATORY TESTS | MOISTURE CONTENT (%) | | DRY DENSITY (PCF) | SAMPLE TYPE | LITHOLOGY | U.S.C.S. | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | SM | @ 0 feet, FILL: SILTY SAND, approximately 10% gravel to 1", 15% coarse grained sand, 25% medium grained sand, 25% fine grained sand, and 25% silty fines, brown, dry. |
| | 11 | | 7.7 | | 107.5 | | | ML | @ 2 feet, ALLUVIUM: SANDY SILT, approximately 5% coarse grained sand, 15% medium grained sand, 25% fine grained sand, and 55% silty fines, brown, dry. |
| 5 | 11 | | 8.1 | | 91.0 | | | | |
| | 54 | | 4.2 | | 118.4 | | | SW SM | @ 5 feet, becomes red brown, some pinhole porosity. @ 7 feet, WELL GRADED SAND with SILT and GRAVEL, approximately 20% gravel to 2", 20% coarse grained sand, 20% medium grained sand, 30% fine grained sand, and 10% silty fines. |
| 10 | 47 | | 5.1 | | 115.2 | | | | |
| 15 | 80 | | 3.7 | | 126.9 | | | | |
| 20 | 56 | | 7.5 | | 125.7 | | | | @ 20 feet, trace clay in fines. |
| 25 | 58 | | 2.6 | | | | | | |
| 30 | 64 | | 2.5 | | | | | | @ 30 feet, clay no longer present. |
| 35 | 71 | | 2.1 | | | | | | |
| 40 | 55 | | 4.3 | | | | | | @ 40 feet, some iron oxide staining. |
| 45 | 18 | | 22.1 | | | | | ML | @ 45 feet, SILT, approximately 10% fine grained sand and 90% silty fines, brown, moist. |
| 50 | 26 | | 21.3 | | | | | | END OF BORING @ 51.5' |
| 55 | | | | | | | | | Fill to 2'<br>No groundwater<br>No bedrock |

TEST DATA

| | | | | |
|---|---|---|---|---|
| **PROJECT:** | Multi-Family Residential Development | **PROJECT NO.:** | 33951.1 | |
| **CLIENT:** | Second Street Family LP | **ELEVATION:** | -- | |
| LOR GEOTECHNICAL GROUP, INC. | | **DATE DRILLED:** | September 21, 2023 | |
| | | **EQUIPMENT:** | Mobile B-61 | |
| | | **HOLE DIA.:** 8" | **ENCLOSURE:** | B-4 |

# LOG OF BORING B-5

| DEPTH IN FEET | SPT BLOW COUNTS | LABORATORY TESTS | MOISTURE CONTENT (%) | | DRY DENSITY (PCF) | SAMPLE TYPE | LITHOLOGY | U.S.C.S. | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| | TEST DATA | | | | | | | | |
| 0 | | 1, 3, 4, 7, 8, 9, 10 | | | | | | SC | @ 0 feet, ALLUVIUM: CLAYEY SAND, approximately 10% gravel to 1", 10% coarse grained sand, 15% medium grained sand, 20% fine grained sand, and 45% silty fines with trace clay, red brown, dry, disturbed in upper 10" to 12". |
| | 11 | | 19.6 | | 84.9 | | | | @ 2 feet, some pinhole porosity, slightly coarser grained. |
| 5 | 12 | | 7.9 | | 100.3 | | | | |
| | 29 | | 8.9 | | 116.1 | | | | @ 7 feet, contains some thin calcite stringers, trace clay. |
| 10 | 49 | | 6.8 | | 111.0 | | | | |
| | | | | | | | | | @ 12 feet, some gravel (drill rig chatter). |
| 15 | 46 for 6" | | 2.4 | | | | | | @ 15 feet, abundant gravel in sample, sample rings disturbed. |
| 20 | 91 for 11" | | 2.2 | | 124.1 | | | SW | @ 20 feet, WELL GRADED SAND with GRAVEL, approximately 25% gravel to 3", 20% coarse grained sand, 25% medium grained sand, 25% fine grained sand, and 5% silty fines, brown, dry. |
| | | | | | | | | | END OF BORING @ 21.42' |
| | | | | | | | | | No fill<br>No groundwater<br>No bedrock |

| | | | |
|---|---|---|---|
| **PROJECT:** | Multi-Family Residential Development | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **ELEVATION:** | -- |
| LOR GEOTECHNICAL GROUP, INC. | | **DATE DRILLED:** | September 21, 2023 |
| | | **EQUIPMENT:** | Mobile B-61 |
| | | **HOLE DIA.:** 8" | **ENCLOSURE:** B-5 |

# LOG OF BORING B-6

| DEPTH IN FEET | SPT BLOW COUNTS | LABORATORY TESTS | MOISTURE CONTENT (%) | | DRY DENSITY (PCF) | SAMPLE TYPE | LITHOLOGY | U.S.C.S. | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| | TEST DATA | | | | | | | | |
| 0 | | | | | | | | SM | @ 0 feet, FILL: SILTY SAND, approximately 5% gravel to 1/2", 20% coarse grained sand, 20% medium grained sand, 20% fine grained sand, and 35% silty fines with trace clay, brown. |
| | 20 | | 4.9 | | 100.7 | | | ML | @ 2 feet, ALLUVIUM: SANDY SILT, trace gravel to 1/2", approximately 5% coarse grained sand, 10% medium grained sand, 20% fine grained sand, and 65% silty fines, red brown, dry, some pinhole porosity. |
| 5 | 19 | | 3.3 | | 105.4 | | | | |
| 10 | 44 | | 3.4 | | 118.8 | | | SW | @ 10 feet, WELL GRADED SAND with GRAVEL, approximately 20% gravel to 3", 20% coarse grained sand, 25% medium grained sand, 30% fine grained sand, and 5% silty fines, brown, dry. |
| | | | | | | | | | END OF BORING @ 11.5' |
| | | | | | | | | | Fill to 2' |
| | | | | | | | | | No groundwater |
| | | | | | | | | | No bedrock |

| | | | |
|---|---|---|---|
| **PROJECT:** | Multi-Family Residential Development | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **ELEVATION:** | -- |
| LOR GEOTECHNICAL GROUP, INC. | | **DATE DRILLED:** | September 21, 2023 |
| | | **EQUIPMENT:** | Mobile B-61 |
| | | **HOLE DIA.:** 8" | **ENCLOSURE:** B-6 |

# APPENDIX C

## Borehole Percolation Testing Program and Infiltration Rate Test Results

## APPENDIX C
## BOREHOLE PERCOLATION TESTING PROGRAM AND INFILTRATION RATE TEST RESULTS

One borehole percolation test was conducted in general accordance with the Deep Percolation Test procedure as outlined in the Design Handbook for Low Impact Development Best Management Practices (RCFCWCD, 2011). Our test was conducted at the requested location and depth as illustrated on Enclosure A-2. Subsequent to drilling, a 3-inch diameter, perforated PVC pipe wrapped in filter fabric was placed within the test hole and 3/4-inch gravel was placed between the outside of the pipe and the hole wall. The test hole was pre-soaked the same day as drilling. Testing took place the next day, September 20, 2023, within 26 hours but not before 15 hours, of the pre-soak. The hole was filled using water from a 200 gallon water tank. Test periods consisted of allowing the water to drop in 30-minute intervals. After each reading, the hole was refilled. Testing was terminated after a total of 12 readings were recorded. The percolation test data was converted to an infiltration rate using the Porchet Method as outlined by the Design Handbook for Low Impact Development Best Management Practices (RCFCWCD, 2011).

Infiltration test results are summarized in the following table:

| Test No. | Depth* (ft) | Infiltration Rate** (in/hr) |
|---|---|---|
| P-1 | 15 | 0.27 |
| * depth measured below existing ground surface<br>** Porchet Method determined clear water rate | | |

The results of this testing are presented as Enclosure C-1.

# BOREHOLE METHOD PERCOLATION TEST RESULTS

| | | | |
|---|---|---|---|
| Project: | Multi-Family Residential Development | Test Date: | September 20, 2023 |
| Project No.: | 33951.1 | Test Hole No.: | P-1 |
| Soil Classificaiton: | (SM) Silty sand | Effective Hole Dia.*: | 4.8 in. |
| Depth of Test Hole: | 15.0 ft. | Date Excavated: | August 19, 2023 |
| Tested By: | A.L. | | |

| READING | TIME START | TIME STOP | TIME INTERVAL | | TOTAL TIME | INITIAL WATER LEVEL | FINAL WATER LEVEL | INITIAL HOLE DEPTH | FINAL HOLE DEPTH | CHANGE IN WATER LEVEL | AVERAGE WETTED DEPTH | PERCOLATION RATE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | min | hr. | hr. | in. | in. | in. | in. | in. | in. | (min/in) |
| 1 | 10:45 AM | 11:15 AM | 30 | 0.50 | 0.50 | 42.00 | 66.00 | 180.00 | 180.00 | 24.00 | 126.00 | 1.3 |
| 2 | 11:16 AM | 11:46 AM | 30 | 0.50 | 1.00 | 46.00 | 73.00 | 180.00 | 180.00 | 27.00 | 120.50 | 1.1 |
| 3 | 11:47 AM | 12:17 PM | 30 | 0.50 | 1.50 | 46.00 | 69.50 | 180.00 | 180.00 | 23.50 | 122.25 | 1.3 |
| 4 | 12:18 PM | 12:48 PM | 30 | 0.50 | 2.00 | 48.00 | 64.75 | 180.00 | 180.00 | 16.75 | 123.63 | 1.8 |
| 5 | 12:49 PM | 1:19 PM | 30 | 0.50 | 2.50 | 48.00 | 62.50 | 180.00 | 180.00 | 14.50 | 124.75 | 2.1 |
| 6 | 1:20 PM | 1:50 PM | 30 | 0.50 | 3.00 | 48.00 | 63.00 | 180.00 | 180.00 | 15.00 | 124.50 | 2.0 |
| 7 | 1:51 PM | 2:21 PM | 30 | 0.50 | 3.50 | 48.00 | 62.25 | 180.00 | 180.00 | 14.25 | 124.88 | 2.1 |
| 8 | 2:22 PM | 2:52 PM | 30 | 0.50 | 4.00 | 48.00 | 62.00 | 180.00 | 180.00 | 14.00 | 125.00 | 2.1 |
| 9 | 2:53 PM | 3:23 PM | 30 | 0.50 | 4.50 | 48.00 | 62.00 | 180.00 | 180.00 | 14.00 | 125.00 | 2.1 |
| 10 | 3:24 PM | 3:54 PM | 30 | 0.50 | 5.00 | 48.00 | 62.50 | 180.00 | 180.00 | 14.50 | 124.75 | 2.1 |
| 11 | 3:55 PM | 4:25 PM | 30 | 0.50 | 5.50 | 48.00 | 62.00 | 180.00 | 180.00 | 14.00 | 125.00 | 2.1 |
| 12 | 4:26 PM | 4:56 PM | 30 | 0.50 | 6.00 | 48.00 | 62.00 | 180.00 | 180.00 | 14.00 | 125.00 | 2.1 |

PERCOLATION RATE CONVERSION (Porchet Method):

| | | |
|---|---|---|
| $H_O$ | 132.00 | |
| $H_f$ | 118.00 | |
| $\Delta H$ | 14.00 | |
| $H_{avg}$ | 125.00 | |
| $I_t$ | **0.27** | in/hr (clear water rate) |

* diameter adjusted to an effective diameter due to the loss in volume of water because of gravel packing

# APPENDIX D

## Laboratory Testing Program and Test Results

## APPENDIX D
## LABORATORY TESTING

General

Selected soil samples obtained from the borings were tested in our geotechnical laboratory to evaluate the physical properties of the soils affecting foundation design and construction procedures. The laboratory testing program performed in conjunction with our investigation included in-place moisture content and dry density, laboratory compaction characteristics, direct shear, sieve analysis, sand equivalent, R-value, expansion index, Atterberg limits, and corrosion. Descriptions of the laboratory tests are presented in the following paragraphs:

Moisture Density Tests

The moisture content and dry density information provides an indirect measure of soil consistency for each stratum, and can also provide a correlation between soils on this site. The dry unit weight and field moisture content were determined for selected undisturbed samples, in accordance with ASTM D 2921 and ASTM D 2216, respectively, and the results are shown on the boring logs, Enclosures B-1 through B-4 for convenient correlation with the soil profile.

Laboratory Compaction

A selected soil sample was tested in the laboratory to determine compaction characteristics using the ASTM D 1557 compaction test method. The results are presented in the following table:

| LABORATORY COMPACTION | | | | |
|---|---|---|---|---|
| **Boring Number** | **Sample Depth (feet)** | **Soil Description (U.S.C.S.)** | **Maximum Dry Density (pcf)** | **Optimum Moisture Content (percent)** |
| B-1 | 0-3 | (SM) Silty Sand with Gravel | 137.0 | 5.5 |
| B-5 | 0-3 | (SC) Clayey Sand | 129.0 | 9.0 |

Direct Shear Test

Shear tests are performed in general accordance with ASTM D 3080 with a direct shear machine at a constant rate-of-strain (0.04 inches/minute). The machine is designed to test a sample partially extruded from a sample ring in single shear. Samples are tested at varying normal loads in order to evaluate the shear strength parameters, angle of internal friction and cohesion. Samples are tested in remolded condition (90 percent relative compaction per ASTM D 1557) and soaked, to represent the worst case conditions expected in the field.

The results of the shear test on a selected soil sample is presented in the following table:

| DIRECT SHEAR TEST | | | | |
|---|---|---|---|---|
| **Boring Number** | **Sample Depth (feet)** | **Soil Description (U.S.C.S.)** | **Apparent Cohesion (psf)** | **Angle of Internal Friction (degrees)** |
| B-1 | 0-3 | (SM) Silty Sand with Gravel | 200 | 33 |
| B-5 | 0-3 | (SC) Clayey Sand | 100 | 29 |

Sieve Analysis

A quantitative determination of the grain size distribution was performed for selected samples in accordance with the ASTM D 422 laboratory test procedure. The determination is performed by passing the soil through a series of sieves, and recording the weights of retained particles on each screen. The results of the grain size distribution analyses are presented graphically on Enclosure D-1.

Sand Equivalent

The sand equivalent of selected soils were evaluated using the California Sand Equivalent Test Method, Caltrans Number 217. The results of the sand equivalent tests are presented with the grain size distribution analyses on Enclosure D-1.

R-Value Test

Based on the indicator testing above, a soil sample was selected and tested to determine its R-value using the California R-Value Test Method, Caltrans Number 301. The results of the R-value test is presented on Enclosure D-1.

Expansion Index Test

Remolded samples are tested to determine their expansion potential in accordance with the Expansion Index (EI) test. The test is performed in accordance with the Uniform Building Code Standard 18-2. The test result for a select soil sample is presented in the following table:

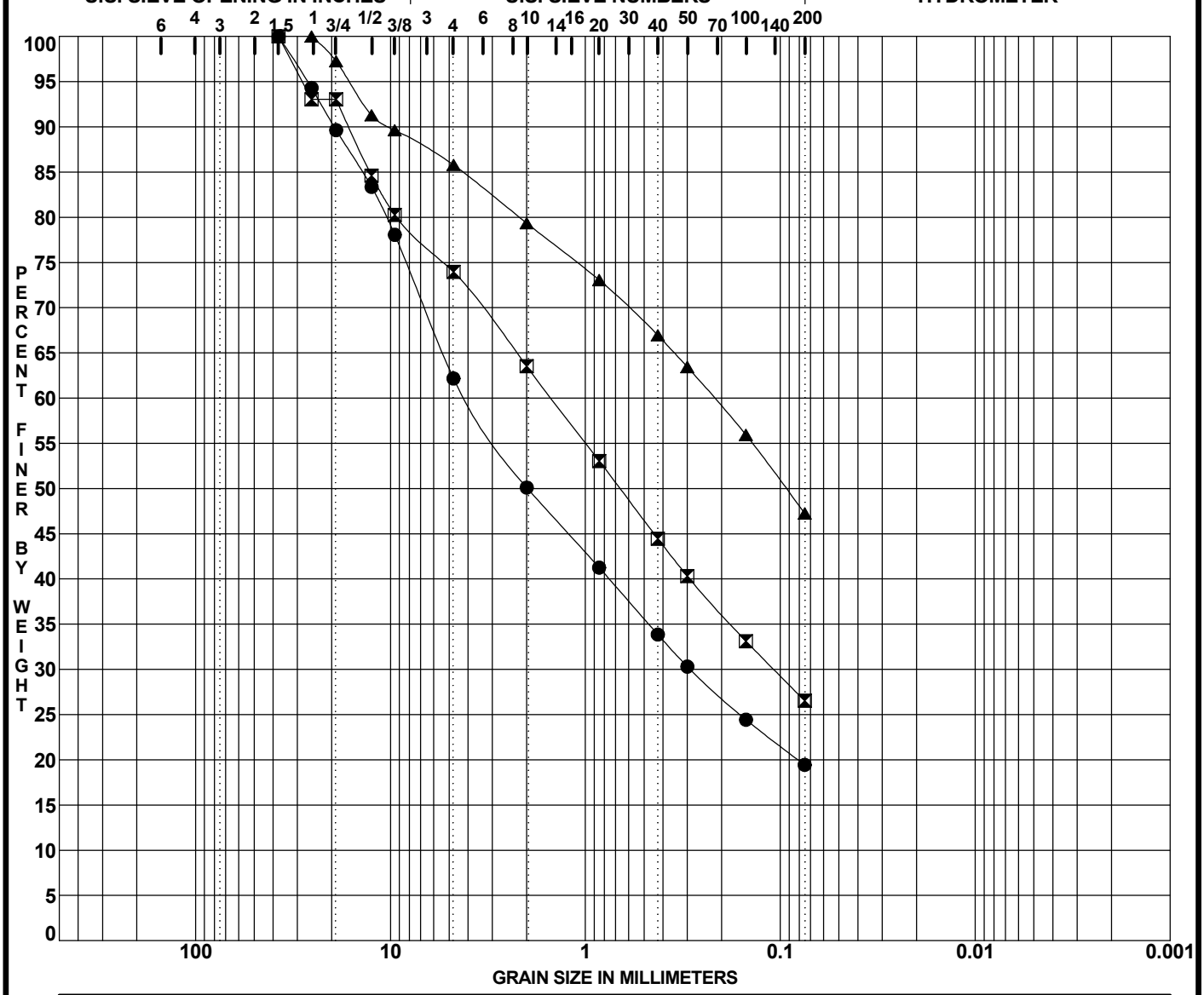
| EXPANSION INDEX TEST | | | | |
|---|---|---|---|---|
| **Boring Number** | **Sample Depth (feet)** | **Soil Description (U.S.C.S.)** | **Expansion Index (EI)** | **Expansion Potential** |
| B-5 | 0-3 | (SC) Clayey Sand | 36 | Low |
| Expansion Index: | 0-20 Very low | 21-50 Low | 51-90 Medium | 91-130 High |

Atterberg Limits

A selected sample of the on-site fine grained, low expansion potential soils were tested for their Atterberg limits in accordance with ASTM D 4318. The results of these tests are presented on Enclosure D-2.

Corrosion

Corrosion testing was conducted by our subconsultant, Project X Corrosion Engineering. Test results are enclosed.




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| | Specimen Identification | | Soil Classification | SE | RV | PL | PI | Cc | Cu |
|---|---|---|---|---|---|---|---|---|---|
| ● | B-1 | @ 0-3' | (SM) Silty Sand with Gravel | 21 | -- | | | | |
| ⊠ | B-3 | @ 0-3' | (SM) Silty Sand with Gravel | 16 | -- | | | | |
| ▲ | B-5 | @ 0-3' | (SC) Clayey Sand | 11 | 27 | 18 | 11 | | |
| | | | | | | | | | |
| | | | | | | | | | |

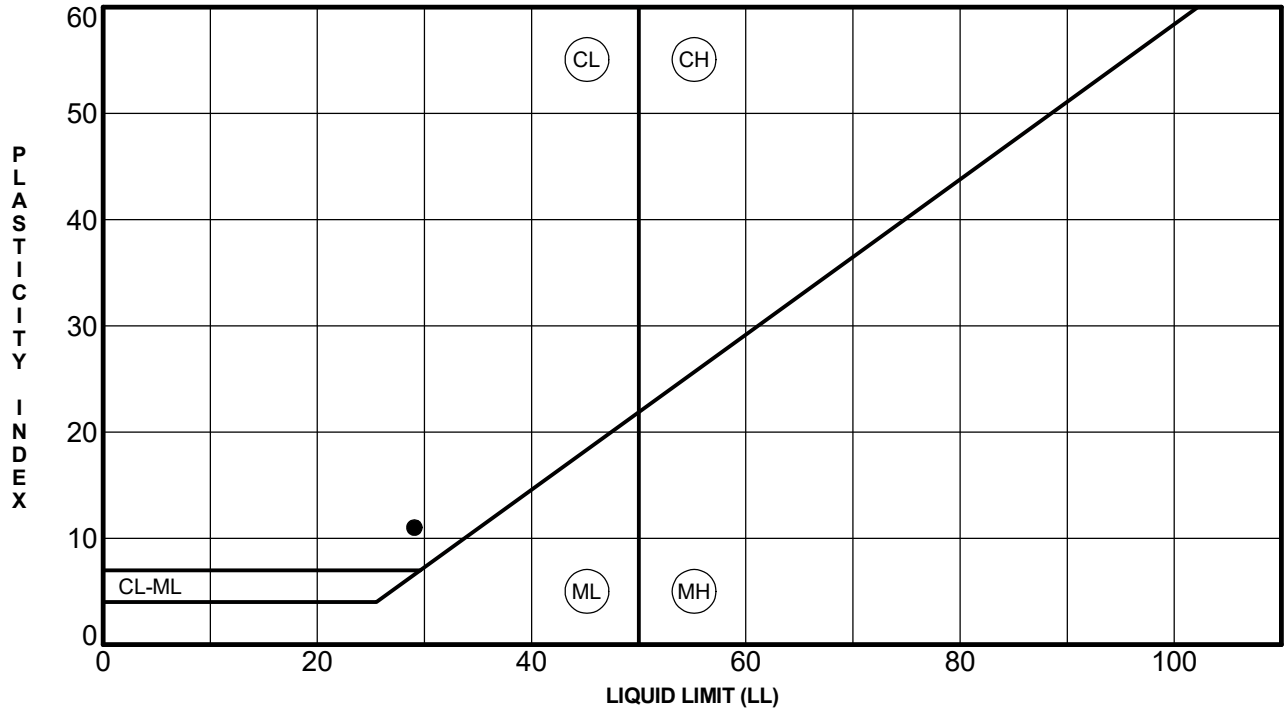
| | Specimen Identification | | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|---|---|
| ● | B-1 | @ 0-3' | 37.50 | 4.07 | 0.289 | | 37.8 | 42.7 | 19.4 | |
| ⊠ | B-3 | @ 0-3' | 37.50 | 1.50 | 0.108 | | 26.0 | 47.4 | 26.5 | |
| ▲ | B-5 | @ 0-3' | 25.40 | 0.22 | | | 14.2 | 38.5 | 47.3 | |
| | | | | | | | | | | |
| | | | | | | | | | | |

| | | | |
|---|---|---|---|
| **PROJECT:** | Multi-Family Residential Development | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **DATE:** | October 2023 |

# GRADATION CURVES

LOR GEOTECHNICAL GROUP, INC.

**ENCLOSURE:** D-1




| Specimen Identification | LL | PL | PI | Fines | Classification |
|---|---|---|---|---|---|
| ● B-5 @ 0-3' | 29 | 18 | 11 | 47.3 | (SC) Clayey Sand |

| | | | |
|---|---|---|---|
| **PROJECT:** | Multi-Family Residential Development | **PROJECT NO.:** | 33951.1 |
| **CLIENT:** | Second Street Family LP | **DATE:** | October 2023 |

# ATTERBERG LIMITS RESULTS

LOR GEOTECHNICAL GROUP, INC.

**ENCLOSURE:** D-2

# Results Only Soil Testing for Multi-Family, Corona, California

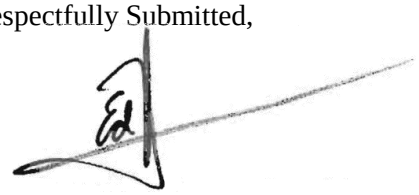
**September 29, 2023**

**Prepared for:**

**Andrew Tardie**
**LOR Geotechnical**
**6121 Quail Valley Ct**
**Riverside, CA**
**atardie@lorgeo.com**

**Project X Job#: S230928F**
**Client Job or PO#: 33951.1**

Respectfully Submitted,



Eduardo Hernandez, M.Sc., P.E.
Sr. Corrosion Consultant
NACE Corrosion Technologist #16592
Professional Engineer
California No. M37102
ehernandez@projectxcorrosion.com



# Soil Analysis Lab Results

Client: LOR Geotechnical
Job Name: Multi-Family, Corona, California
Client Job Number: 33951.1
Project X Job Number: S230928F
September 29, 2023

| | Method | ASTM D4327 | | ASTM D4327 | | ASTM G187 | | ASTM G51 | ASTM G200 | SM 4500-D | ASTM D4327 | ASTM D6919 | ASTM D6919 | ASTM D6919 | ASTM D6919 | ASTM D6919 | ASTM D6919 | ASTM D4327 | ASTM D4327 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bore# / Description** | **Depth** | **Sulfates** $SO_4^{2-}$ | | **Chlorides** $Cl^-$ | | **Resistivity** As Rec'd \| Minimum | | **pH** | **Redox** | **Sulfide** $S^{2-}$ | **Nitrate** $NO_3^-$ | **Ammonium** $NH_4^+$ | **Lithium** $Li^+$ | **Sodium** $Na^+$ | **Potassium** $K^+$ | **Magnesium** $Mg^{2+}$ | **Calcium** $Ca^{2+}$ | **Fluoride** $F_2^{--}$ | **Phosphate** $PO_4^{3-}$ |
| | (ft) | (mg/kg) | (wt%) | (mg/kg) | (wt%) | (Ohm-cm) | (Ohm-cm) | | (mV) | (mg/kg) | (mg/kg) | (mg/kg) | (mg/kg) | (mg/kg) | (mg/kg) | (mg/kg) | (mg/kg) | (mg/kg) | (mg/kg) |
| RV-3 - B-5 - (SM) Silty Sand | 0-3 | 192.4 | 0.0192 | 123.1 | 0.0123 | 12,730 | 1,273 | 7.1 | 166 | ND | 77.8 | 8.5 | ND | 152.3 | 11.0 | 29.8 | 158.1 | 5.0 | 2.5 |

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

**Note**: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops which is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.

# Project X
Corrosion Engineering

Lab Request Sheet Chain of Custody
Phone (213) 928-7213 Fax (951) 226-1720 www.projectxcorrosion.com
Ship Samples To: 29990 Technology Dr, Suite 13, Murrieta, CA 92563

**Project X Job Number** S230928 F LOR 33951.1 Multi-Family 1 Full

**IMPORTANT: Please complete Project and Sample Identification Data as you would like it to appear in report & include this form with samples.**

| | | | |
|---|---|---|---|
| **Company Name:** | LOR Geotechnical Group, Inc. | **Contact Name:** | Andrew Tardie |
| **Mailing Address:** | 6121 Quail Valley | **Contact Email:** | atardie@lorgeo.com |
| **Accounting Contact:** | John Leuer | **Invoice Email:** | atardie@lorgeo.com |
| **Client Project No:** | 33951.1 | **Project Name:** | Multi-Family, Corona, California |
| **P.O. #:** | -- | **Phone No:** | 951-653-1760 |

| | 3-5 Day Standard | 3 Day Guarantee 50% mark-up | 24 Hour RUSH 100% mark-up |
|---|---|---|---|
| **(Business Days) Turn Around Time:** | ● | | |

**For Corrosion Control Recommendations (350g soil sample):**
**NEED (1) Groundwater depth and**
**(2) Soil Sample Locations Map**

**FOR THERMAL RESISTIVITY PROVIDE (1,500g soil sample):**
**(1) Optimal Moisture %**
**(2) Dry Density{PCF}**
**(3) Desired Compaction**
**Date & Received By:**

**METHOD ANALYSIS REQUESTED (Please circle)**

| | SAMPLE ID - BORE # - Description | DEPTH (ft) | DATE COLLECTED |
|---|---|---|---|
| 373 1 | RV-3 - B-5 - (SM) Silty Sand | 0-3 | 09/21/2023 |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| 11 | | | |
| 12 | | | |
| 13 | | | |
| 14 | | | |
| 15 | | | |

| Default Method | Soil Resistivity | pH | Sulfate | Chloride | Redox Potential | Sulfide | Ammonia | Nitrate | Flouride | Phosphate | Lithium | Sodium | Potassium | Magnesium | Calcium | Full Corrosion Series | Soil Corrosivity Evaluation Report | Water Corrosivity Mini Report | Moisture Content | Total Alkalinity | Soil Remolding | Thermal Resistivity | (ANC) Alk Neutr Cap | (SRB) Sulfate Reducing | Puckorius Index | XRF Elemental Analysis | Water Hardness |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Caltrans CTM643 | Caltrans CTM643 | Caltrans CTM417 | Caltrans CT422 | | | | | | | | | | | | 350g Sample | *Req. Min. 3 Samples, site map, and groundwater info | | ASTM D2216 | SM 2320B | ASTM D6910 | ASTM D5334 8-inch | 1,500g Sample | HACH HAR1 | | ASTM A322 | ASTM A751 |
| | AASHTO T288 | AASHTO T 289 | AASHTO T 290 | AASHTO T 291 | SM 2580B | | SM 4500-NH3 | SM 4500-NO3 | | | | | | | | | | | | | ASTM D2216 | IEEE 442 6-inch | | | ASTM E1621 | | |
| | ASTM G187 | ASTM G 51 | ASTM D4327 | ASTM D4327 | ASTM G200 | SM 4500-S2 | ASTM D4327 | ASTM D4327 | SM 2320B | ASTM D4327 | ASTM D4327 | ASTM D4327 | ASTM D4327 | ASTM D4327 | ASTM D4327 | | | | | | | | | | | | |
| | Geo Quad | | | | Full Corrosion Series | | | | | | | | | | | | Reports | | | | | | | | | | | |

# APPENDIX E

## Seismic Design Spectra

# SITE-SPECIFIC GROUND MOTION ANALYSIS
**(ASCE 7-16)**

**ALL values on this page were used for determination of ASCE 7-16 Section 21.3 General Spectrum and are NOT intended to be used for design**

**Project:** Multi-Family Development
**Project Number:** 33951.1
**Client:** Second Street Housing LP
**Site Lat/Long:** 33.8803/-117.5795
**Controlling Seismic Source:** Elsinore

| REFERENCE | NOTATION | VALUE |
|---|---|---|
| Site Class | C, D, D default, or E | D measured |
| Site Class D - Table 11.4-1 | $F_a$ | 1.0 |
| Site Class D - 21.3(ii) | $F_v$ | 2.5 |
| $0.2*(S_{D1}/S_{DS})$ | $T_0$ | 0.188 |
| $S_{D1}/S_{DS}$ | $T_S$ | 0.938 |
| Fundamental Period (12.8.2) | T | Period |
| Seismic Design Maps or Fig 22-14 | $T_L$ | 8 |
| Equation 11.4-4 - $2/3*S_{M1}$ | $S_{D1}$ | 1.2950 |
| Equation 11.4-2 - $F_V*S_1$ [1] | $S_{M1}$ | 1.9425 |

[1] - $F_V$ as determined by Section 21.3

| REFERENCE | NOTATION | VALUE |
|---|---|---|
| Fv (Table 11.4-2)[Used for General Spectrum] | $F_v$ | 1.7 |
| Design Maps | $S_s$ | 2.070 |
| Design Maps | $S_1$ | 0.777 |
| Equation 11.4-1 - $F_A*S_S$ | $S_{MS}$ | 2.070 |
| Equation 11.4-3 - $2/3*S_{MS}$ | $S_{DS}$ | 1.380 |
| Design Maps | PGA | 0.868 |
| Table 11.8-1 | $F_{PGA}$ | 1.1 |
| Equation 11.8-1 - $F_{PGA}*PGA$ | $PGA_M$ | 0.955 |
| Section 21.5.3 | 80% of $PGA_M$ | 0.764 |
| Design Maps | $C_{RS}$ | 0.915 |
| Design Maps | $C_{R1}$ | 0.906 |

| REFERENCE | NOTATION | VALUE |
|---|---|---|
| $0.2*(S_{D1}/S_{DS})$ | $T_0$ | 0.128 |
| $S_{D1}/S_{DS}$ | $T_S$ | 0.638 |
| Equation 11.4-4 - $2/3*S_{M1}$ | $S_{D1}$ | 0.881 |
| Equation 11.4-2 - $F_V*S_1$ | $S_{M1}$ | 1.321 |

**RISK COEFFICIENT**

| | | |
|---|---|---|
| Cr - At Perods <=0.2, Cr=$C_{RS}$ | $C_{RS}$ | 0.915 |
| Cr - At Periods >=1.0, Cr=$C_{R1}$ | $C_{R1}$ | 0.906 |

Cr - At Periods between 0.2 and 1.0
use trendline formula to complete

| Period | Cr |
|---|---|
| 0.200 | 0.915 |
| 0.300 | 0.914 |
| 0.400 | 0.913 |
| 0.500 | 0.912 |
| 0.600 | 0.911 |
| 0.680 | 0.910 |
| 1.000 | 0.906 |

Mapped values from https://hazards.atcouncil.org/

**PROBABILISTIC SPECTRA[1]**
**2% in 50 year Exceedence**

Project No: 33951.1

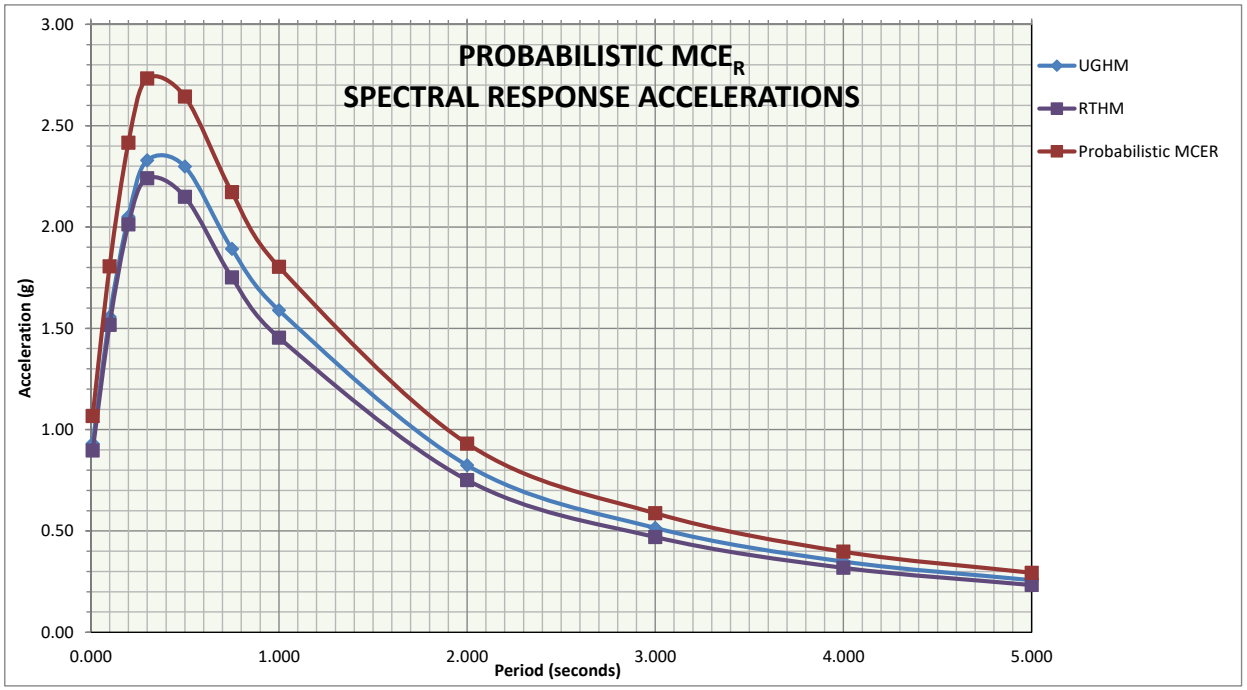
| Period | UGHM | RTGM | Max Directional Scale Factor[2] | Probabilistic MCE |
|---|---|---|---|---|
| 0.010 | 0.931 | 0.897 | 1.19 | 1.067 |
| 0.100 | 1.556 | 1.517 | 1.19 | 1.805 |
| 0.200 | 2.051 | 2.013 | 1.20 | 2.416 |
| 0.300 | 2.329 | 2.240 | 1.22 | 2.733 |
| 0.500 | 2.298 | 2.149 | 1.23 | 2.643 |
| 0.750 | 1.892 | 1.751 | 1.24 | 2.171 |
| 1.000 | 1.589 | 1.454 | 1.24 | 1.803 |
| 2.000 | 0.824 | 0.751 | 1.24 | 0.931 |
| 3.000 | 0.515 | 0.470 | 1.25 | 0.588 |
| 4.000 | 0.349 | 0.318 | 1.25 | 0.398 |
| 5.000 | 0.257 | 0.233 | 1.26 | 0.294 |

Probabilistic PGA: 0.931

Is Probabilistic $Sa_{(max)}$<1.2$F_a$? NO

[1] Data Sources:
https://earthquake.usgs.gov/hazards/interactive/
https://earthquake.usgs.gov/designmaps/rtgm/

[2] Shahi-Baker RotD100/RotD50 Factors (2014)



## DETERMINISTIC SPECTRUM

**Largest Amplitudes of Ground Motions Considering All Sources Calculated using Weighted Mean of Attenuation Equations[1]**

**Controlling Source: Elsinore**

Is Probabilistic $Sa_{(max)}$<1.2Fa? NO

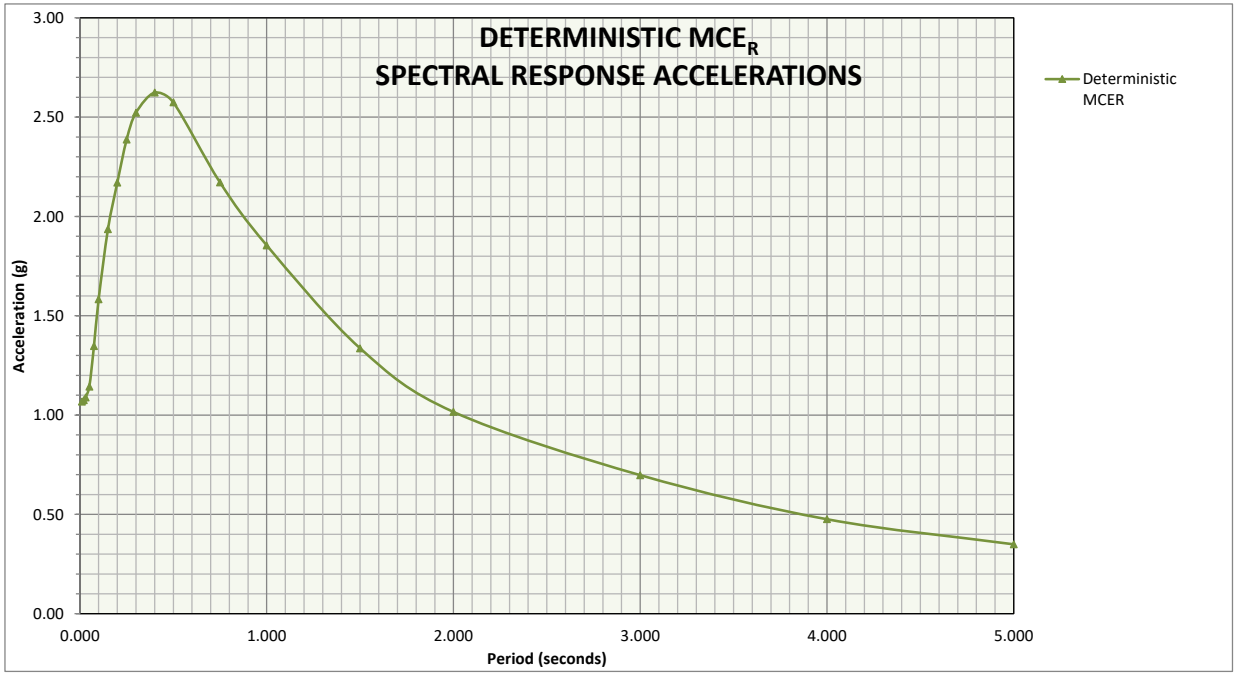
| Period | Deterministic PSa Median + 1.σ for 5% Damping | Max Directional Scale Factor[2] | Deterministic MCE | Section 21.2.2 Scaling Factor Applied |
|---|---|---|---|---|
| 0.010 | 0.897 | 1.19 | 1.067 | 1.067 |
| 0.020 | 0.903 | 1.19 | 1.075 | 1.075 |
| 0.030 | 0.915 | 1.19 | 1.089 | 1.089 |
| 0.050 | 0.960 | 1.19 | 1.143 | 1.143 |
| 0.075 | 1.132 | 1.19 | 1.347 | 1.347 |
| 0.100 | 1.330 | 1.19 | 1.583 | 1.583 |
| 0.150 | 1.613 | 1.20 | 1.936 | 1.936 |
| 0.200 | 1.808 | 1.20 | 2.170 | 2.170 |
| 0.250 | 1.973 | 1.21 | 2.387 | 2.387 |
| 0.300 | 2.067 | 1.22 | 2.522 | 2.522 |
| 0.400 | 2.133 | 1.23 | 2.624 | 2.624 |
| 0.500 | 2.093 | 1.23 | 2.574 | 2.574 |
| 0.750 | 1.751 | 1.24 | 2.171 | 2.171 |
| 1.000 | 1.496 | 1.24 | 1.854 | 1.854 |
| 1.500 | 1.078 | 1.24 | 1.336 | 1.336 |
| 2.000 | 0.819 | 1.24 | 1.016 | 1.016 |
| 3.000 | 0.558 | 1.25 | 0.697 | 0.697 |
| 4.000 | 0.380 | 1.25 | 0.475 | 0.475 |
| 5.000 | 0.277 | 1.26 | 0.349 | 0.349 |

Project No: 33951.1

| | |
|---|---|
| Is Determinstic $Sa_{(max)}$<1.5*Fa? | NO |
| Section 21.2.2 Scaling Factor: | N/A |
| Deterministic PGA: | 0.897 |
| Is Deterministic PGA >=$F_{PGA}$*0.5? | YES |

[1] NGAWest 2 GMPE worksheet and Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3) - Time Dependent Model

[2] Shahi-Baker RotD100/RotD50 Factors (2014)



## SITE SPECIFIC SPECTRA

| Period | Probabilistic MCE | Deterministic MCE | Site-Specific MCE | Design Response Spectrum (Sa) |
|---|---|---|---|---|
| 0.010 | 1.067 | 1.067 | 1.067 | 0.711 |
| 0.100 | 1.805 | 1.583 | 1.583 | 1.055 |
| 0.200 | 2.416 | 2.170 | 2.170 | 1.447 |
| 0.300 | 2.733 | 2.522 | 2.522 | 1.681 |
| 0.500 | 2.643 | 2.574 | 2.574 | 1.716 |
| 0.750 | 2.171 | 2.171 | 2.171 | 1.447 |
| 1.000 | 1.803 | 1.854 | 1.803 | 1.202 |
| 2.000 | 0.931 | 1.016 | 0.931 | 0.621 |
| 3.000 | 0.588 | 0.697 | 0.588 | 0.392 |
| 4.000 | 0.398 | 0.475 | 0.398 | 0.265 |
| 5.000 | 0.294 | 0.349 | 0.294 | 0.207 |

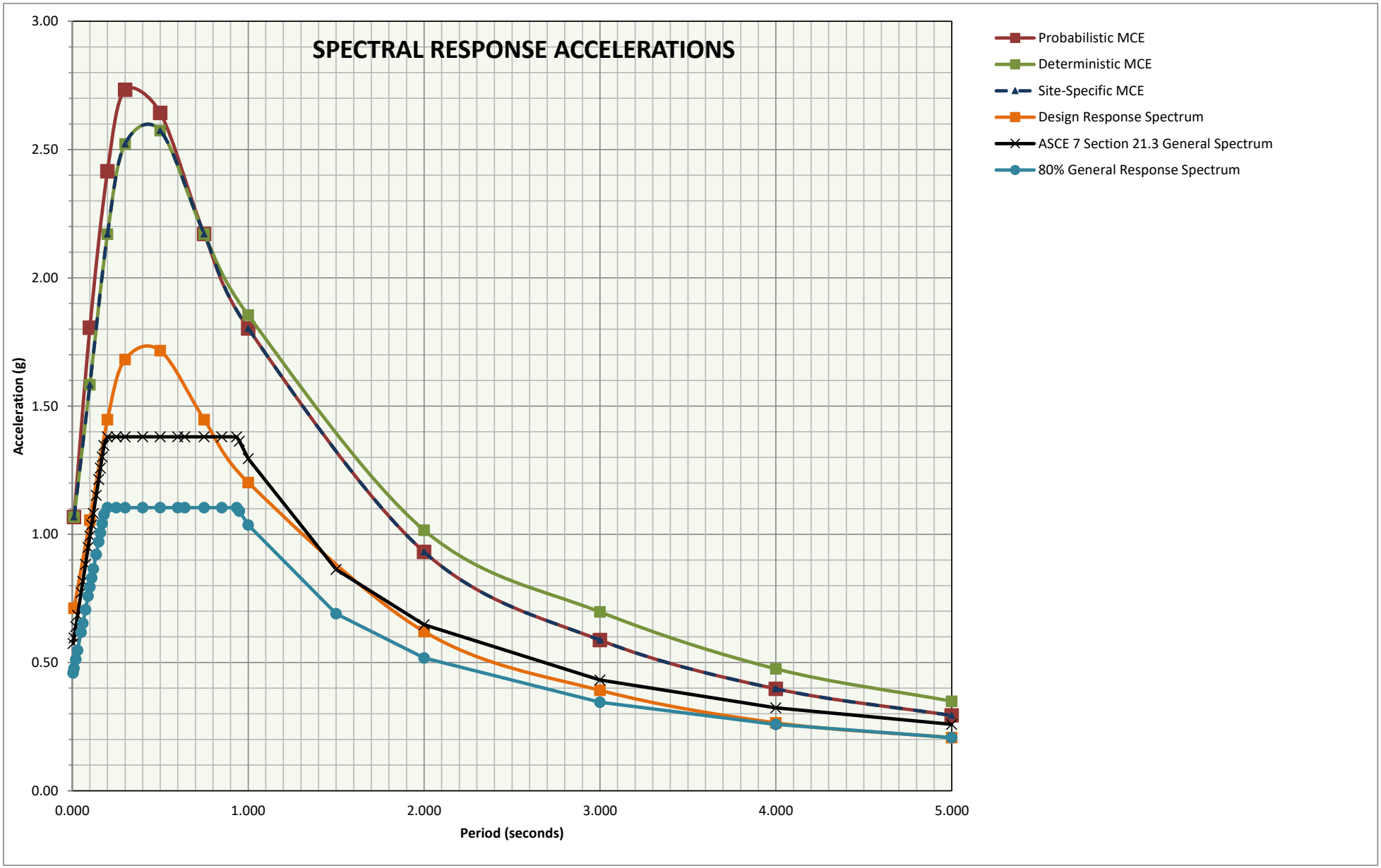
**ASCE 7-16: Section 21.4**
**Site Specific**

| | Calculated Value | Design Value |
|---|---|---|
| **SDS:** | 1.544 | 1.544 |
| **SD1:** | 1.242 | 1.242 |
| **SMS:** | 2.317 | 2.317 |
| **SM1:** | 1.862 | 1.862 |
| **Site Specific PGAm:** | 0.897 | 0.897 |
| **Site Class:** | D measured | |

**Seismic Design Category - Short*** E
**Seismic Design Category - 1s*** E
* Risk Categories I, II, or III

| Period | ASCE 7 SECTION 21.3 General Spectrum | 80% General Response Spectrum |
|---|---|---|
| 0.005 | 0.574 | 0.459 |
| 0.010 | 0.596 | 0.477 |
| 0.020 | 0.640 | 0.512 |
| 0.030 | 0.684 | 0.547 |
| 0.050 | 0.773 | 0.618 |
| 0.060 | 0.817 | 0.653 |
| 0.075 | 0.883 | 0.706 |
| 0.090 | 0.949 | 0.759 |
| 0.100 | 0.993 | 0.795 |
| 0.110 | 1.037 | 0.830 |
| 0.120 | 1.081 | 0.865 |
| 0.136 | 1.152 | 0.922 |
| 0.150 | 1.214 | 0.971 |
| 0.160 | 1.258 | 1.006 |
| 0.170 | 1.302 | 1.042 |
| 0.180 | 1.346 | 1.077 |
| 0.200 | 1.380 | 1.104 |
| 0.250 | 1.380 | 1.104 |
| 0.300 | 1.380 | 1.104 |
| 0.400 | 1.380 | 1.104 |
| 0.500 | 1.380 | 1.104 |
| 0.600 | 1.380 | 1.104 |
| 0.640 | 1.380 | 1.104 |
| 0.750 | 1.380 | 1.104 |
| 0.850 | 1.380 | 1.104 |
| 0.935 | 1.380 | 1.104 |
| 0.950 | 1.363 | 1.091 |
| 1.000 | 1.295 | 1.036 |
| 1.500 | 0.863 | 0.691 |
| 2.000 | 0.648 | 0.518 |
| 3.000 | 0.432 | 0.345 |
| 4.000 | 0.324 | 0.259 |
| 5.000 | 0.259 | 0.207 |

Project No: 33951.1




Project No: 33951.1

LOR GEOTECHNICAL GROUP, INC.

# Appendix 4:  Historical Site Conditions

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




# PHASE I ENVIRONMENTAL SITE ASSESSMENT

## Vacant Property

## SWC S. Buena Vista Avenue and W. 2nd Street

## APN 1183-020-30 and a portion of 1182-700-55
## County of Riverside, California 92882

**Prepared For:**
Second Street Family L.P.
14211 Yorba Street, Suite 200
Tustin, CA 92780

## September 25, 2023

**Project 0823004**

**TAGDD Corporate: 1938 Kellogg Avenue, Suite 103, Carlsbad, CA 92008**

**PHASE I ENVIRONMENTAL SITE ASSESSMENT**

**Prepared for:**
Second Street Family L.P.
14211 Yorba Street, Suite 200
Tustin, CA 92780

**Subject Property:**
SWC S. Buena Vista Avenue and W. 2nd Street
APN 1183-020-30 and a portion of APN 1182-700-55
Corona, Riverside County, California 92882

**Prepared and Edited by:**



Timothy A. Lester
Managing Principal

**TAGDD, LLC**
1938 Kellogg Avenue, Suite 103
Carlsbad, California 92008
(760) 431-3747

Project 0823004

**TABLE OF CONTENTS**

**GENERAL SUBJECT PROPERTY INFORMATION** ..... i

**EXECUTIVE SUMMARY** ..... ii

**1.0 INTRODUCTION** ..... 1
- 1.1 Purpose ..... 1
- 1.2 Scope of Services ..... 1
- 1.3 Reliance ..... 1

**2.0 PHYSIOGRAPHIC SETTING** ..... 2
- 2.1 Subject Property Description ..... 2
- 2.2 Topography ..... 2
- 2.3 Regional and Local Geology ..... 2
- 2.4 Regional and Local Hydrogeology ..... 3
- 2.5 Hydrologic Flood Plain Information ..... 3

**3.0 SUBJECT PROPERTY BACKGROUND** ..... 3
- 3.1 Subject Property Ownership and AUL ..... 3
- 3.2 Subject Property History ..... 4
  - 3.2.1 Historical Aerial Photograph and Topographic Map Review ..... 4
  - TABLE 1 Summary of Historical Aerial Photograph and Topographic Map Review ..... 4
  - 3.2.2 City/County Directories ..... 5
  - 3.2.3 Fire Insurance Maps ..... 6
  - 3.2.4 Summary of Property History ..... 6
- 3.3 Regulatory Database Review ..... 6
  - 3.3.1 Subject Property ..... 6
  - 3.3.2 Adjacent Properties (within 1/8th Mile Radius Distance (660 feet) ..... 6
  - 3.3.3 Surrounding Area; 1/8 to 1/4 Miles Radius Distance (660-1,320 feet) ..... 8
  - 3.3.4 Surrounding Area; 1/4 to 1/2 Miles Radius Distance (1,320-2,640 feet) ..... 9
  - 3.3.5 Surrounding Area; 1/2 to 1.0 Miles Radius Distance (2,640-5,280 feet) ..... 10
  - 3.3.6 Orphan / Unplottable Sites ..... 11
- 3.4 Regulatory y Agency Review and Interviews ..... 11
  - 3.4.1 City of Corona ..... 11
  - 3.4.2 Riverside County ..... 12
  - 3.4.3 State Water Resources Control Board ..... 12
  - 3.4.4 California Department of Toxic Substances Control ..... 13
  - 3.4.5 California Department of Conservation Geologic Energy Management Division 14
  - 3.4.6 National Pipeline Mapping System ..... 14
- 3.5 Current Property Owner Questionnaire ..... 14
  - 3.5.1 Past or Present Uses Indicating Environmental Concern ..... 14
  - 3.5.2 Environmental Liens or Governmental Notification ..... 14
  - 3.5.3 Presence of Hazardous Substances or Environmental Violations ..... 14
  - 3.5.4 Previous Assessments ..... 14
  - 3.5.5 Legal Proceedings ..... 14
- 3.6 User Provided Information ..... 14
  - 3.6.2 Specialized Knowledge ..... 15
  - 3.6.3 Valuation Reduction for Environmental Issues ..... 15
  - 3.6.4 Presence or Likely Presence of Contamination ..... 15
  - 3.6.5 Other ..... 15

3.7 Other Environmental Issues ..... 15
3.7.1 Asbestos-Containing Materials ..... 15
3.7.2 Lead-Based Paint ..... 16
3.7.3 Radon ..... 16
3.7.4 Emerging Contaminants ..... 16

**4.0 SITE RECONNAISSANCE ..... 17**
4.1 Purpose ..... 17
4.2 Subject Property ..... 17
TABLE 3 - Summary of Site Reconnaissance ..... 18
4.3 Adjacent Properties ..... 18

**5.0 VAPOR ENCROACHMENT SCREEN ..... 19**
5.1 Site Conditions ..... 19
5.2 User Provided Information ..... 19
5.3 Tier 1 Screening – Search Distance Test/Chemicals of Concern ..... 20
**5.4 Findings** ..... 20

**6.0 DATA GAPS AND DEVIATIONS FROM ASTM PRACTICES ..... 20**
6.1 Historical Data Gaps ..... 20
6.2 Regulatory Data Gaps ..... 20
6.3 Onsite Data Gaps ..... 20
6.4 Deviations from ASTM Practices ..... 20

**7.0 CONCLUSIONS AND RECOMMENDATIONS ..... 20**

**8.0 SELECTED REFERENCES ..... 22**

**FIGURES**

Figure 1 – Site Vicinity
Figure 2 – Site Location / Aerial

**APPENDICES**

Appendix A – Photographic Log
Appendix B – Preliminary Title Report and FEMA Map
Appendix C – Historical Maps / Data Search Results
Appendix D – Environmental Records Search
Appendix E – Property Owner/User Provided Questionnaires
Appendix F – Résumé of Environmental Professional

**GENERAL SUBJECT PROPERTY INFORMATION**

**Project Information:** Vacant Property

**Project:** 0823004

**Subject Property:**
SWC S. Buena Vista Avenue and W. 2nd Street
APN 1183-020-30 and a portion of APN 1182-700-55
Corona, Riverside County, California 92882

**Client Information:**
Second Street Family L.P.
14211 Yorba Street, Suite 200
Tustin, CA 92780

**Consultant Information:**
TAGDD, LLC
1938 Kellogg Avenue, Suite 103, Carlsbad, California 92008
Phone: (760) 473-0645
E-mail Address of Environmental Professional:timothy.lester@TA-GroupDD.com

**Site Access Contact:** Client provided access.

**Inspection Date:** August 19, 2023 **Report Date:** September 25, 2023

**Site Assessor:** Timothy Lester – Principal

**Environmental Professional (EP) Certification:** I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in 40 CFR 312.10 (**Resume, Appendix F**).



Timothy Lester
Managing Principal

**AAI Certification:** We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. We have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.



Timothy Lester
Managing Principal

## EXECUTIVE SUMMARY

At the request and authorization of the Client (Second Street Family, L.P.), TAGDD conducted a Phase I Environmental Site Assessment (ESA) for an approximately 4-acre property located in the city of Corona, Riverside County, California. No address has been assigned. The subject property is comprised of Assessor's Parcel Number (APN) 1183-020-30 and a portion of APN 1182-700-55.

The purpose of this Phase I ESA was to assess the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment (i.e., *recognized environmental condition* as delineated in ASTM International *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*, Designation ASTM E1527-21.

The following bulleted items summarize the information obtained during the preparation of this ESA:

- The subject property comprises approximately 4-acres located on two non-contiguous lots located at the southwest and northwest corner of the intersection of W. 2nd Street and S. Buena Vista Avenue, in the City of Corona, Riverside County, California (**Figure 1**). The subject property is comprised of Assessor's Parcel Number (APN) 1183-020-30 and a portion of APN 1182-700-55.

- Based on historical records such as aerial photographs, topographic maps, and previous reports, the subject property was undeveloped until sometime between 1931 and 1938, when a structure (presumed rural residence) was constructed. Between 1948-1971 2-3 residences were present on the subject property. From at least 1960 to at least 1966 much of the western portion of the property was used for outdoor equipment storage. Between 1967 and 1971 the rural residences were replaced by a mobile home park. The mobile home park was removed between 2014-2016 during the construction of E. 2nd Street. Since that time the subject property has been either vacant or used for outdoor equipment storage.

- On August 19, 2023, TAGDD personnel conducted a reconnaissance of the subject property to physically observe the property and adjoining properties for conditions indicating a potential environmental concern. Concerns would include any evidence of contamination, distressed vegetation, petroleum-hydrocarbon staining, waste drums, illegal dumping, or improper waste storage and/or handling. The only utilities noted were underground at the sidewalks on the north and eastern adjacent sidewalks. Windblown trash is present. No evidence of environmental concerns was noted on the subject property during our site reconnaissance.

- TAGDD performed a Vapor Encroachment Screen (VES) for the subject property, in accordance with ASTM E2600-15. The purpose was to evaluate whether sites (e.g., gas stations, dry cleaners, or other listings of environmental concern) that store or dispose of potential chemicals of concern or have documented releases, may migrate as vapors onto the property, as a result of contaminated soil and/or groundwater which may be present on or near the property (i.e., a potential Vapor Encroachment Condition or pVEC). The presence of a pVEC could be ruled out due to the lack of release sites within the AOC.

**Findings**

- *Known or suspected RECs* – are defined by the ASTM E1527-21 as the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment.

  This assessment has revealed no evidence of *known or suspected RECs* in connection with the subject property.

- *Controlled RECs (CRECs)* – are defined by the ASTM E1527-21 as a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (e.g., as evidenced by the issuance of a NFA letter or equivalent, or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (e.g., property use restrictions, AULs, institutional controls, or engineering controls).

  This assessment has revealed no evidence of *CREC's* in connection with the subject property.

- *Historical RECs (HRECs)* – are defined by the ASTM E1527-21 as a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted residential use criteria established by a regulatory authority, without subjecting the property to any required controls (e.g., property use restrictions, AULs, institutional controls, or engineering controls).

  This assessment has revealed no evidence of the presence of *HRECs* in connection with the subject property.

- De Minimis Conditions – include environmental concerns identified which may warrant discussion but do not qualify as RECs, as defined by the ASTM E1527-21.

  This assessment has revealed no evidence of *De Minimis* Conditions at the subject property.

We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM E1527-21 of APN 1183-020-30 and a portion of APN 1182-700-55, the *subject property*. Any exceptions to, or deletions from, this practice are described in Section 7.0 of this report.

This assessment has revealed no evidence of *recognized environmental conditions* in connection with the *subject property. Further investigation is not warranted.*

# 1.0 INTRODUCTION

## 1.1 Purpose

The purpose of this Phase I Environmental Site Assessment (ESA) was to assess the possible presence of *recognized environmental conditions Recognized environmental condition*s *(RECs)* include property uses that may indicate the for the approximately 4-acre property located at the southwest and northwest corner of the intersection of W. 2nd Street and S. Buena Vista Avenue, in the City of Corona, Riverside County, California (**Figure 1**). The subject property is comprised of Assessor's Parcel Number (APN) 1183-020-30 and a portion of APN 1182-700-55. presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. The term *REC* is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment, and that would not be subject to enforcement action by a regulatory agency.

This ESA was performed in general conformance with the ASTM International *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*, Designation ASTM E1527-21 (E1527-21).

## 1.2 Scope of Services

The following scope of services was conducted by TAGDD:

- A review of readily available documents which included topographic, geologic, and hydrogeologic conditions associated with the subject property.
- A review of readily available maps, aerial photographs, and other documents relative to historical subject property usage and development.
- A review of previous environmental reports and regulatory file information pertaining to both existing and historic property conditions.
- A review of readily available federal, state, county, and city documents and database files concerning hazardous material storage, generation and disposal, active and inactive landfills, existing environmental concerns, and associated permits related to the subject property and/or immediately adjacent sites.
- A site reconnaissance to ascertain current conditions on the subject property.
- Interviews with person(s) knowledgeable of the subject property.
- The preparation of this report which presents our findings, conclusions, and recommendations.

## 1.3 Reliance

This ESA has been prepared for the use of Second Street Family L.P. (Client) and may also be relied upon by *C&C Development, Orange Housing Development Corporation, Inc, National Equity Fund, Bank of America, Citi Bank, the City of Corona and/or the County of Riverside*. This assessment should not be relied upon by other parties without the express written consent of TAGDD and Client. Any use or reliance upon this assessment by a party other than the Client; therefore, shall be solely at the risk of such third party

and without legal recourse against TAGDD, its employees, officers, or director regardless of whether the action in which recovery of damages is brought or based upon contract, tort, statute or otherwise.

This assessment should not be interpreted as a statistical evaluation of the subject property, but rather is intended to provide a preliminary indication of onsite impacts from previous property usage and/or the release of hazardous materials. If significant indicators of the presence of hazardous materials and/or petroleum contamination are not encountered during our research, such substances may still be present. The findings in this report are based upon published geologic and hydrogeologic information, information (both documentary and oral) provided by the Client, various local, state and federal agencies, Environmental Risk Information Services (ERIS) (i.e., agency database search), and TAGDD's field observations. Some of these data are subject to change over time. Some of these data are based on information not currently observable or measurable but recorded by documents or orally reported by individuals.

## 2.0 PHYSIOGRAPHIC SETTING

### 2.1 Subject Property Description

The subject property is comprised of 4-acres of undeveloped land on 2 non-contiguous parcels identified as Assessor's Parcel Number (APN) 1183-020-30 and a portion of APN 1182-700-55. The western end of APN 1182-700-55 is not part of the subject property (**Figure 2**).

The subject property is immediately bound by an onramp to Highway 91 to the north, and commercial properties to the east, west, and south. S. Buena Vista Avenue separates the two APN. The general surrounding area is developed with a combination of commercial and residential properties. According to the City's online zoning database (https://gis-cityofcorona.opendata.arcgis.com/), , the majority of the subject property is zoned "MP" (low density residential). APN 1183-020-30 is zoned as "R3", or high density residential.

### 2.2 Topography

The subject property is located on the United States Geological Survey (USGS) 7.5 Minute Corona North Quadrangle map (USGS, 2022. GoogleEarth© indicates the elevation of the subject property ranges from approximately 642 feet above mean sea level (amsl) at the west end to approximately 632 feet amsl at the east end. The subject property is graded and relatively level. Surface drainage would tend to move west to east based on topography.

### 2.3 Regional and Local Geology

The subject property lies within the Peninsular Ranges Geomorphic Province. The Peninsular Ranges geomorphic province, one of the largest geomorphic units in western North America, extends from the Transverse Ranges geomorphic province and the Los Angeles Basin, south to Baja California. It is bound on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province. The Peninsular Ranges are a series of northeast-southeast oriented fault blocks (CGS, 2002).

Three (3) major faults zones and some subordinate fault zones are found in this province. The Elsinore Fault zone and the San Jacinto Fault zone trend northwest-southeast and are found near the middle of the province. The San Andreas Fault zone borders the north-easterly margin of the province, whereas, a

fault related to the San Andreas Transform Fault System, the Newport-Inglewood-Rose Canyon Fault zone exists near the western margin and Continental Borderland Geomorphic Province (CDMG, 1977).

Based on a phase II ESA report for a nearby property (Lincoln and Highway 91/Geo-Cal, 2010): "*The City of Corona is developed on a substrate of Pleistocene alluvium referred to locally as the Corona compound alluvial fan. The proximal end of the fan abuts the northeast front of the Santa Ana Mountains and conceals the Elsinore Fault Zone (EFZ). The EFZ bifurcates approximately 2 miles south of the Site into the Whittier fault and the Chino fault. The distal end of the fan terminates against the flood plains of the Temescal Wash and the Santa Ana River to the east and north, respectively. Near the Site, the surficial deposits consist of alluvial terrace deposits and older alluvium (Morton, 1972). The terrace deposits are yellowish red to reddish brown unconsolidated gravels made up of angular to subrounded clastic material consisting of metavolcanic, metasedimentary, and granitic rock types. The older alluvium is composed of material similar to that of the terrace deposits; however, the clasts are generally smaller."*

Soil in the immediate vicinity of the subject property was researched on the United States Department of Agriculture - Natural Resource Conservation Service, online Web Soil Survey database (https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx). Soil beneath the subject property was identified as a gravelly fine sandy loam of the Garretson Soil Series at 2 to 8 percent slopes. These soil series consists of well drained soils with slow to medium runoff and moderate permeability.

### 2.4 Regional and Local Hydrogeology

According to the Santa Ana Regional Water Quality Control Board – Region 8 (SARWQCB, 1995), the subject property is located within the Temescal Sub Area (8-002.09). Groundwater in this subarea has been designated as beneficial for municipal domestic supply, agricultural, and industrial.

Based on a nearby Phase II ESA project (Geo-Cal, 2010) "*The City of Corona is located within the Temescal Groundwater Basin in the Upper Santa Ana River watershed. The basin is bounded physiographically to the east, west, and sou*https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/*th by the Gavilan Hills and Santa Ana Mountains and to the north by the Santa Ana River, which roughly separates the Temescal Basin from the adjacent Chino Basin (CRWQCB-SAR, 1995). Regional groundwater flow within the Temescal Basin is generally to the northwest and west towards the Prado Flood Control Basin."* The same report identified groundwater depth at >100-feet below ground surface.

### 2.5 Hydrologic Flood Plain Information

Om March 2, 2023 TAGDD reviewed the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) online database (FEMA, 2023) to determine if the subject property was in a flood zone. According to Panel 06065C0689G (effective August 28, 2008), the subject property is located within a Zone X subset. In this case the Zone is inside the 500-year flood plain, subject to 0.02% flood hazard. A copy of the FIRM is included in **Appendix B**.

## 3.0 SUBJECT PROPERTY BACKGROUND

### 3.1 Subject Property Ownership and AUL

The overall subject property is owned by the City of Corona Housing Authority, Specific Information regarding the ownership of the subject property was obtained from a Title Report prepared by TICOR Title Insurance Company, dated June 13, 2023. Ownership is identified as the "*City of Corona Housing*

*Authority, California public body, corporate and politic".* A copy of the Policy with detailed subject property descriptions is included in **Appendix B**.

No separate Title report was provided to evaluate Activity and Use Limitations (AUL). However, the State Envirostor© website includes a state-wide listing of DTSC sites with AUL. TAGDD reviewed that site; the subject property was not listed. Based on the undeveloped nature of the property, as well as its rural location, TAGDD does not consider a separate environmental lien title search to be necessary.

### 3.2 Subject Property History

TAGDD reviewed readily available information sources to evaluate historic land use in and around the subject site. These information sources include aerial photographs, United States Geological Survey (USGS) maps, and city and/or county records. The information sources are reviewed in the following sections.

#### 3.2.1 Historical Aerial Photograph and Topographic Map Review

Historical aerial photographs and topographic maps were reviewed to identify historical land development and any surface conditions which may have impacted the subject property. Aerial photographs (1931 - 2022) and historical topographic maps (1942-2022) were obtained and reviewed from ERIS®. An aerial photograph was also obtained from Google Earth® and used to prepare **Figure 1**.

**Table 1** summarizes the results of the aerial photograph review. Topo information may not be listed if additional information is not observed. Reviews were made at approximate 5-year jumps on recent maps to lessen repetitive data. Copies of all aerial photographs and historical topographic maps provided by ERIS® are included in **Appendix C**.

**TABLE 1**
**Summary of Historical Aerial Photograph and Topographic Map Review**

| Year | Source and Scale | Comments |
|---|---|---|
| 1931 | Fairchild 1" = 500' | The subject property is undeveloped and appears to be dry farmed for hay or a similar crop. S Buena Vista is present and may be paved. 2nd Street is a dirt path. Adjacent properties north, west, and south are also cultivated and dry farmed. To the east are several rural residential properties on large lots. |
| 1938 | ASCS 1" = 500' | Subject property and adjacent generally as above. Pattern on subject property, property to south, and property to southeast may be (not confirmed) orchard or grape plantings? Surrounding generally as above but infilling and plants maturing. |
| 1942-43 | USGS 15' **Topo** | Topo at this scale does not provide additional information. No development noted on subject property. |
| 1948 | USGS 1" = 500' | North half of subject cultivated (hay?) as are properties east, north, and south. South half of subject is developed with structures at the southeast and southwest corners. Small lot at NE corner is part of a larger lot with several trees (small orchard?). Otherwise undeveloped. Surrounding generally as above but infilling. |
| 1954 | ASCS 1" = 500' | Small lot at NEC now appears to be a back yard for a residence. Larger subject property lot as above, with exception that there may be a shed or small structure added north of the SE corner structure. Adjacent property on northeast end of larger lot now has at least 2 small structures immediately adjacent. East end of property adjacent south now has a large building, as well as a driveway with either sheds or parking. |

| TABLE 1<br>Summary of Historical Aerial Photograph and Topographic Map Review | | |
|---|---|---|
| **Year** | **Source and Scale** | **Comments** |
| 1954 | USGS 7.5' **Topo** | Appears to show a structure on NEC APN across S. Buena Vista. |
| 1960 | Fairchild 1" = 500' | Smaller lot at NE corner appears to have 2 small sheds. Formerly adjacent structure to north of that lot gone. Larger subject property lot appears to be used primarily for outdoor storage. A fenced lot east of center has storage but also appears to be developed with 4 sheds. East end has 2 structures (likely homes); offsite immediately north also has a structure. Balance of area to north appears to be under grading for the future State 91 highway; former ag use and/or structures in its path have been removed. |
| 1966 | USGS 1" = 500' | Subject property generally as above with bulk of property used for outdoor storage; 3 residences/structures sill present at east and west ends. 4 sheds east of center gone. Highway 91 now fully developed to north. Adjacent residence west of Buena Vista still present. Majority of adjacent to west and south still open and under cultivation. |
| 1967 | USGS 7.5' **Topo** | Appears to show a single structure on SE corner main APN. |
| 1973 | USGS 7.5' **Topo** | Appears to show a structure at SW corner of subject property. |
| 1973 | TG 1" = 500' | Subject property and adjacent north between subject and Highway 91 are developed as a mobile home park. 2 of 3 former residences at northeast corner and southwest end still present. Substantially more development north across Highway 91. In general the local area is infilling with mostly residential. |
| 1975/81 | USGS 7.5' **Topo** | Topo is an aerial map. Mobile home park development shown. |
| 1980/85 | USGS 1" = 500' | As above with exception that retail center developed immediately to west end. A residence/building may be present on small lot at NE corner of Subject. Open land to south now developed with 2 large commercial buildings and bus parking lot present. |
| 1994/2002 | USGS 1" = 500' | Subject as above. Properties adjacent west and southwest completely developed with commercial. |
| 2004-2012 | USGS 1" = 500' | Subject and adjacent generally as above. |
| 2014 | USGS 1" = 500' | Subject generally as above. Adjacent southeast cleared and 5 building foundations present. Adjacent otherwise generally as above. |
| 2015 | USGS 7.5' **Topo** | Topos from this date forward do not provide details regarding subject property. |
| 2016/18 | USGS 1" = 500' | **Substantial Changes.** Mobile Homes and residences on subject are gone. Subject appears to be used for outdoor storage. All structures between subject property and Highway 91 have been cleared. 2nd Street has been constructed adjacent to north side subject property. Grading for Highway 91 onramp in progress. Former commercial to northwest removed. Property adjacent east end multifamily development with several buildings. |
| 2018-2021 | USDA 1" = 500' | Subject vacant. Surrounding generally as above. |

ASCS is the Agriculture and Soil Conservation Service. NAIP is the National Agriculture Inspection Program. USGS is the U.S. Geological Survey. NHAP is National High-Altitude Photography.

### 3.2.2 City/County Directories

Directory listings associated with the street addresses located adjacent to and surrounding the subject property was obtained from ERIS, an environmental information/database retrieval

service. Searches were requested on the 100-500 blocks of S. Buena Vista Avenue and all of w. 2nd Street. Directories dating to 1924 were reviewed. The 300 S. Buena Vista address was noted as a school property starting in 1971 and remained school related to the present. The mobile home park Buena Vista Mobile Manor, or separate residents, associated with the larger APN was identified at an address from 1971-2016. Other addresses in the 100-200 S. Buena Vista range were individuals. No other listings for the subject property addresses were present.

No gas stations, cleaners, or other occupants of potential environmental concern were identified on the subject property, or adjacent properties. A copy of the City Directory Report is provided in **Appendix C**.

#### 3.2.3 Fire Insurance Maps

TAGDD researched available Fire Insurance Maps of the subject property. Such maps provide detailed information on site structures, uses, and occupancies and were typically utilized by insurance companies to evaluate potential fire risk. Coverage was not available for the subject property. A copy of the ERIS report is included in **Appendix C**.

#### 3.2.4 Summary of Property History

Based on historical records such as aerial photographs, topographic maps, and previous reports, the subject property was undeveloped until sometime between 1931 and 1938, when a structure (presumed rural residence) was constructed. Between 1948-1971 2-3 residences were present on the subject property. From at least 1960 to at least 1966 much of the western portion of the property was used for outdoor equipment storage. Between 1967 and 1971 the rural residences were replaced by a mobile home park. The mobile home park was removed between 2014-2016 during the construction of E. 2nd Street. Since that time the subject property has been either vacant or used for outdoor equipment storage.

### 3.3 Regulatory Database Review

TAGDD subcontracted an electronic database report from ERIS®, an environmental information/database retrieval service. Facilities were identified by county, state, or federal agencies that generate, store, or dispose of hazardous materials or which have or have had releases from underground storage tanks, industrial uses, or related sites. A copy of the full ERIS® report is provided in **Appendix D,** along with a description of the individual databases. **Table 2** summaries noted information sorted by radius:

#### 3.3.1 Subject Property

There are no listings on the subject property:

#### 3.3.2 Adjacent Properties (within 1/8th Mile Radius Distance (660 feet)

Listings 1-25 are in this search radius:

- Listings 1-7 located in the vicinity of the subject property are all compliance/permit related listings which do not represent spill or releases. Such compliance/permit listings are not considered REC in the absence of releases.

- Listing 8 (**300 S. Buena Vista Avenue**) is the adjacent school and municipal property immediately south of the subject property. The listing documents 9 notations. Seven (7) of the listings are Permit/Compliance related and not considered further. Three (3) document former and current UST. In the absence of a release, such permit/compliance listings are not considered Recognized Environmental Conditions (REC). *WE note that a release case related to this property is discussed in **Section 3.4.3** which is not considered a REC.*

- Listing 9 **(100' ESE of subject property)** has 3 notations, all related to the discovery of "PFAS" constituents at parts-per-trillion (PPT) concentrations in a "desalter" well (Well 21) near the subject property. PFAS are "per-and polyfluoroalkyl substances." At this time, there are no Federal health risk standards for these substances, although we understand that such standards are being developed. Due to the depth of groundwater (>100'feet) in the referenced well, and due to the lack of industrial development on the subject property, it appears unlikely that the subject property would be a source for the PFAS in the local groundwater well. As such, we do not consider the presence of PFAS in local groundwater as a current REC.

- Listings 10 (**367-449 S. Buena Vista Avenue**) has a single compliance/permit notation. Such compliance/permit listings are not considered REC in the absence of releases.

- Listing 11 (**300 S. Buena Vista Avenue**), immediately adjacent south, is a school and municipal property with 10 notations, several of which relate to an historical LUST case. The project is further discussed in **Section 3.4.3.** As noted in that section, due to distance, size, and duration of LUST case, the site is not considered a REC.

- Listing 12 (**330 S. Buena Vista Avenue**), immediately adjacent south, has a single compliance/permit notation. Such compliance/permit listings are not considered REC in the absence of releases.

- Listing 13 (**231 S Lincoln Avenue**), is located several hundred feet to the west, at a former Honda Car Dealership. There are 4 notations, 2 of which relate to a gasoline LUST release case that was closed in 2011. Soil Vapor Extraction (SVE) was performed until 2007. Groundwater monitoring verified low or non-detect levels of most fuel constituents, and the case was closed. Based on distance, depth to groundwater, remediation, and regulatory closure, the case is not considered a REC.

- Listing 14 (**405 Sierra Vista Street**), is located several hundred feet to the west, has a single compliance/permit notation. Such compliance/permit listings are not considered REC in the absence of releases.

- Listing 15 (**301 S Lincoln Avenue**), is a Cardenas Market site located >500-feet west-southwest with 4 compliance/permit notations. Such compliance/permit listings are not considered REC in the absence of releases.

- Listing 16 (**no address**) located >600-feet southwest, is another municipal desalter well (Well 22) with PFAS (see Listing 9). As noted for listing 9: Due to the depth of groundwater (>100'feet) in the referenced well, and due to the lack of industrial development on the subject property, it appears unlikely that the subject property would

be a source for the PFAS in the local groundwater well. As such, we do not consider the presence of PFAS in local groundwater as a current REC.

- Listing 17-21 (**Various**) have compliance/permit notations. Such compliance/permit listings are not considered REC in the absence of releases.

- Listing 22 (no address) located >700-feet east-southeast, is another municipal desalter well (Well 25) with PFAS (see Listings 9 and 16). As noted for listing 9: Due to the depth of groundwater (>100'feet) in the referenced well, and due to the lack of industrial development on the subject property, it appears unlikely that the subject property would be a source for the PFAS in the local groundwater well. As such, we do not consider the presence of PFAS in local groundwater as a current REC.

- Listing 23-25 (**Various**) have compliance/permit notations. Such compliance/permit listings are not considered REC in the absence of releases.

### 3.3.3 Surrounding Area; 1/8 to 1/4 Miles Radius Distance (660-1,320 feet)

Listing numbers 26-57 are in this search radius.

- Listing 26-29 (**Various**) have compliance/permit notations. Such compliance/permit listings are not considered REC in the absence of releases.

- Listing 30 (**230 S. Lincoln Avenue**) located >900 feet west, is a former service station site with 12 notations. Several of the notations reference historical LUST cases which document soil-only release cases. The last case was closed in 1997. Due to distance, soil-only history, and closures, the release cases are not considered REC.

- Listing 31 (**130 N. Vicentia**) located >900 feet east-southeast, has a single compliance notation. Such compliance/permit listings are not considered REC in the absence of releases.

- Listing 32 (**341 S. Lincoln Avenue**) located >950 feet west-southwest, is a former dry cleaner location. Most of the notations are compliance related. However, one listing is a LOP (local oversight program) notation which identifies an initial 2010 investigation. The case is open as of 2020 but no work has been done since 2010. Based on distance and lack of evidence regarding any potential groundwater release, the site is not currently considered a REC.

- Listing 33-35 (**Various**) have compliance/permit notations. Such compliance/permit listings are not considered REC in the absence of releases.

- Listing 36 (**no address**) located 1,100-feet north-northeast, is another municipal desalter well (Well 28) with PFAS (see Listings 9 and 16). As noted for listing 9: Due to the depth of groundwater (>100'feet) in the referenced well, and due to the lack of industrial development on the subject property, it appears unlikely that the subject property would be a source for the PFAS in the local groundwater well. As such, we do not consider the presence of PFAS in local groundwater as a current REC.

- Listing 37-49 (**Various**) have compliance/permit notations. One listing (#45) is a dry cleaner site without a release case. Such compliance/permit listings are not considered REC in the absence of releases.

- Listing 50 (**no address**) located 1,200-feet southeast, is another municipal desalter well (Well 09A) with PFAS (see Listings 9 and 16). As noted for listing 9: Due to the depth of groundwater (>100'feet) in the referenced well, and due to the lack of industrial development on the subject property, it appears unlikely that the subject property would be a source for the PFAS in the local groundwater well. As such, we do not consider the presence of PFAS in local groundwater as a current REC.

- Listing 51-54 (**Various**) have compliance/permit notations. One listing (#45) is a dry cleaner site without a release case. Such compliance/permit listings are not considered REC in the absence of releases.

- Listing 55 (**846 W. 6th Street**) located >1.200-feet south-southeast, is a police station with a LUST release case involving a diesel release to soil. The case was closed in 1999. Based on soil-only release, distance, and closure status, the case is not considered a REC.

- Listing 56 (**no address**) located >1,280-feet east-southeast, is an industrial location with "metal machinery" location flagged as a potential PFAS emitter. No violations were noted and no release case is present. Such compliance/permit listings are not considered REC in the absence of releases.

- Listing 57 (**no address**) located >1,290-feet west-northwest, is a "mangular supply" well (Well 15) with PFAS (see Listings 9, 16, 50). As noted for listing 9: Due to the depth of groundwater (>100'feet) in the referenced well, and due to the lack of industrial development on the subject property, it appears unlikely that the subject property would be a source for the PFAS in the local groundwater well. As such, we do not consider the presence of PFAS in local groundwater as a current REC.

### 3.3.4 Surrounding Area; 1/4 to 1/2 Miles Radius Distance (1,320-2,640 feet)

Listing numbers 58-81 are in this search radius. Since TAGDD notes that proximity is the most important factor when assessing the degree of hazard to a subject property, we eliminate listings at this distance and further that are purely compliance/permit related. Only release cases are identified below (PFAS well locations are present but appear to reflect regional conditions rather than any site-specific point source release).

- Listing 63 (**625 W. 6th Street**), located >1,600-feet east, is a former service station (**Texaco Stanfield**) with an Listing 59 (**111 N Lincoln Avenue**), located approximately 1,400-feet northwest, is a former service station (**Shell Lincoln),** with an historical gasoline release discovered in 1989 and closed in 2004. The case file reports 2 monitoring wells which were not impacted (soil only). Remediation consisted of tank removals. Based on distance, soil-only release, and closure status, the location is not considered a REC.

- Listing 64 (**333 Railroad St.**), located >1,700-feet east-northeast, is a CALSITES listing of a manufactured gas plant site with operations dating to the early 1900's. The summary notations indicate a Preliminary Endangerment Assessment (PEA) was completed which concluded that a variety of contaminants could present threats to onsite workers. Based

on the lack of verified groundwater impact, distance, and lack of remedial actions (regulator concern) the location is not considered a REC.

- Listing 65 (**624 W. 6th St.**), located >1,700-feet southeast, is a service station (ARCO 9706 / Thrifty 336) with a LOP (local oversight) gasoline release to soil. The case was opened in 1999 and closed in 2003. No remediation occurred and the release was mitigated through tank removal. Based on soil only impact, distance, and closure status, the site is not considered a REC.

- Listing 66/67 (**706 S Vincentia**), located >1,800-feet south-southeast, is a private property (Harold King) with a LOP / LUST gasoline release to soil. The case was opened in 1992 and closed in 1995. No remediation occurred and the release was mitigated through tank removal. Based on soil only impact, distance, and closure status, the site is not considered a REC.

- Listing 68 (**612 W. 6th St.**), located >1,800-feet southeast, is an AAMCO transmission location with a LUST case documenting a gasoline release to soil. The case was opened in 1987 and closed in 1989. No remediation occurred and the release was mitigated through tank removal. Based on soil only impact, distance, and closure status, the site is not considered a REC.

- Listing 71 (**633 Railroad St.**), located >1,900-feet east-northeast, appears to be the same as Listing 64 (part of a manufactured gas site). The notation indicates a land use restriction is in place. As noted previously the case is not considered a REC.

- Listing 77 (**325 N. Cote St.**), located >2,300-feet north-northeast, is an MTA Truck School LOP/ LUST case documenting a diesel release to soil. The case was opened in 1993 and closed in 1994. No remediation occurred and the release was mitigated through tank removal. Based on soil only impact, distance, and closure status, the site is not considered a REC.

- Listing 78 (**401 W. 6th St.**), located >2,400-feet east-southeast, is an EZ Stop service station site with 2 LOP/LUST cases. The first documented a waste oil release to soil. The case was opened in 1993 and closed in 1994. A second case was opened and included 6 deep (100-foot+) monitoring wells showing a northerly gradient and low concentration fuel impacts. Deep soil vapor extraction (SVE) was conducted. Following remediation fuel impacted soils remained at depth, The release case was closed in 2010 due to a lack of receptors. Based on distance, low groundwater concentrations, and closure status, the site is not considered a REC.

### 3.3.5 Surrounding Area; 1/2 to 1.0 Miles Radius Distance (2,640-5,280 feet)

Listing numbers 82-93 are in this search radius.

- Listing 83 (**1267 W. 6th St.**), located >2,600-feet west, is identified as JAY'S MARKET, with a LOP/LUST case opened in 1999 and closed in 2009. Remediation of gasoline via SVE was conducted. Soil and groundwater were impacted. Three monitoring wells were installed in 2002/2003 and initial concentrations of fuel constituents dropped rapidly and were mostly non-detect in further sampling. Based on distance, low groundwater concentrations, and closure status, the site is not considered a REC.

- Listing 87 (**180 Sherman Ave**) located over 3,200-feet west-northwest, is an Envirostor listing. There is no release case – however the site is mentioned because it could be a substantial groundwater impact site. Based on great distance and lack of release case, the site is not currently considered a REC (and is unlikely to become a REC in our opinion).

- Several other cases similar to Listing 87 (not current release sites but requiring investigation) are also present at this great distance, and are not considered likely to become REC due to great distance.

None of the remaining release cases at this distance appear to be REC or potential REC.

### 3.3.6 Orphan / Unplottable Sites

There are 11 unplottable listings in the ERIS database. The majority are for non-release sites and are not considered further.

One is for a "CHMIRS" site documenting a release of petroleum at a site in "unincorporated east riverside county". Such a release would be outside of the City of Corona and not near the subject property.

A second listing is for a "McDaniel Fruit" site referenced on "Buena Vista". The case is an "irrigated lands" listing and not related to a release. Therefore, the case is not considered relevant.

Lastly there is a HMIRS case involving a hazardous materials release on Highway 91. Such a release would not typically be a threat to properties within the immediate vicinity and would have been mitigated by CalTrans if significant.

| TABLE 2<br>Database Search ID with Results | No. of Reported Notations | Search Radius (Miles) |
|---|---|---|
| ONE HALF to ONE MILE (.05-1.0) RADIUS | 18 | 0.5-1.0 |
| ONE QUARTER to ONE HALF MILE (0.25-0.5) RADIUS | 41 | 0.25-0.5 |
| ONE EIGTH TO ONE QUARTER MILE (0.125-0.25) RADIUS | 99 | 0.125-0.25 |
| SUBJECT TO ONE EIGHTH MILE (0.125) Radius | 51 | 0-0.125 |
| SUBJECT SITE | 0 | SUBJECT |

## 3.4 Regulatory y Agency Review and Interviews

Note that copies of requests and responses are not appended, as enough information is documented to allow a third party to recreate such information.

### 3.4.1 City of Corona

TAGDD contacted the City of Corona on August 19, 2023 though their record request portal (https://coronaca.govqa.us/WEBAPP/_rs/(S(z15wyuhnppt2mwpcpim1swd5))/RequestOpen.aspx?rqst=1&sSessionID=) concerning any permit, inspection, UST, or cleanup information available

for the subject property (request # C001156-081923). On February 28, 2023 the City responded on their portal had records. TAGDD reviewed records for the 300 S. Buena Vista address which pertained to the adjacent school property to the south. No records for the subject property were present. The City also referred TAGDD to the ETrakit website (https://etrakit.coronaca.gov/etrakit/) for permit records. TAGDD searched ETrakit by APN and addresses and found no records.

Following historical directory confirmation that the former mobile home park was associated with the address of 206 S. Buena Vista Avenue, a separate request (C001179-082323) was made on August 23, 2023. On August 24, 2023 the City indicated that no records were found.

### 3.4.2 Riverside County

On August 18, 2023 TAGDD contacted the County of Riverside, including the Department of Environmental Health (RCDEH); Land Use/Water Resources, and "all other programs" by and submitting the County's Request for Records" form (htt ps://www.rivcoeh.org/Portals/0/PDF/Request-for-Records.pdf) to the Hazardous Materials Division; Land Use/Water Division, and "all other programs" (request number 22423-5). Based on the location of the project and a review of neighboring addresses, 300 and 301 S. Buena Vista Avenue was used for the site address. APN's were also provided. DEH directed TAGDD to a new request portal and also advised TAGDD that the City would hold building permit records.

We filed request 23-1330 on a new request website (https://riversidecountyca.nextrequest.com/requests/23-1330) to the DEH. On August 31, 2023 the County Land Use department responded that no records were present for the subject APN. On September 15, 2023 the DEH responded that no responsive records were present. On August 31, 2023 we filed a new request (23-1511) with a new address revealed through directory searches (206 S. Buena Vista). On September 22, 2023 Shantel Bacon at DEH indicated that no responsive records were found. She also noted in a separate response that no septic records were found.

The RCDEH also referred TAGDD to the County's online "Find a Well" water well location resource (https://rivcoeh.org/request-public-records). The resource did not identify wells on the subject property. A 470-feet deep public water well (#WP0019845) completion report was on file for the property adjacent to the southeast. Depth of water was not reported.

Records also indicated that four groundwater monitoring wells had been present at the property located to the west of the subject property (231 S. Lincoln Avenue). Wells MW1-MW4 in 2000; MW-1 was perforated at depths below 100-feet. All 4 wells were abandoned (legally removed) in 2011.

On August 18, 2023 we also submitted a separate request to the County Transportation and Land Management Agency (TMLS) (https://rctlma.org/building/Records-Request) which includes Building Safety/Permitting; Code Enforcement; Planning; and Transportation. On August 18, 2023 the TMLS indicated that no building permits were located for the APN and addresses submitted.

### 3.4.3 State Water Resources Control Board

TAGDD reviewed the online database GeoTracker https://geotracker.waterboards.ca.gov/ on August 18, 2023, which provides records on Leaking Underground Storage Tanks (LUSTs) and

Spills, Leaks, Investigation and Cleanup (SLIC) sites, which is maintained by the State Water Quality Control Board. The subject property was not listed on the GeoTracker database.

Geotracker did contain a listing; the Corona-Riverside Unified School District (T0606500336), immediately to the south. The listing address (300 Buena Vista Avenue) is the same address that would map to the subject site. Currently, the property adjacent south, which is owned by the School District, is listed with an address of 330 S. Buena Vista Avenue.

TAGDD reviewed Geotracker files on the case to verify the exact location of the release case. The case involved the removal of several fuel tanks; an investigation; the removal of fuel impacted soil to a depth of 25-feet below grade; and finally, the allowance of some impacted soils to remain in place.

TAGDD reviewed figures within a "*Tank Closure Report for Corona Unified School District, 300 South Buena Vista Avenue, Corona, California*" by AEC (AEC, 1993). A location map in the report indicates that school district property to the south (now 330 S. Buena Vista Avenue) was the location of the project. One of the figures identified the district's "Bus Parking" area – that area is located on the eastern half of the adjacent property. To verify this information, TAGDD called the facility and spoke to Mr. Tim Russell in Facility Maintenance / 951-768-1588). Mr. Russell indicated that the referenced USTs had been at the extreme south end of the facility – "far away" from the subject property. Based on this confirmation the former USTs are not considered REC.

### 3.4.4 California Department of Toxic Substances Control

On March 1, 2023 TAGDD reviewed the online database EnviroStor, which provides records on: Federal Superfund sites (National Priority List); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites, which are maintained by the California Department of Toxic Substances Control. Envirostor has two listings in the immediate area, both of which are adjacent south:

- Transportation Office Orange Grove HS; 300 S. Buena Vista Avenue (#60003533)
- Orange Grove HS: 300 S. Buena Vista Avenue (#70000110)
- Orange Grove HS Case (#70000110) documents a Phase I ESA conducted in 2006 as required by DTSC for school sites. The case did not find evidence of REC and no further investigation was warranted.

The Transportation Office case (#60003533) documents a Phase I ESA request related to a new (June 2023) construction project at the school property immediately adjacent south. No report has been uploaded. TAGDD contacted the DTSC manager (Shahir Haddad / shahir.haddad@dtsc.ca.gov) to enquire if that report had been completed and whether REC were found. Ms. Haddad responded on August 21 that the Phase I was in progress and no determinations had been made.

As noted previously, Envirostor also provides a statewide listing (https://www.envirostor.dtsc.ca.gov/public/deed_restrictions) of Activity and Use Limitations (AUL). TAGDD reviewed those listings. Neither the subject site nor adjacent sites were listed.

#### 3.4.5 California Department of Conservation Geologic Energy Management Division

Oil and gas wells were not observed at the subject property during our site reconnaissance. A August 18, 2023 review of the California Department of Conservation, Geologic Energy Management Division website for oil and gas fields in California and Alaska (https://maps.conservation.ca.gov/oilgas/) indicated that no oil and gas wells were present in the vicinity.

#### 3.4.6 National Pipeline Mapping System

TAGDD reviewed the National Pipeline Mapping System (https://pvnpms.phmsa.dot.gov/PublicViewer/) public viewer website, accessed om August 18, 2023 for information on gas transmission pipelines and hazardous liquid trunk lines on or close to the subject property. According to the website, no pipelines are present at or in the immediate vicinity.

### 3.5 Current Property Owner Questionnaire

A representative of the property owner (Cynthia Lara of the City of Corona) completed am Owner questionnaire dated September 6, 2023. The information provided is documented below. A copy of the property owner questionnaire is included in **Appendix E**.

#### 3.5.1 Past or Present Uses Indicating Environmental Concern

Ms. Lara stated that the subject property is currently vacant. Historically the property was identified as a mobile home park.

#### 3.5.2 Environmental Liens or Governmental Notification

Ms. Lara stated that she was not aware of any environmental liens or governmental notification relating to past or recurrent violations of environmental laws with respect to the subject property.

#### 3.5.3 Presence of Hazardous Substances or Environmental Violations

Ms. Lara stated that she was not aware of the presence of hazardous substances, drums, petroleum substance containers, underground or aboveground tanks, chemical spills/releases, or PCB containing equipment on the subject property. Ms. Lara also stated that he was not aware of any environmental violations and/or cleanups associated with the subject property.

#### 3.5.4 Previous Assessments

Ms. Lara cited a 2018 vapor survey (**See Section 3.7.5**).

#### 3.5.5 Legal Proceedings

Ms. Lara stated that she was not aware of any environmental liens, unresolved notices of violation, or litigation related to a contamination issue at the subject property.

### 3.6 User Provided Information

Pursuant to ASTM E1527-21, TAGDD provided a Phase I ESA User Specific Questionnaire to the "user" (the person on whose behalf the Phase I ESA is being conducted). *NOTE that this Phase I ESA is not part of a*

*property transaction.* Mr. Scott Bering, representing the User (2nd Street Family LP), filled out the User Questionnaire. The User Specific Information provided is documented in the following sections. A list of the user specific questions (per ASTM E1527-13/21) with associated responses is included in **Appendix E**.

#### 3.6.1 Environmental Liens or Activity and Use Limitations

Mr. Bering did not have knowledge of environmental liens or activity and use limitations (AULs) in association with the subject property. No separate Environmental Lien Search was provided as part of this work product.

#### 3.6.2 Specialized Knowledge

Mr. Bering stated that he has no specialized knowledge or experience related to the subject property or nearby properties (i.e., knowledge of the chemicals or processes used by a type of business).

#### 3.6.3 Valuation Reduction for Environmental Issues

Mr. Bering stated that when purchased, the property was purchased at fair market value.

#### 3.6.4 Presence or Likely Presence of Contamination

Mr. Bering stated that he was not aware of any environmental contamination, spills, or releases related to the subject property.

#### 3.6.5 Other

Mr. Bering stated that no special Phase I ESA scope items were requested. Mr. Bering was aware of a past use of the property as a mobile home park.

### 3.7 Other Environmental Issues

#### 3.7.1 Asbestos-Containing Materials

Asbestos, a natural fiber used in the manufacturing of several different building materials, has been identified as a human carcinogen. Most friable (i.e., easily broken or crushed) Asbestos-Containing Material (ACM) was banned in building materials by 1978. By 1989, most major manufacturers had voluntarily removed non-friable ACM (i.e., flooring, roofing, and mastics/sealants) from the market. These materials, however, were not banned completely.

In October 1995, the Federal Occupational Safety and Health Administration (OSHA) redefined how building materials are classified in regard to asbestos and the also the way these materials are to be handled. Under this ruling, “thermal system insulation and sprayed-on or troweled on or otherwise applied surfacing materials” applied before 1980 are considered presumed Asbestos-Containing Materials (PACM). Other building materials such as “floor or ceiling tiles, siding, roofing, transite panels” (i.e., non-friable) are also considered PACM unless tested.

The subject property is vacant and currently undeveloped. Based on this information, the presence of asbestos-containing materials is not considered likely.

### 3.7.2 Lead-Based Paint

Lead-Based Paint (LBP) is identified by OSHA, the Environmental Protection Agency (EPA) and the Department Housing and Urban Development Department (HUD) as being a potential health risk to humans, particularly children, based upon its effects to the central nervous system, kidneys, and bloodstream. The risk of Lead-Based Paint has been classified by HUD based upon the age and condition of the painted surface. This classification includes the following:

- maximum risk is from paint applied before 1950;
- a severe risk is present from paint applied before 1960;
- a moderate risk is present from paint applied before 1970;
- a slight risk is present from paint applied before 1977; and
- paint applied after 1977 is not expected to contain lead.

The subject property is undeveloped. Historically portions of the subject property were developed as a mobile home park. Based on this information, the presence of lead-based paint is not considered likely.

### 3.7.3 Radon

Radon is a radioactive gas which has been identified as a human carcinogen. Radon gas is typically associated with fine-grained rock and soil, and results from the radioactive decay of radium. The U.S. EPA recommends that homeowners in areas with radon screening levels greater than 4 Picocuries per liter (pCi/L) conduct mitigation of radon gas to reduce exposure. Sections 307 and 309 of the Indoor Radon Abatement Act of 1988 (IRAA) directed the U.S. EPA to list and identify areas of the U.S. with the potential for elevated indoor radon levels. U.S. EPA's Map of Radon Zones (EPA-402-R-93-071) assigns each of the 3,141 counties in the US to one of three zones based on radon potential:

- Zone 1 counties have a predicted average indoor radon screening level greater than 4 pCi/L.
- Zone 2 counties have a predicted average indoor radon screening level between 2 and 4 pCi/L.
- Zone 3 counties have a predicted average indoor radon screening level less than 2 pCi/L.

Based on such factors as indoor radon measurements; geology; aerial radioactivity; and soil 2permeability, the U.S. EPA has identified the Riverside as Zone 2 (i.e., a predicted average indoor radon screening level between 2 and 4 pCi/L). EEI does not consider radon as a significant environmental concern at this time.

### 3.7.4 Emerging Contaminants

Regulatory agencies are evaluating a number of "emerging chemicals", commonly to include per- and poly-fluoroalkyl substances (PFAS), 1-4 Dioxane, and others. According to the California State Water Board (https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/pfas.html) *"Per- and polyfluoroalkyl substances (PFAS) are a group of more than 12,000 human-made substances that are not naturally occurring and are resistant to heat, water, and oil. These chemicals have been used and produced extensively in the United States for both commercial and industrial purposes, as well as for emergency fire response. Due to their unique chemistry, PFAS have been widely used as surface coatings and protectant formulations in consumer goods such*

*as carpet and home textiles; clothing; food packaging; and non-stick cookware. PFAS have also been used as a surfactant in chrome plating, firefighting foam, and other industrial applications. In typical conditions, PFAS are resistant to degradation and do not break down in the environment. These substances can accumulate within the human body and are toxic at relatively low concentrations".*

As noted in **Section 3.3 database reviews**; PFAS have been documented at parts per trillion (PPT) levels in many "desalter well" within the database search radii. The closest of these is Well 21 located 100-feet to the east southeast of the subject property. PFAS are noted as a regional contamination issue in groundwater, which is present at depths of >100-feet below grade. The past lack of industrial development of the subject property would indicate that such chemicals would not likely have originated on the subject property. Additionally cleanup concentrations have not been approved by regulators at this time. We do not consider these PFAS to be a REC due to groundwater depth and the extremely low (parts per trillion) levels documented in regional groundwater.

### 3.7.5 Historical Vapor Survey / Phase I ESA

The City of Corona provided a Tier II Vapor Screen (Ninyo & Moore, 2019) for the subject property which identified 2 potential Vapor Encroachment Conditions (pVEC). One pVEC was identified at a dry cleaner release site located at 341 S. Lincoln (to the southwest). A second pVEC was identified at the school-owned property immediately south of the subject property. The Tier 2 study eliminated these pVEC.

*PSI (PSI, 2011)* prepared a closure report for a Honda LUST release located several hundred feet to the northwest. The report documented a gasoline release, remediation, and closure. The site was closed following Soil vapor extraction (SVE) remediation. Final rebound testing included influent soil gas testing. Relatively low concentrations of fuel remained in the soil. No vapor surveys were completed. The location is not considered a REC due to distance and closure status.

## 4.0 SITE RECONNAISSANCE

### 4.1 Purpose

The purpose of our site reconnaissance was to observe the subject property, any onsite structures, and adjoining properties visually and physically for conditions indicating an existing release, past release, or threatened release of any hazardous materials/substances or petroleum products into structures on the subject property, or into soil and/or groundwater beneath the property. This would include any evidence of contamination, distressed vegetation, petroleum-hydrocarbon surface staining, waste drums, ASTs/USTs, illegal dumping, or improper waste storage/handling. Detailed information is provided in the following text.

### 4.2 Subject Property

On August 19, 2023, TAGDD personnel conducted a site reconnaissance to visually observe the subject property and adjoining properties for conditions indicating a potential environmental concern. TAGDD was unescorted. Visual conditions present during the site reconnaissance are documented in the Photographic Log (**Appendix A**) and summarized in **Table 3**.

TAGDD accessed the subject property from S. Buena Vista Avenue. The overall subject property is unfenced, relatively level, and has surface vegetation ranging from weeds to trees. Much of the overall property is gravel covered with very sparse vegetation.

TAGDD initially walked the small lot at the northeast corner of S. Buena Vista and 2nd Street. The lot is vacant and unfenced along both frontage roads. A short concrete block wall is present on the south side, and a steel fence is located on the east end. An apartment complex bounds the property on the south and east. The lot is vacant, level, and its surface primarily gravel. Some vegetation is present at the south and east ends. Utilities are present in the street and/or sidewalks which bound the west and north sides.

TAGDD crossed S. Buena Vista and walked the main, larger lot at the northwest corner (NWC) of S. Buena Vista and 2nd Street. We proceeded westward on 2nd street to the lot's west end, crossed to the south boundary, and walked transects back through the balance of the lot. Abundant wind-blown trash is present. Utilities are also present in the adjacent sidewalks and street. A storm drain appears to be present along the north end of the subject property.

No evidence of contamination, distressed vegetation, petroleum-hydrocarbon surface staining, waste drums, USTs, ASTs, illegal dumping, or improper waste storage/handling was noted during our site reconnaissance.

**TABLE 3 - Summary of Site Reconnaissance**

| Item | Concerns | Comments |
|---|---|---|
| General Housekeeping | No | No concerns observed. |
| Surface Spills | No | No concerns observed. |
| Stained Surfaces | No | No concerns observed. |
| Fill Materials | No | No concerns observed. |
| Pits/Ponds/Lagoons | No | No concerns observed. |
| Surface Impoundments | No | No concerns observed. |
| ASTs/USTs | No | No concerns observed. |
| Distressed Vegetation | No | No concerns observed. |
| Wetlands | No | No concerns observed. |
| Electrical Substations | No | No concerns observed. |
| Areas of Dumping | No | No concerns observed. |
| Transformers | No | No concerns observed. |
| Waste/Scrap Storage | No | No concerns observed. |
| Chemical Use/Storage | No | No concerns observed. |

### 4.3 Adjacent Properties

TAGDD conducted a visual and auto reconnaissance of the adjoining immediate area to observe the potential for offsite impacts that may affect the subject property. These would include evidence of chemical storage or usage, surface staining or leakage, distressed vegetation, or evidence of illegal dumping.

Highway 91 is adjacent immediately north of the subject property. A residential complex is located immediately east across S. Buena Vista Avenue. A school district headquarters and a Riverside County Transportation Commission office is located immediately south of the overall larger APN. To the west is a retail center.

No evidence of contamination, distressed vegetation, petroleum-hydrocarbon surface staining, waste drums, USTs, ASTs, illegal dumping, or improper waste storage/handling at these adjacent addresses was noted during our local reconnaissance.

## 5.0 VAPOR ENCROACHMENT SCREEN

ASTM Standard E2600-15 Standard Guide for Vapor Encroachment Screening (VES) on Property Involved in Real Estate Transactions was used as guidance for conducting a VES for the subject property. The purpose of the screening is to determine whether a Vapor Encroachment Condition (VEC) exists from chemicals of concern (COC) that may migrate as vapors onto a property because of contaminated soil and groundwater on or near the subject property. The screening involves a two-tiered approach to assessing VEC risk as described herein. The VES process includes a review of site conditions (e.g., aerial photographs, city directories, and environmental database information), which is information typically collected during a Phase I ESA, user provided information, and in some instances the use of a third-party vapor encroachment application. The following sections describe the VES performed on the property.

### 5.1 Site Conditions

The elevation of the subject property ranges from approximately 642 feet above mean sea level (amsl) at the west end to approximately 632 feet amsl at the east end. The subject property is graded and relatively level. Surface drainage would tend to move west to east based on topography.

Soil beneath the subject property was identified as a gravelly fine sandy loam of the Garretson Soil Series at 2 to 8 percent slopes. These soil series consists of well drained soils with slow to medium runoff and moderate permeability.

Referenced regional groundwater flow within the Temescal Basin is reported to be generally to the northwest and west towards the Prado Flood Control Basin. However, monitoring wells associated with a LUST release to the northwest (213 S. Lincoln Avenue) reported an eastward groundwater gradient roughly a decade ago. The referenced sources identified groundwater depth at >100-feet below ground surface.

### 5.2 User Provided VES Information

To assist TAGDD in the completion of the VES, Mr. Bering also completed a Vapor Encroachment Screen - User Questionnaire (**Appendix E**). The questionnaire provided basic information regarding the use, condition, and proposed development of the subject property.

According to Mr. Bering, future construction is intended to be a 110-unit affordable housing project, The project will be wood framed, slab-on-grade construction. Heating will be with electrical and gas utilities. Future development would not include service stations or dry cleaners, or hazardous materials.

### 5.3 Tier 1 Screening – Search Distance Test/Chemicals of Concern

A Tier 1 Screening includes the search distance test that involves a review of the regulatory database report and available historical records obtained during the Phase I ESA process to decide if any known or suspect potentially contaminated properties exist within the Area of Concern (AOC). High risk sites are typically current and former gas stations, former and current dry cleaners, manufactured gas plants, and industrial sites (Brownfields).

The AOC is defined as any up-gradient sites within the ASTM E1527-13/21 standard search distances and any cross or down gradient sites within 1/3 mile (1745-feet) *for solvents and petroleum products. If the contamination at the known or potentially contaminated sites within the AOC consists of Chemicals of Concern (COCs), then a potential Vapor Encroachment Condition (pVEC) exists, and a Tier 2 Screening evaluation is recommended. If no known or potentially contaminated sites with COCs exist within the AOC, no further inquiry is necessary.

Based on our understanding of the ASTM guidance, there are no upgradient releases, or releases within the AOC distances of 50 and 100-feet from the subject property boundary, that would qualify as potential pVEC.

### 5.4 Findings

TAGDD concludes that no potential Vapor Encroachment Conditions are present.

## 6.0 DATA GAPS AND DEVIATIONS FROM ASTM PRACTICES

Section 3.2.21 (ASTM E1527-21) defines a data gap as “a lack or inability to obtain information required by the practice despite good faith effort of the environmental professional to gather such information.”

### 6.1 Historical Data Gaps

No historical data gaps were identified during our research efforts.

### 6.2 Regulatory Data Gaps

As of the report date, records requests had not been answered by the Riverside County Transportation and Land Division. Based on the amount of data collected elsewhere, including our discission with the adjacent school property, and a query to DTSC, we do not anticipate that significant hazmat-related records will be found for the subject property.

### 6.3 Onsite Data Gaps

No onsite data gaps were identified during our research efforts.

### 6.4 Deviations from ASTM Practices

Section 12.10 (ASTM E1527-21), states that all deletions and deviations from this practice shall be listed individually and in detail, including client-imposed constraints, and all additions should be listed.

TAGDD believes that no exceptions to, or deletions and deviations from, the ASTM E1527-21 Guidelines, are present.

## 7.0 CONCLUSIONS AND RECOMMENDATIONS

We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM E1527-121 of APN 1183-020-30 and a portion of APN 1182-700-55, the *subject property*. Any exceptions to, or deletions from, this practice are described in Section 7.0 of this report. Based on the information obtained in this ESA, TAGDD has the following conclusions and recommendations:

- *Known or suspected RECs* – are defined by the ASTM E1527-21 as the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment.

  This assessment has revealed no evidence of *known or suspected RECs* in connection with the subject property.

- *Controlled RECs (CRECs)* – are defined by the ASTM E1527-21 as a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (e.g., as evidenced by the issuance of a NFA letter or equivalent, or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (e.g., property use restrictions, AULs, institutional controls, or engineering controls).

  This assessment has revealed no evidence of *CREC's* in connection with the subject property.

- *Historical RECs (HRECs)* – are defined by the ASTM E1527-21 as a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted residential use criteria established by a regulatory authority, without subjecting the property to any required controls (e.g., property use restrictions, AULs, institutional controls, or engineering controls).

  This assessment has revealed no evidence of the presence of *HRECs* in connection with the subject property.

- De Minimis Conditions – include environmental concerns identified which may warrant discussion but do not qualify as RECs, as defined by the ASTM E1527-21.

  This assessment has revealed no evidence of *De Minimis* Conditions at the subject property.

We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM E1527-21 of APN 1183-020-30 and a portion of APN 1182-700-55, the *subject property*. Any exceptions to, or deletions from, this practice are described in Section 7.0 of this report.

This assessment has revealed no evidence of *recognized environmental conditions* in connection with the *subject property. Further investigation is not warranted.*

## 8.0 SELECTED REFERENCES

AEC: *Tank Closure Report for Corona-Riverside School District, 300 South Buena Vista Avenue, Corona, California*" by AEC (dated August 1993).

California Department of Conservation Division of Mines and Geology (CDMG), 2002 California Geological Survey, California Geomorphic Provinces Note 36, Electronic Copy.

California Department of Toxic Substances (DTSC), Website (http://www.envirostor.dtsc.ca.gov/public/), EnviroStor database accessed August 2023.

California Department of Conservation Geologic Energy Management Division (CDCGEMD) Website (https://www.conservation.ca.gov/calgem) accessed August 2023.

City of Corona, Public Records Request (https://lookout.lake-elsinore.org/Forms/Public-Records-Request) accessed August 2023.

County of Riverside, Online Records search; wells; (https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/) accessed August 2023.

Geo-Cal: *PHASE II Environmental Assessment, (Dry Cleaner Express) and Visual Site Reconnaissance at Corona Towne Center, Corona, California, 92882*" dated February 18, 2010

Federal Emergency Management Act (FEMA), Flood Insurance Rate Map (FIRM), Website (http://msc.fema.gov) accessed August 2023.

National Pipeline Mapping System (NPMS), Public Map Viewer Website, (https://www.npms.phmsa.dot.gov/PublicViewer/ accessed August 2023.

Ninyo and Moore: "*Tier 2 Vapor Encroachment Screening (VES), Former Buena Vista Mobile Manor Property 206 South Buena Vista Avenue Corona, California 92882*", dated June 5, 2019

PSI: "*Revised Site Closure Document for Former Honda Cars of America, 231 S Lincoln Avenue, Corona, California"* dated September 2011.

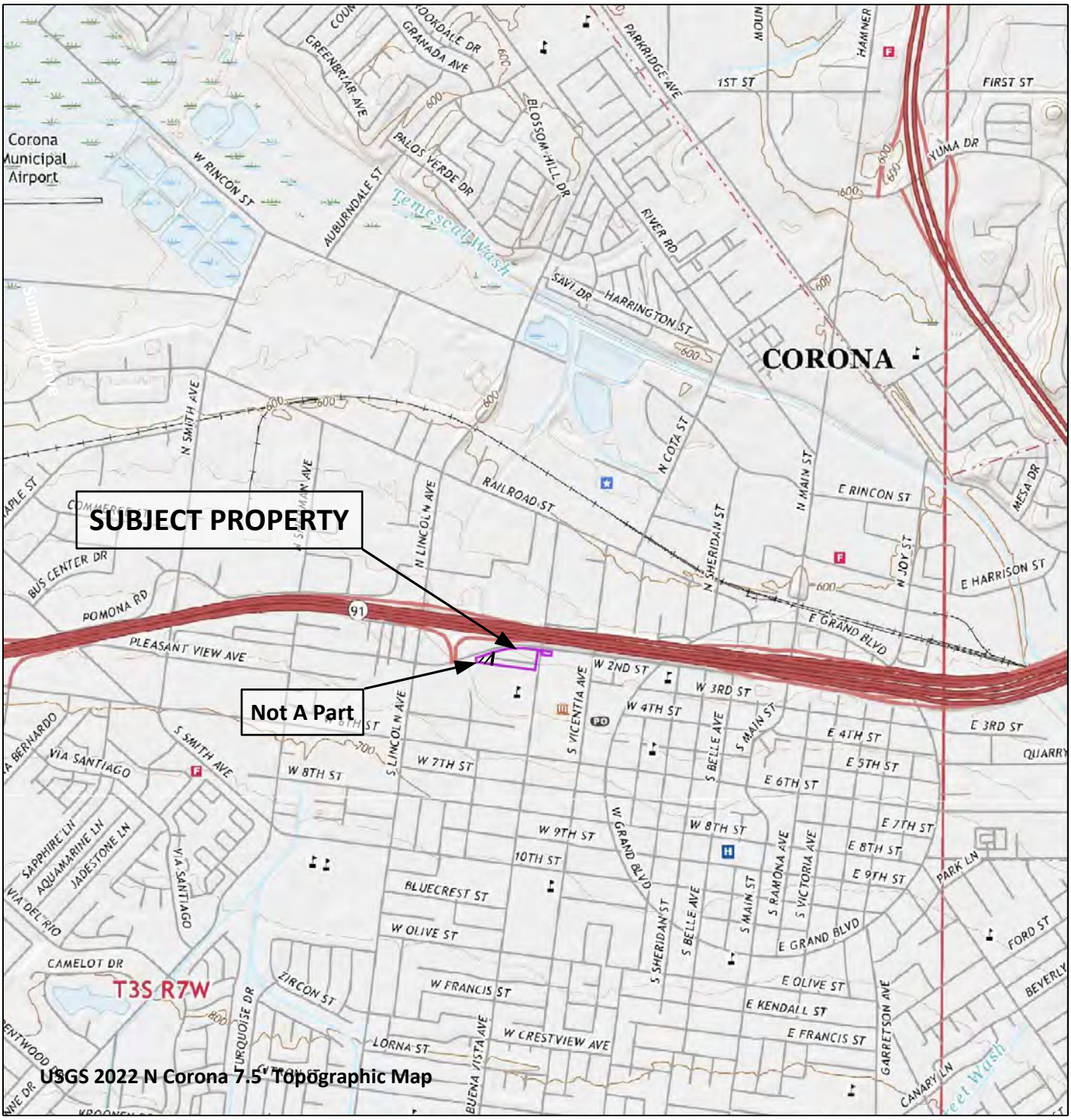
Santa Ana Regional Water Quality Control Board (SARWQCB) Region 8: Water Quality Control Plan, for the Santa Ana River Basin (8), January 1995 (Updated 2008), California State Water Resources Control Board Publication accessed August 2023

State Water Resources Control Board (SWRCB), Website, GeoTracker database, (http://www.geotracker.swrcb.ca.gov/) accessed August 2023.

United States Department of Agriculture (USDA), Natural Resources Conservation Service, Website (http://websoilsurvey.nrcs.usda.gov/app/) Web Soil Survey accessed August 2023.

United States Geological Survey (USGS), 2022, 7.5' Topographic Map, Corona North, California Quadrangle.

# FIGURES




N

0 0.25 0.5 MI

Approximate Scale

## VICINITY MAP

NWC/NEC W. 2nd Street & S. Buena Vista Avenue
Corona, Riverside County, California
Project 0823004

TA-Group DD, LLC

**FIGURE 1**




N

0 175 ft 350 ft

Approximate Scale

**AERIAL SITE MAP**

NWC/NEC W. 2nd Street & S. Buena Vista Avenue
Corona, Riverside County, California
Project 0823004

TA-Group DD, LLC

**FIGURE 2**

# Appendix 5: LID Infeasibility

*LID Technical Infeasibility Analysis*

Not Applicable

# Appendix 6: BMP Design Details

*BMP Sizing, Design Details and other Supporting Documentation*

# Santa Ana Watershed - BMP Design Flow Rate, $Q_{BMP}$

(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: Fuscoe Engineering Inc. | Date: 4/4/2024

Designed by: A. McMillian | Case No:

Company Project Number/Name: 1339-010 West 2nd Apartments

## BMP Identification

BMP NAME / ID: MWS - DMA A

*Must match Name/ID used on BMP Design Calculation Sheet*

## Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

## Drainage Management Area Tabulation

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

DMAs

| DMA Type/ID | DMA Area (square feet) | Post-Project Surface Type (use pull-down menu) | Effective Imperivous Fraction, $I_f$ | DMA Runoff Factor | DMA Areas x Runoff Factor | *Design Rainfall Intensity (in/hr)* | *Design Flow Rate (cfs)* | *Proposed Flow Rate (cfs)* |
|---|---|---|---|---|---|---|---|---|
| *A/1* | *5,807.80* | *Ornamental Landscaping* | *0.10* | *0.11* | *641.5* | | | |
| *A/2* | *24,208.800* | *Concrete or Asphalt* | *1* | *0.892* | *21594.2* | | | |
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## Santa Ana Watershed - BMP Design Flow Rate, $Q_{BMP}$

(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: Fuscoe Engineering Inc. | Date: 4/3/2024

Designed by: A. McMillian | Case No:

Company Project Number/Name: 1339-010 West 2nd Apartments

### BMP Identification

BMP NAME / ID: MWS - DMA B

*Must match Name/ID used on BMP Design Calculation Sheet*

### Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

### Drainage Management Area Tabulation

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

DMAs

| DMA Type/ID | DMA Area (square feet) | Post-Project Surface Type (use pull-down menu) | Effective Imperivous Fraction, $I_f$ | DMA Runoff Factor | DMA Areas x Runoff Factor | Design Rainfall Intensity (in/hr) | Design Flow Rate (cfs) | Proposed Flow Rate (cfs) |
|---|---|---|---|---|---|---|---|---|
| B/1 | 11,148.00 | Ornamental Landscaping | 0.10 | 0.11 | 1231.4 | | | |
| B/2 | 24,060.00 | Concrete or Asphalt | 1 | 0.892 | 21461.5 | | | |
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| | 35208 | Total | | | 22692.9 | 0.20 | 0.104 | 0.115 |

Notes:

Sizing = MWS-L-4-8

# Santa Ana Watershed - BMP Design Flow Rate, $Q_{BMP}$

(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: Fuscoe Engineering Inc. | Date: 4/4/2024

Designed by: A. McMillian | Case No:

Company Project Number/Name: 1339-010 West 2nd Apartments

## BMP Identification

BMP NAME / ID: MWS - DMA C

*Must match Name/ID used on BMP Design Calculation Sheet*

## Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

## Drainage Management Area Tabulation

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

DMAs

| DMA Type/ID | DMA Area (square feet) | Post-Project Surface Type (use pull-down menu) | Effective Imperivous Fraction, $I_f$ | DMA Runoff Factor | DMA Areas x Runoff Factor | *Design Rainfall Intensity (in/hr)* | *Design Flow Rate (cfs)* | *Proposed Flow Rate (cfs)* |
|---|---|---|---|---|---|---|---|---|
| *C/1* | *6,663.80* | *Ornamental Landscaping* | *0.10* | *0.11* | *736.1* | | | |
| *C/2* | *20,615.050* | *Concrete or Asphalt* | *1* | *0.892* | *18388.6* | | | |
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# Santa Ana Watershed - BMP Design Flow Rate, $Q_{BMP}$

(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 | Fuscoe Engineering Inc. | Date | 12/18/2023 |
| Designed by | Serena Ausili | Case No | |
| Company Project Number/Name | 1339-010 West 2nd Apartments | | |

## BMP Identification

BMP NAME / ID: MWS - DMA D

*Must match Name/ID used on BMP Design Calculation Sheet*

## Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

## Drainage Management Area Tabulation

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

DMAs

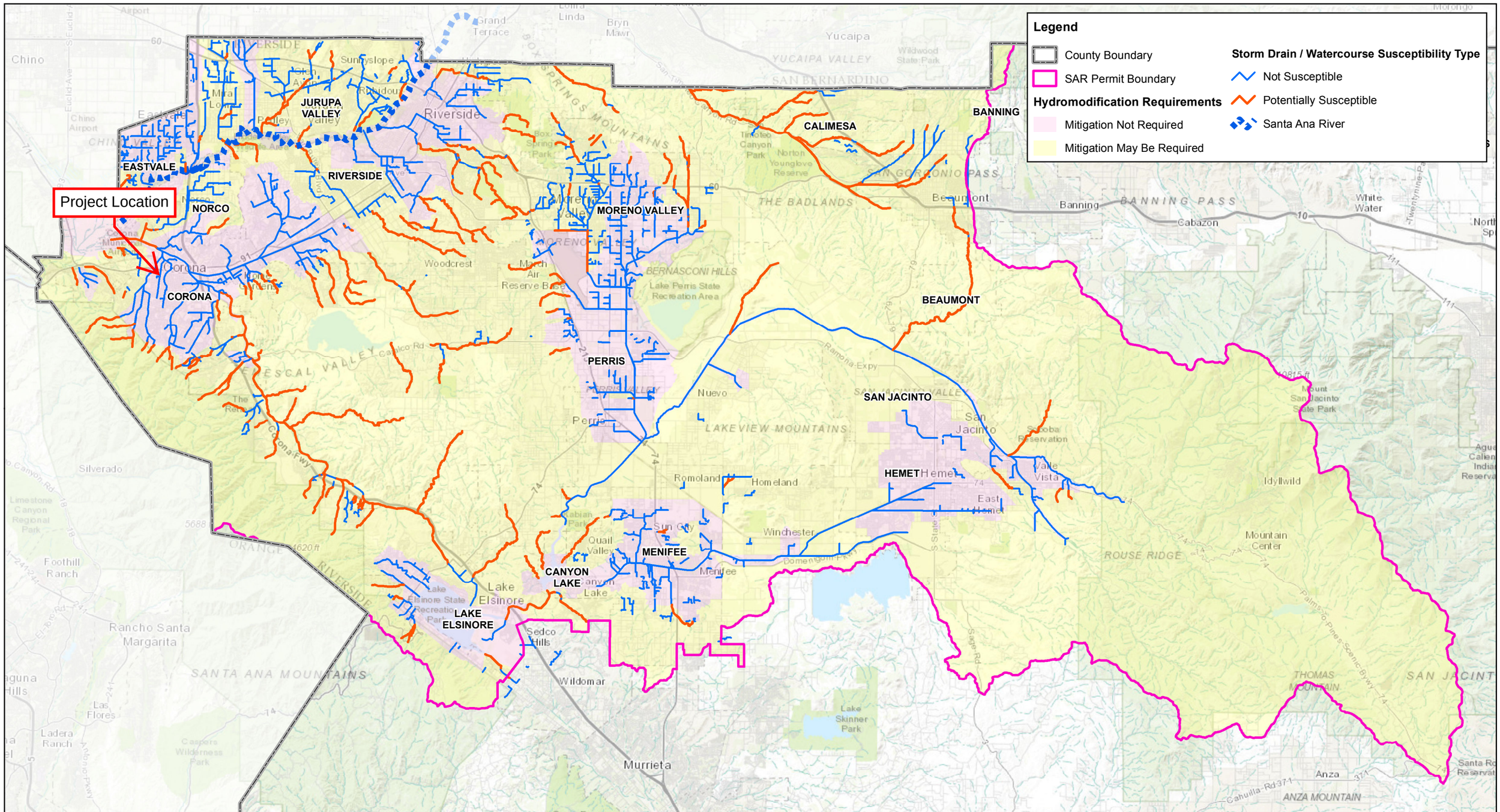
| DMA Type/ID | DMA Area (square feet) | Post-Project Surface Type (use pull-down menu) | Effective Imperivous Fraction, $I_f$ | DMA Runoff Factor | DMA Areas x Runoff Factor | *Design Rainfall Intensity (in/hr)* | *Design Flow Rate (cfs)* | *Proposed Flow Rate (cfs)* |
|---|---|---|---|---|---|---|---|---|
| *D/1* | *3,445.90* | *Ornamental Landscaping* | *0.10* | *0.11* | *380.6* | | | |
| *D/2* | *54,399.230* | *Concrete or Asphalt* | *1* | *0.892* | *48524.1* | | | |
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| | **57845.13** | | ***Total*** | | **48904.7** | **0.20** | ***0.225*** | ***0.346*** |

Notes:

Sizing = MWS-L-8-12

# Appendix 7: Hydromodification

*Supporting Detail Relating to Hydrologic Conditions of Concern*


Legend
County Boundary
SAR Permit Boundary
Hydromodification Requirements
Mitigation Not Required
Mitigation May Be Required
Storm Drain / Watercourse Susceptibility Type
Not Susceptible
Potentially Susceptible
Santa Ana River
Project Location
EASTVALE
JURUPA VALLEY
RIVERSIDE
NORCO
CORONA
MORENO VALLEY
PERRIS
CALIMESA
BANNING
BEAUMONT
SAN JACINTO
HEMET
MENIFEE
CANYON LAKE
LAKE ELSINORE
Chino
Riverside
Corona
Norco
Moreno Valley
Perris
Calimesa
Banning
Beaumont
San Jacinto
Hemet
Menifee
Canyon Lake
Lake Elsinore
Murrieta
Wildomar
Temecula
Yucaipa
Redlands
Loma Linda
Grand Terrace
Colton
Jurupa Valley
Eastvale
Mira Loma
Woodcrest
Nuevo
Romoland
Homeland
Sun City
Quail Valley
Winchester
Sedco Hills
Foothill Ranch
Rancho Santa Margarita
Las Flores
Ladera Ranch
Silverado
Limestone Canyon Regional Park
Cleveland National Forest
Box Spring Mountains
Bernasconi Hills
Lake Perris State Recreation Area
March Air Reserve Base
Lake Elsinore State Recreation Park
Lake Skinner Park
Lake Perris
Lake Matthews
Mount Jacinto State Park
Idyllwild
Mountain Center
Rouse Ridge
Anza
Anza Mountain
Thomas Mountain
Santa Rosa Reservation
Soboba Reservation
San Gorgonio Pass
Banning Pass
Cabazon
Beaumont
Banning
White Water
Yucaipa Valley
San Bernardino
The Badlands
Lakeview Mountains
Santa Ana Mountains
Escalon Valley
San Jacinto Valley
Perris Valley
Temescal Valley
Orange
Riverside
San Bernardino
Ramona Expy
Cajalco Rd
Corona Fwy
Cahuilla Rd
Palms to Pines Scenic Byway
Scott Rd
Winchester Rd
Domenigoni Pkwy
Antelope Rd
Cabazon
Banning
Beaumont
Hemet
Menifee
Perris
Corona
Norco
Riverside
Eastvale
Jurupa Valley
Calimesa
Yucaipa
Redlands
Loma Linda
Grand Terrace
Colton
Chino
Moreno
Twentynine Palms
Airport
Chino Airport
Eastvale Airport
Riverside Municipal Airport
Hemet-Ryan Airport
Perris Valley Airport
Corona Municipal Airport
Flabob Airport
Box Spring Park
Tinoteo Canyon Park
Norton Younglove Reserve
Sunnyslope
Rubidoux
Mira Loma
Pedley
Valley
Sky Canyon
Kabian Park
Sun City
Quail Valley
Menifee
Canyon Lake
Lake Elsinore
Sedco Hills
Wildomar
Murrieta
Temecula
Romoland
Homeland
Winchester
Nuevo
Perris
Hemet
East Hemet
San Jacinto
Valle Vista
Idyllwild
Mountain Center
Anza
Cahuilla
Rancho Santa Margarita
Foothill Ranch
Ladera Ranch
Las Flores
Silverado
Limestone Canyon Regional Park
Caspers Wilderness Park
Lake Skinner Park
Lake Elsinore State Recreation Park
Lake Perris State Recreation Area
Mount San Jacinto State Park
Soboba Reservation
Santa Rosa Reservation
Box Spring Mountains
Bernasconi Hills
Lakeview Mountains
Rouse Ridge
Thomas Mountain
Anza Mountain
Santa Ana Mountains
Escalon Valley
San Jacinto Valley
Perris Valley
Temescal Valley
San Gorgonio Pass
Banning Pass
The Badlands
Yucaipa Valley

# Appendix 8:  Source Control

*Pollutant Sources/Source Control Checklist*

# STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

| IF THESE SOURCES WILL BE ON THE PROJECT SITE ... | ... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE | | |
|---|---|---|---|
| 1<br>Potential Sources of Runoff Pollutants | 2<br>Permanent Controls—Show on WQMP Drawings | 3<br>Permanent Controls—List in WQMP Table and Narrative | 4<br>Operational BMPs—Include in WQMP Table and Narrative |
| ☒ A. **On-site storm drain inlets** | ☒ **Locations of inlets.** | ☒ **Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.** | ☒ **Maintain and periodically repaint or replace inlet markings.**<br>☒ **Provide stormwater pollution prevention information to new site owners, lessees, or operators.**<br>☒ **See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**<br>☒ **Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."** |
| ☐ B. **Interior floor drains and elevator shaft sump pumps** | | ☐ **State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.** | ☐ **Inspect and maintain drains to prevent blockages and overflow.** |
| ☐ C. **Interior parking garages** | | ☐ **State that parking garage floor drains will be plumbed to the sanitary sewer.** | ☐ **Inspect and maintain drains to prevent blockages and overflow.** |

| IF THESE SOURCES WILL BE ON THE PROJECT SITE ... | ... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE | | |
|---|---|---|---|
| 1<br>Potential Sources of Runoff Pollutants | 2<br>Permanent Controls—Show on WQMP Drawings | 3<br>Permanent Controls—List in WQMP Table and Narrative | 4<br>Operational BMPs—Include in WQMP Table and Narrative |
| ☒ D1. **Need for future indoor & structural pest control** | | ☒ **Note building design features that discourage entry of pests.** | ☒ **Provide Integrated Pest Management information to owners, lessees, and operators.** |
| ☒ D2. **Landscape/ Outdoor Pesticide Use** | ☐ **Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.**<br>☒ **Show self-retaining landscape areas, if any.**<br>☒ **Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)** | **State that final landscape plans will accomplish all of the following.**<br>☒ **Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.**<br>☒ **Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.**<br>☒ **Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.**<br>☒ **Consider using pest-resistant plants, especially adjacent to hardscape.**<br>**To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.** | ☒ **Maintain landscaping using minimum or no pesticides.**<br>☒ **See applicable operational BMPs in "What you should know for…..Landscape and Gardening"** at http://rcflood.org/stormwater/**Error! Hyperlink reference not valid.**<br>☒ **Provide IPM information to new owners, lessees and operators.** |

| IF THESE SOURCES WILL BE ON THE PROJECT SITE ... | ... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE | | |
|---|---|---|---|
| 1<br>Potential Sources of Runoff Pollutants | 2<br>Permanent Controls—Show on WQMP Drawings | 3<br>Permanent Controls—List in WQMP Table and Narrative | 4<br>Operational BMPs—Include in WQMP Table and Narrative |
| ☒ E. **Pools, spas, ponds, decorative fountains, and other water features.** | ☒ **Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)** | **If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.** | ☒ **See applicable operational BMPs in** "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/ |
| ☐ F. **Food service** | ☐ **For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment.**<br>☐ **On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.** | ☐ **Describe the location and features of the designated cleaning area.**<br>☐ **Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.** | ☐ **See the brochure, "**The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/<br>**Provide this brochure to new site owners, lessees, and operators.** |
| ☒ G. **Refuse areas** | ☒ **Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas.**<br>☐ **If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area.**<br>☐ **Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.** | ☒ **State how site refuse will be handled and provide supporting detail to what is shown on plans.**<br>☒ **State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.** | ☒ **State how the following will be implemented:**<br>**Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at** www.cabmphandbooks.com |

| IF THESE SOURCES WILL BE ON THE PROJECT SITE ... | ... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE | | |
|---|---|---|---|
| 1<br>Potential Sources of Runoff Pollutants | 2<br>Permanent Controls—Show on WQMP Drawings | 3<br>Permanent Controls—List in WQMP Table and Narrative | 4<br>Operational BMPs—Include in WQMP Table and Narrative |
| ❑ H. **Industrial processes.** | ❑ **Show process area.** | ❑ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."** | ❑ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**<br>See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/ |

| IF THESE SOURCES WILL BE ON THE PROJECT SITE ... | ... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE | | |
|---|---|---|---|
| 1<br>Potential Sources of Runoff Pollutants | 2<br>Permanent Controls—Show on WQMP Drawings | 3<br>Permanent Controls—List in WQMP Table and Narrative | 4<br>Operational BMPs—Include in WQMP Table and Narrative |
| ❑ I. **Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)** | ❑ **Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area.**<br>❑ **Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults.**<br>❑ **Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.** | **Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.**<br>**Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for:**<br>▪ **Hazardous Waste Generation**<br>▪ **Hazardous Materials Release Response and Inventory**<br>▪ **California Accidental Release (CalARP)**<br>▪ **Aboveground Storage Tank**<br>▪ **Uniform Fire Code Article 80 Section 103(b) & (c) 1991**<br>▪ **Underground Storage Tank**<br>**www.cchealth.org/groups/hazmat/** | ❑ **See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** |

| IF THESE SOURCES WILL BE ON THE PROJECT SITE ... | ... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE | | |
|---|---|---|---|
| 1<br>Potential Sources of Runoff Pollutants | 2<br>Permanent Controls—Show on WQMP Drawings | 3<br>Permanent Controls—List in WQMP Table and Narrative | 4<br>Operational BMPs—Include in WQMP Table and Narrative |
| ❑ J. **Vehicle and Equipment Cleaning** | ❑ **Show on drawings as appropriate:**<br>**(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.**<br>**(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).**<br>**(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.**<br>**(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.** | ❑ **If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.** | **Describe operational measures to implement the following (if applicable):**<br>❑ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/<br>❑ **Car dealerships and similar may rinse cars with water only.** |

| IF THESE SOURCES WILL BE ON THE PROJECT SITE ... | ... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE | | |
|---|---|---|---|
| 1<br>Potential Sources of Runoff Pollutants | 2<br>Permanent Controls—Show on WQMP Drawings | 3<br>Permanent Controls—List in WQMP Table and Narrative | 4<br>Operational BMPs—Include in WQMP Table and Narrative |
| ❑ K. **Vehicle/Equipment Repair and Maintenance** | ❑ **Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater.**<br>❑ **Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.**<br>❑ **Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.** | ❑ **State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.**<br>❑ **State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.**<br>❑ **State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.** | **In the Stormwater Control Plan, note that all of the following restrictions apply to use the site:**<br>❑ **No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.**<br>❑ **No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.**<br>❑ **No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.**<br>Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/<br>Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ |

| IF THESE SOURCES WILL BE ON THE PROJECT SITE ... | ... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE | | |
|---|---|---|---|
| 1<br>Potential Sources of Runoff Pollutants | 2<br>Permanent Controls—Show on WQMP Drawings | 3<br>Permanent Controls—List in WQMP Table and Narrative | 4<br>Operational BMPs—Include in WQMP Table and Narrative |
| ❑ L. **Fuel Dispensing Areas** | ❑ **Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable.**<br>❑ **Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.** | | ❑ **The property owner shall dry sweep the fueling area routinely.**<br>❑ **See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** |

[6] **The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.**

| IF THESE SOURCES WILL BE ON THE PROJECT SITE ... | ... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE | | |
|---|---|---|---|
| 1<br>Potential Sources of Runoff Pollutants | 2<br>Permanent Controls—Show on WQMP Drawings | 3<br>Permanent Controls—List in WQMP Table and Narrative | 4<br>Operational BMPs—Include in WQMP Table and Narrative |
| ❑ M. **Loading Docks** | ❑ **Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer.**<br>❑ **Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.**<br>❑ **Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.** | | ❑ **Move loaded and unloaded items indoors as soon as possible.**<br>❑ **See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** |

| IF THESE SOURCES WILL BE ON THE PROJECT SITE ... | ... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE | | |
|---|---|---|---|
| 1<br>Potential Sources of Runoff Pollutants | 2<br>Permanent Controls—Show on WQMP Drawings | 3<br>Permanent Controls—List in WQMP Table and Narrative | 4<br>Operational BMPs—Include in WQMP Table and Narrative |
| ☒ N. **Fire Sprinkler Test Water** | | ☒ **Provide a means to drain fire sprinkler test water to the sanitary sewer.** | ☒ **See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** |
| O. **Miscellaneous Drain or Wash Water or Other Sources**<br>❑ **Boiler drain lines**<br>❑ **Condensate drain lines**<br>❑ **Rooftop equipment**<br>❑ **Drainage sumps**<br>☒ **Roofing, gutters, and trim.**<br>❑ **Other sources** | | ❑ **Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.**<br>❑ **Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.**<br>❑ **Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.**<br>❑ **Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.**<br>☒ **Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.**<br>**Include controls for other sources as specified by local reviewer.** | |

# STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

| IF THESE SOURCES WILL BE ON THE PROJECT SITE ... | ... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE | | |
|---|---|---|---|
| 1<br>Potential Sources of Runoff Pollutants | 2<br>Permanent Controls—Show on WQMP Drawings | 3<br>Permanent Controls—List in WQMP Table and Narrative | 4<br>Operational BMPs—Include in WQMP Table and Narrative |
| ☒ P. **Plazas, sidewalks, and parking lots.** | | | ☒ **Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.** |

# Appendix 9: O&M

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

**[***MODEL - REMOVE THIS TITLE WHEN USED***]**

# CITY OF CORONA
# WATER QUALITY MANAGEMENT PLAN AND STORMWATER BMP MAINTENANCE AND RIGHT OF ENTRY AGREEMENT WITH [***INSERT NAME OF OWNER***]

## 1. PARTIES AND DATE.

THIS WATER QUALITY MANAGEMENT PLAN AND STORMWATER BMP MAINTENANCE AND RIGHT OF ENTRY AGREEMENT ("Agreement") is made and entered into in the City of Corona, California, this [***INSERT DAY***] day of [***INSERT MONTH***], [***INSERT YEAR***] by and between the City of Corona, a California municipal corporation ("City"), and [***INSERT NAME***], a [***[INSERT TYPE OF ENTITY - CORPORATION, PARTNERSHIP, SOLE PROPRIETORSHIP OR OTHER LEGAL ENTITY]***] with its principal place of business at [***INSERT FULL ADDRESS***] ("Owner"). This Agreement applies to property located at [***INSERT FULL STREET ADDRESS***], APN No. [***INSERT APN***] in the County of Riverside, State of California.

## 2. RECITALS.

2.1 The Owner owns real property ("Property") in the City of Corona, County of Riverside, State of California, more specifically described in Exhibit "A" and depicted in Exhibit "B", each of which exhibits is attached hereto and incorporated herein by this reference.

2.2 At the time of initial approval of Owner's development project known as [***INSERT COMMON NAME OF PROJECT***] within the Property, the City required the project to employ Best Management Practices, hereinafter referred to as "BMPs," to minimize pollutants in urban runoff.

2.3 The Owner has chosen to install and/or implement BMPs as described in the Water Quality Management Plan, on file with the City, hereinafter referred to as "WQMP", to minimize pollutants in urban runoff and to minimize other adverse impacts of urban runoff.

2.4 The WQMP has been certified by the Owner and reviewed and approved by the City.

2.5 The BMPs, with installation and/or implementation on private property and draining only private property, are part of a private facility with all maintenance or replacement, therefore, the sole responsibility of the Owner in accordance with the terms of this Agreement.

2.6 The Owner is aware that periodic and continuous maintenance, including, but not necessarily limited to, filter material replacement and sediment removal, is

required to assure peak performance of all BMPs in the WQMP and that, furthermore, such maintenance activity will require compliance with all Local, State, or Federal laws and regulations, including those pertaining to confined space and waste disposal methods, in effect at the time such maintenance occurs

**3. TERMS.**

3.1 Responsibility for Operation and Maintenance of BMPs. Owner shall diligently maintain all BMPs in a manner assuring peak performance at all times. All reasonable precautions shall be exercised by Owner and Owner's representative or contractor in the removal and extraction of any material(s) from the BMPs and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. As may be requested from time to time by the City, the Owner shall provide the City with documentation identifying the material(s) removed, the quantity, and disposal destination.

3.2 Right of Access. Owner hereby provides the City or City's designee complete access, of any duration, to the BMPs and their immediate vicinity at any time, upon reasonable notice, or in the event of emergency, as determined by City's Director of Public Works ("Director"), no advance notice, for the purpose of inspection, sampling, testing of the BMPs, and in case of emergency, to undertake, in the City's sole discretion, necessary repairs or other preventative measures at Owner's expense as provided in paragraph 3 below. City shall make every effort at all times to minimize or avoid interference with Owner's use of the Property.

3.3 City Maintenance at Owner's Expense. In the event Owner, or its successors or assigns, fails to accomplish the necessary maintenance contemplated by this Agreement, within five (5) days of being given written notice by the City, the City is hereby authorized to cause any maintenance necessary to be done and charge the entire cost and expense to the Owner or Owner's successors or assigns, including administrative costs, attorneys fees and interest thereon at the maximum rate authorized by the Civil Code from the date of the notice of expense until paid in full. The City, at its sole election, may make these costs to be a lien upon the property that may be collected at the same time and in the same manner as ordinary municipal taxes as provided in Government Code section 38773.5. Nothing in this section or this Agreement creates an obligation by the City to maintain or repair any BMP, nor does this section prohibit the City from pursuing other legal recourse against Owner.

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

3.5 Attorney's Fees. In event of legal action occasioned by any default or action of the Owner, or its successors or assigns, the Owner and its successors or assigns

agree(s) to pay all costs incurred by the City in enforcing the terms of this Agreement, including reasonable attorney's fees and costs, and that the same shall become a part of the lien against said Property.

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

3.7 Binding on Successors. The obligations herein undertaken shall be binding upon the heirs, successors, executors, administrators and assigns of the parties hereto. The term "Owner" shall include not only the present Owner, but also its heirs, successors, executors, administrators, and assigns. Owner shall notify any successor to title of all or part of the Property about the existence of this Agreement. Owner shall provide such notice prior to such successor obtaining an interest in all or part of the Property. Owner shall provide a copy of such notice to the City at the same time such notice is provided to the successor.

3.8 Indemnity and Insurance. The Owner, its heirs, successors, executors, administrators and assigns agree to defend, indemnify and holds harmless the City, its officials, employees and its authorized agents from any and all damages, accidents, casualties, occurrences or claims (collectively, "Claims") which might arise or be asserted against the City and which are in any way connected with the construction, operation, presence, existence or maintenance of the BMP by the Owner, or from any personal injury or property damage that may result from the City or other public entities entering the Property under Sections 2 or 3 of this Agreement; provided, however, that in no event shall Owner, its heirs, successors, executors, administrators and assigns be obligated to defend, indemnify or hold harmless the City, its officials, employees, and its authorized agents from any Claims arising from the City's or its officials, employees, and its authorized agents active negligence or willful misconduct while the City enters the Property under Section 2 or 3 of this Agreement.. The Owner shall maintain liability insurance in commercially reasonable amounts, but not less than $1,000,000.00, covering the BMP and City. The City shall require proof of insurance to be provided to City on a regular basis as determined by the City.

3.9 Time of the Essence. Time is of the essence in the performance of this Agreement.

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

| IF TO CITY: | IF TO OWNER: |
|---|---|
| City of Corona | [***INSERT NAME OF OWNER***] |
| 400 South Vicentia Avenue | [***INSERT STREET ADDRESS***] |
| Corona, CA 92882 | [***INSERT CITY, STATE, ZIP***] |
| Attn: Sylvia Edwards | Attn: [***INSERT NAME & TITLE***] |

[SIGNATURES ON FOLLOWING PAGE]

[REMAINDER OF PAGE LEFT INTENTIONALLY BLANK]

**SIGNATURE PAGE TO**
**CITY OF CORONA**
**WATER QUALITY MANAGEMENT PLAN AND STORMWATER BMP MAINTENANCE AND RIGHT OF ENTRY AGREEMENT**
**WITH [***INSERT NAME OF OWNER***]**

**IN WITNESS THEREOF,** the parties hereto have executed this Agreement as of the date first written above.

**CITY OF CORONA**
**a California municipal corporation**

By: _____
Savat Khamphou
Acting Public Works Director

ATTEST:

_____
City Clerk

**[***INSERT APPLICANT NAME***]**
**a [***INSERT TYPE OF LEGAL ENTITY***]**

By: _____
Signature

_____
Name (Print)

_____
Title (Print)

By: _____
Signature

_____
Name (Print)

_____
Title (Print)

ATTEST:

_____
[***INSERT NAME***]
[***INSERT TITLE***]

[***NOTE (READ AND DELETE THIS BLOCK BEFORE USING MODEL): SIGNATURE BLOCKS CAN VARY DEPENDING UPON THE APPLICANT'S TYPE OF LEGAL ENTITY (E.G. CORPORATION; GENERAL PARTNERSHIP; LIMITED PARTNERSHIP; LIMITED LIABILITY PARTNERSHIP OR COMPANY; OR AN INDIVIDUAL). THIS MODEL CONTAINS A GENERAL FRAMEWORK WHICH WILL WORK FOR MOST CORPORATIONS, INDIVIDUAL (NON-CORPORATE) PARTNERSHIPS AND INDIVIDUAL SOLE PROPRIETORSHIPS. PLEASE REFER TO THE CITY CLERK'S "SIGNATURE REQUIREMENT" MEMO ON THE INFO WEB FOR COMPLETE INFORMATION***]

NOTARY ACKNOWLEDGEMENT OF CITY

**ACKNOWLEDGMENT**

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California
County of _____)

On _____ before me, _____
(insert name and title of the officer)

personally appeared _____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____ **(Seal)**

## ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California
County of _____)

On _____ before me, _____
(insert name and title of the officer)

personally appeared _____,
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

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who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____ **(Seal)**

**EXHIBIT "A"**
**(LEGAL DESCRIPTION)**

**[***INSERT PARCEL NUMBER(S) AND LEGAL DESCRIPTION(S)***]**

**EXHIBIT "B"**
**(MAP/ILLUSTRATION)**

**[***INSERT DEPICTION AND/OR ILLUSTRATION***]**

# Operation and maintenance Plan

*Maintenance Requirements*

All BMP included as part of the project WQMP are required to be maintained through the regular scheduled inspection and maintenance. The Table below summarizes inspection and maintenance schedule for all BMP included in the WQMP. The maintenance Agreement can be found in Appendix 9.

| BMP Inspection and Maintenance | | | |
|---|---|---|---|
| BMP | Responsible Party(s) | Inspection/Maintenance Activities Required | Minimum Frequency of Activities |
| Proprietary Biotreatment Unit | Owner | - Remove trash and debris<br>- Identify excess erosion or scour<br>- Identify sediment accumulation that requires maintenance<br>- Inspect during storm event, when possible, to estimate treatment capacity and determine if premature bypass is occurring<br>- Evaluate plant health and need for corrective action<br>- Identify any needed corrective maintenance that will require site-specific planning or design | Four times per year during wet season, including inspection just before the wet season and within 24 hours after at least two storm events ≥ 0.5 inches. |

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

| BMP NAME (AS SHOWN IN O&M PLAN) | BRIEF DESCRIPTION OF IMPLEMENTATION, MAINTENANCE, AND INSPECTION ACTIVITY PERFORMED |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

# APPENDIX L

# LID/Treatment Control BMP Inspection Form

SANTA ANA REGION
LID/TREATMENT CONTROL BMP
OPERATION AND MAINTENANCE INSPECTION FORM

This inspection and reporting form is used to document findings of inspections of LID/Treatment Control BMPs and maintenance activities for Insert Permittee Name owned facilities and developments under the jurisdiction of the Insert Permittee Name subject to maintenance and annual reporting requirements. A list of types of LID/Treatment Control BMPs is provided on the next page.

Annual Reporting Period: _____
Project Site Name: _____
Project Site Location / Address: _____

Sub Watershed ☐ MSAR ☐ San Jacinto/Lake Elsinore
Owner / Operator: _____
Contact Name: _____
Contact Address: _____
Contact Phone Number: _____
Contact Email: _____
Inspector Name / Title: _____
Inspector Phone Number: _____
Inspector Signature: _____
Inspection Date / Time: _____

**LID/Treatment Control BMP Information:**

| Identifying Number of BMP | Type of Structural Post-Construction BMP | Date of Construction | Date of Certification to Approved Plans | Location of Structural Post-Construction BMP on the Site |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**Summary of LID/Treatment Control BMP Inspections and Maintenance:**

| Identifying Number of BMP | Self or 3rd Party Certification | Operation and Maintenance Activities Performed and Date(s) Conducted | Inspection Results (including vector or nuisance problems) and Corrective Actions |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

SANTA ANA REGION
LID/TREATMENT CONTROL BMP
OPERATION AND MAINTENANCE INSPECTION FORM

## Types of LID/Treatment Control BMPs

- ☐ Bioretention
- ☐ Dry Well
- ☐ Extended detention basin
- ☐ Grass Filter Strip
- ☐ Grass Swale
- ☐ Green Roof
- ☐ Infiltration Basin
- ☐ Infiltration Trench
- ☐ Landscaped Filter Basin
- ☐ Porous Pavement
- ☐ Rain Barrel/Aboveground Cistern
- ☐ Sand Filter (Austin)
- ☐ Sand Filter (Delaware)
- ☐ Sand Filter Basin
- ☐ Underground Detention/Cistern
- ☐ Water Quality Inlet
- ☐ Wet Pond or Constructed Wetland
- ☐ Other BMPs
- ☐ Proprietary BMPs
    - ☐ Biotreatment
    - ☐ Catch Basin Insert
    - ☐ Hydrodynamic Separation
    - ☐ Media Filtration
    - ☐ Underground Infiltration
    - ☐ Wetland
    - ☐ Wet Vault
    - ☐ Other

# Appendix 10: Educational Materials

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

CONTECH®
ENGINEERED SOLUTIONS

# Modular Wetlands® Linear Stormwater Biofiltration



# The experts you need to solve your stormwater challenges



**Contech is the leader in stormwater solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.**

With our responsive team of stormwater experts, local regulatory expertise and flexible solutions, Contech is the trusted partner you can count on for stormwater management solutions.

## Your Contech Team



### STORMWATER CONSULTANT

*It's my job to recommend the best solution to meet permitting requirements.*



### STORMWATER DESIGN ENGINEER

*I work with consultants to design the best approved solution to meet your project's needs.*



### REGULATORY MANAGER

*I understand the local stormwater regulations and what solutions will be approved.*



### SALES ENGINEER

*I make sure our solutions meet the needs of the contractor during construction.*

**Contech is your partner in stormwater management solutions**




# Restoring Nature's Presence in Urban Areas – Modular Wetlands® Linear

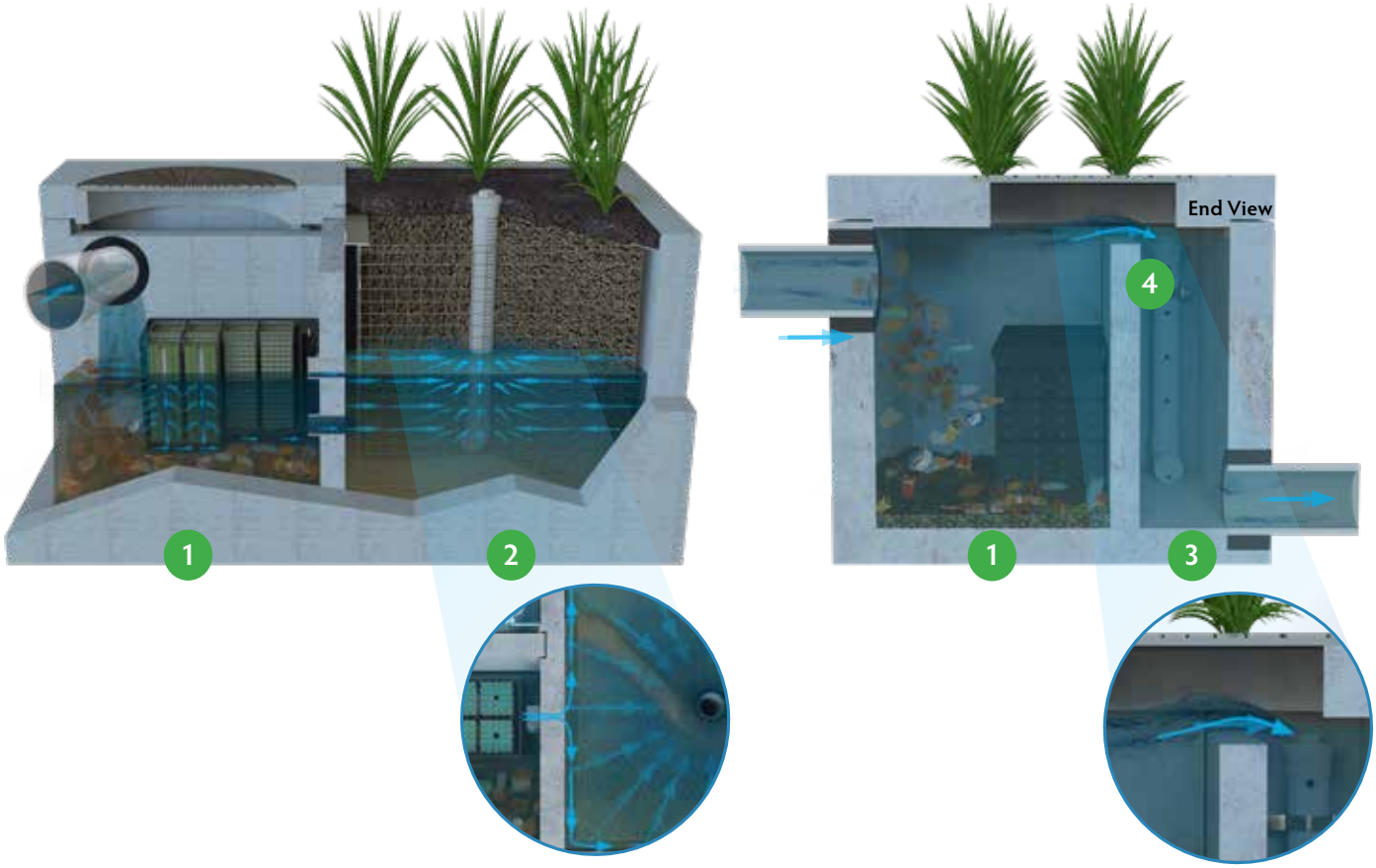
*As cities grow, there is less space for natural solutions to treat stormwater. Contech understands this and is committed to providing compact, Low Impact Development (LID) solutions like the Modular Wetlands Linear to protect our nation's waterways.*

The Modular Wetlands® Linear is the only biofiltration system to utilize patented horizontal flow, allowing for a small footprint, high treatment capacity, and design versatility. It is also the only biofiltration system that can be routinely installed downstream of storage for additional volume control and treatment.

With numerous regulatory approvals, the system's aesthetic appeal and superior pollutant removal make it the ideal solution for a wide range of stormwater applications, including urban development projects, commercial parking lots, residential streets, mixed-use developments, streetscapes, and more.

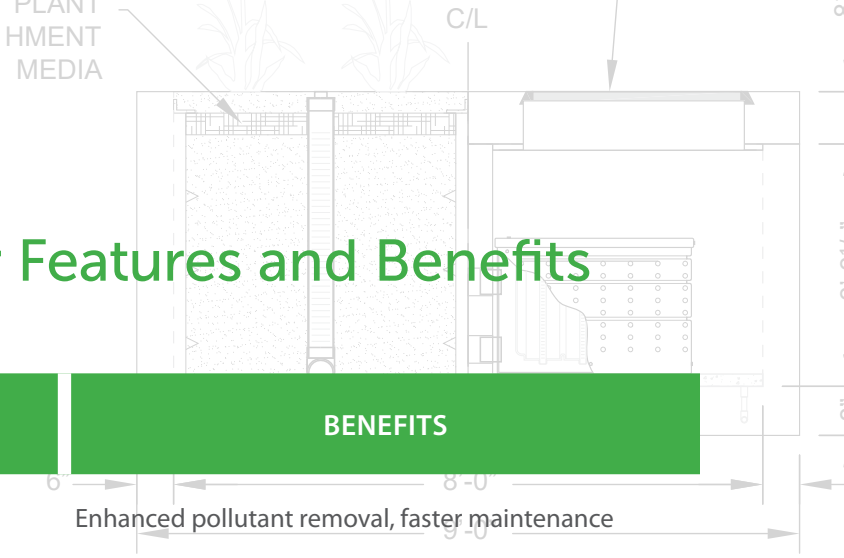
MODULAR WETLANDS®

# How the Modular Wetlands® Linear Works




1. **PRETREATMENT** | Stormwater enters the pretreatment chamber where total suspended solids settle, and trash and debris are contained within the chamber. Stormwater then travels through the pretreatment filter boxes that provide additional treatment.
2. **BIOFILTRATION** | As water enters the biofiltration chamber, it fills the void space in the chamber's perimeter. Horizontal forces push the water inward through the biofiltration media, where nutrients and metals are captured. The water then enters the drain pipe to be discharged.
3. **DISCHARGE** | The specially designed vertical drain pipe and orifice control plate control the flow of water through the media to a level lower than the media's capacity, ensuring media effectiveness. The water then enters the horizontal drain pipe to be discharged.
4. **BYPASS** | During peak flows, an internal weir in the side-by-side configuration allows high flows to bypass treatment, eliminating flooding and the need for a separate bypass structure. Bypass is not provided in the end-to end configuration.

## Using horizontal flow to improve performance




# Modular Wetlands® Linear Features and Benefits

| FEATURE | BENEFITS |
|---|---|
| Pretreatment chamber | Enhanced pollutant removal, faster maintenance |
| Horizontal flow biofiltration | Greater filter surface area |
| Performance verified by both the WA DOE and NJ DEP | Superior pollutant capture with confidence |
| Built-in high flow bypass | Eliminates flooding and the need for a separate bypass structure |
| Available in multiple configurations and sizes | Flexibility to meet site-specific needs |

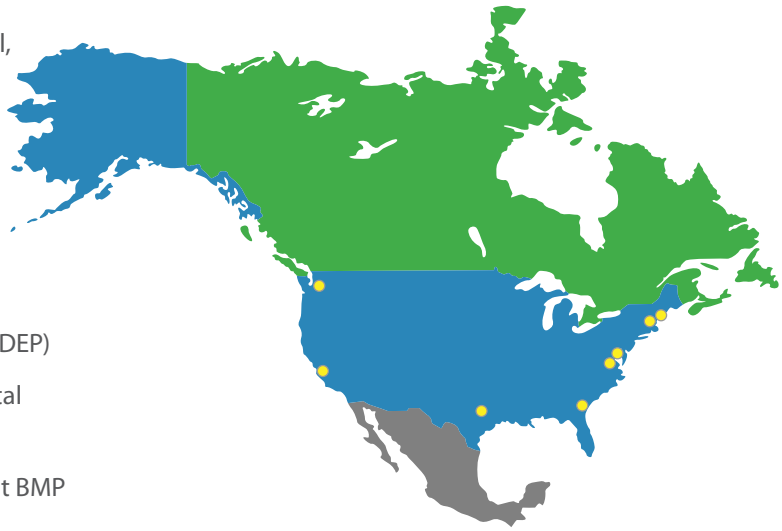


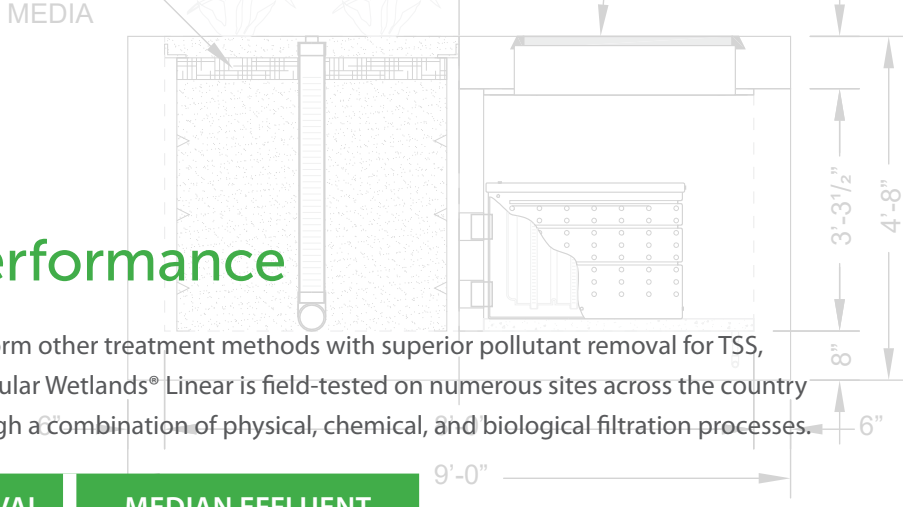
**The Modular Wetlands system offers many different configurations.**

# Select Modular Wetlands® Linear Approvals

Modular Wetlands Linear is approved through numerous local, state and federal programs, including but not limited to:

- Washington State Department of Ecology TAPE
- California Water Resources Control Board, Full Capture Certification
- Virginia Department of Environmental Quality (VA DEQ)
- New Jersey Department of Environmental Protection (NJDEP)
- Maryland Department of the Environment - Environmental Site Design (ESD)
- Rhode Island Department of Environmental Management BMP
- Texas Commission on Environmental Quality (TCEQ)
- Atlanta Regional Commission Certification






# Modular Wetlands® Performance

The Modular Wetlands® Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, and hydrocarbons. The Modular Wetlands® Linear is field-tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes.

| POLLUTANT OF CONCERN | MEDIAN REMOVAL EFFICIENCY | MEDIAN EFFLUENT CONCENTRATION (MG/L) |
|---|---|---|
| Total Suspended Solids (TSS) | 89% | 12 |
| Total Phosphorus - TAPE (TP) | 61% | 0.041 |
| Nitrogen (TN) | 23% | 1 |
| Total Copper (TCu) | 50% | 0.006 |
| Total Dissolved Copper | 37% | 0.006 |
| Total Zinc (TZn) | 66% | 0.019 |
| Dissolved Zinc | 60% | 0.0148 |
| Motor Oil | 79% | 0.8 |

*Sources:*
*TAPE Field Study - 2012*
*TAPE Field Study - 2013*

*Note: Some jurisdictions recognize higher removal rates. Contact your Contech Stormwater Consultant for performance expectations.*

# Modular Wetlands® Linear Maintenance

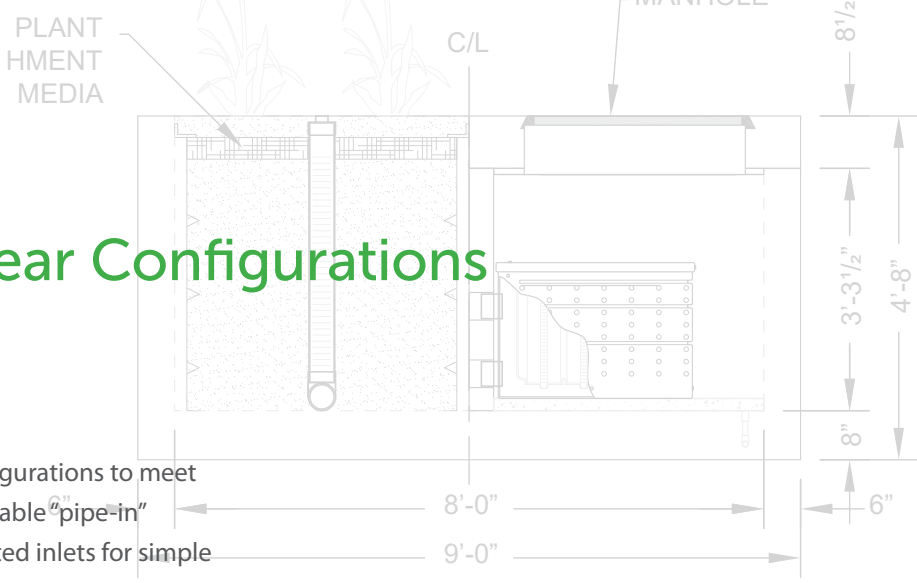
The Modular Wetlands® Linear is a self-contained treatment train. Maintenance requirements for the unit consist of five simple steps that can be completed using a vacuum truck. The system can also be cleaned by hand.

- Remove trash from the screening device
- Remove sediment from the separation chamber
- Periodically replace the pretreatment cartridge filter media
- Replace the drain down filter media
- Trim vegetation



*Most Modular Wetland Linear systems can be cleaned in about thirty minutes.*

## Multiple configurations allow for easy site integration




# Modular Wetlands® Linear Configurations

**Multiple system configurations integrate with site hydraulic design and layout ...**

The Modular Wetlands Linear is offered in multiple configurations to meet site specific needs. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



## Curb Inlet

The Curb Inlet configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions.



## Vault

The Vault configuration can be used in end-of-the-line installations. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements, or for traffic-rated designs (no plants).



## Downspout

The Downspout configuration is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

# A partner you can rely on



STORMWATER SOLUTIONS

PIPE SOLUTIONS

STRUCTURES SOLUTIONS

Few companies offer the wide range of high-quality stormwater resources you can find with us — state-of-the-art products, decades of expertise, and all the maintenance support you need to operate your system cost-effectively.

## THE CONTECH WAY

Contech® Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors, and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.

## TAKE THE NEXT STEP

For more information: www.ContechES.com

NOTHING IN THIS CATALOG SHOULD BE CONSTRUED AS A WARRANTY. APPLICATIONS SUGGESTED HEREIN ARE DESCRIBED ONLY TO HELP READERS MAKE THEIR OWN EVALUATIONS AND DECISIONS, AND ARE NEITHER GUARANTEES NOR WARRANTIES OF SUITABILITY FOR ANY APPLICATION. CONTECH MAKES NO WARRANTY WHATSOEVER, EXPRESS OR IMPLIED, RELATED TO THE APPLICATIONS, MATERIALS, COATINGS, OR PRODUCTS DISCUSSED HEREIN. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE ARE DISCLAIMED BY CONTECH. SEE CONTECH'S CONDITIONS OF SALE (AVAILABLE AT WWW.CONTECHES.COM/COS) FOR MORE INFORMATION.

CONTECH® ENGINEERED SOLUTIONS

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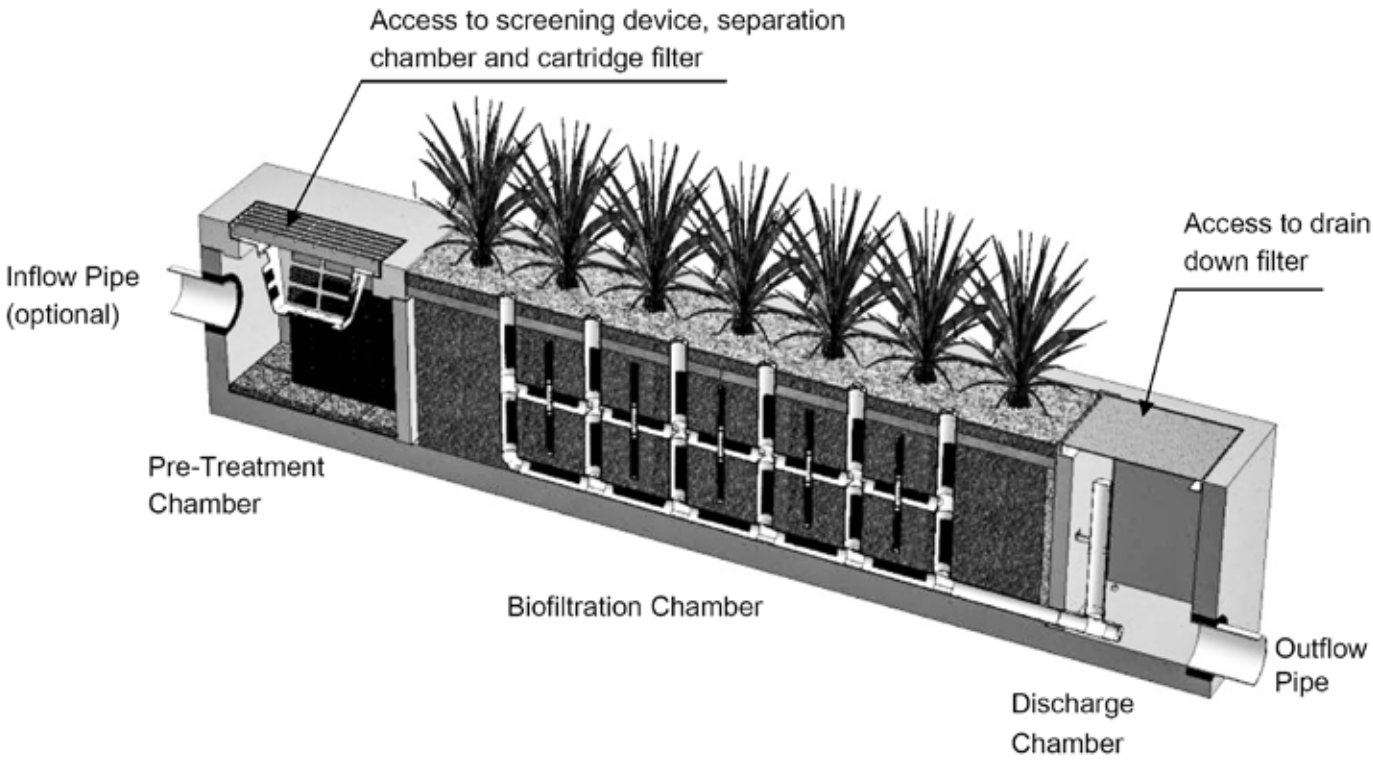
# Modular Wetlands® Linear
# Operation & Maintenance Manual



MODULAR WETLANDS®

## Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - *(5 minute average service time ).*
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - *(10 minute average service time ).*
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - *(10-15 minute per cartridge average service time ).*
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - *(5 minute average service time ).*
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - *(Service time varies).*




*System Diagram*

## Maintenance Procedures

### *Screening Device*

1. Remove grate or manhole cover to gain access to the screening device in the Pre- Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

### *Separation Chamber*

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer, spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

### *Cartridge Filters*

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

### *Drain Down Filter*

1. Remove hatch or manhole cover over discharge chamber and enter chamber. Entry into chambers may require confined space training based on state and local regulations.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

## Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/ inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.
2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.
3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.
4. Entry into chambers may require confined space training based on state and local regulations.
5. No fertilizer shall be used in the Biofiltration Chamber.
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

## Maintenance Procedure Illustration

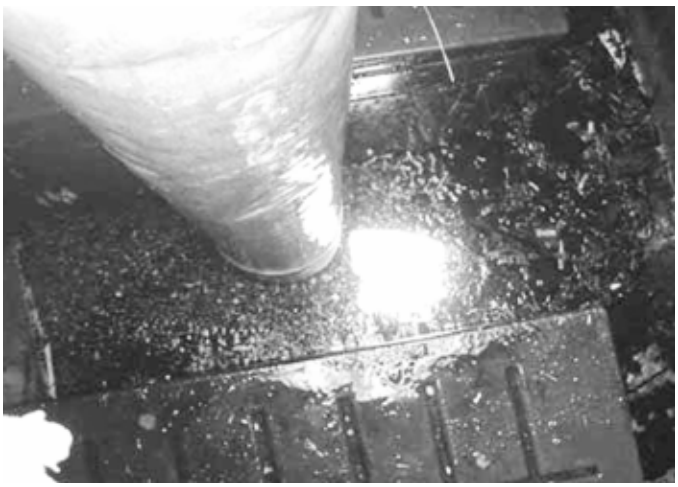
### *Screening Device*

*The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.*



### *Separation Chamber*

*The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.*



## *Cartridge Filters*

*The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.*



## *Drain Down Filter*

*The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.*



## *Trim Vegetation*

*Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.*



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# Inspection Report
# Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

| For Office Use Only |
|---|
| (Reviewed By) |
| (Date) |
| Office personnel to complete section to the left. |

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

## Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

| **Structural Integrity:** | **Yes** | **No** | **Comments** |
|---|---|---|---|
| Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure? | | | |
| Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure? | | | |
| Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)? | | | |
| Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly? | | | |
| **Working Condition:** | | | |
| Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit? | | | |
| Is there standing water in inappropriate areas after a dry period? | | | |
| Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system? | | | |
| Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes, specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber. | | | Depth: |
| Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber? | | | Chamber: |
| Any signs of improper functioning in the discharge chamber? Note issues in comments section. | | | |
| **Other Inspection Items:** | | | |
| Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)? | | | |
| Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below. | | | |
| Is there a septic or foul odor coming from inside the system? | | | |

| **Waste:** | **Yes** | **No** |
|---|---|---|
| Sediment / Silt / Clay | | |
| Trash / Bags / Bottles | | |
| Green Waste / Leaves / Foliage | | |

| **Recommended Maintenance** | |
|---|---|
| No Cleaning Needed | |
| Schedule Maintenance as Planned | |
| Needs Immediate Maintenance | |

| **Plant Information** | |
|---|---|
| Damage to Plants | |
| Plant Replacement | |
| Plant Trimming | |

Additional Notes: _____

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# Cleaning and Maintenance Report
# Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

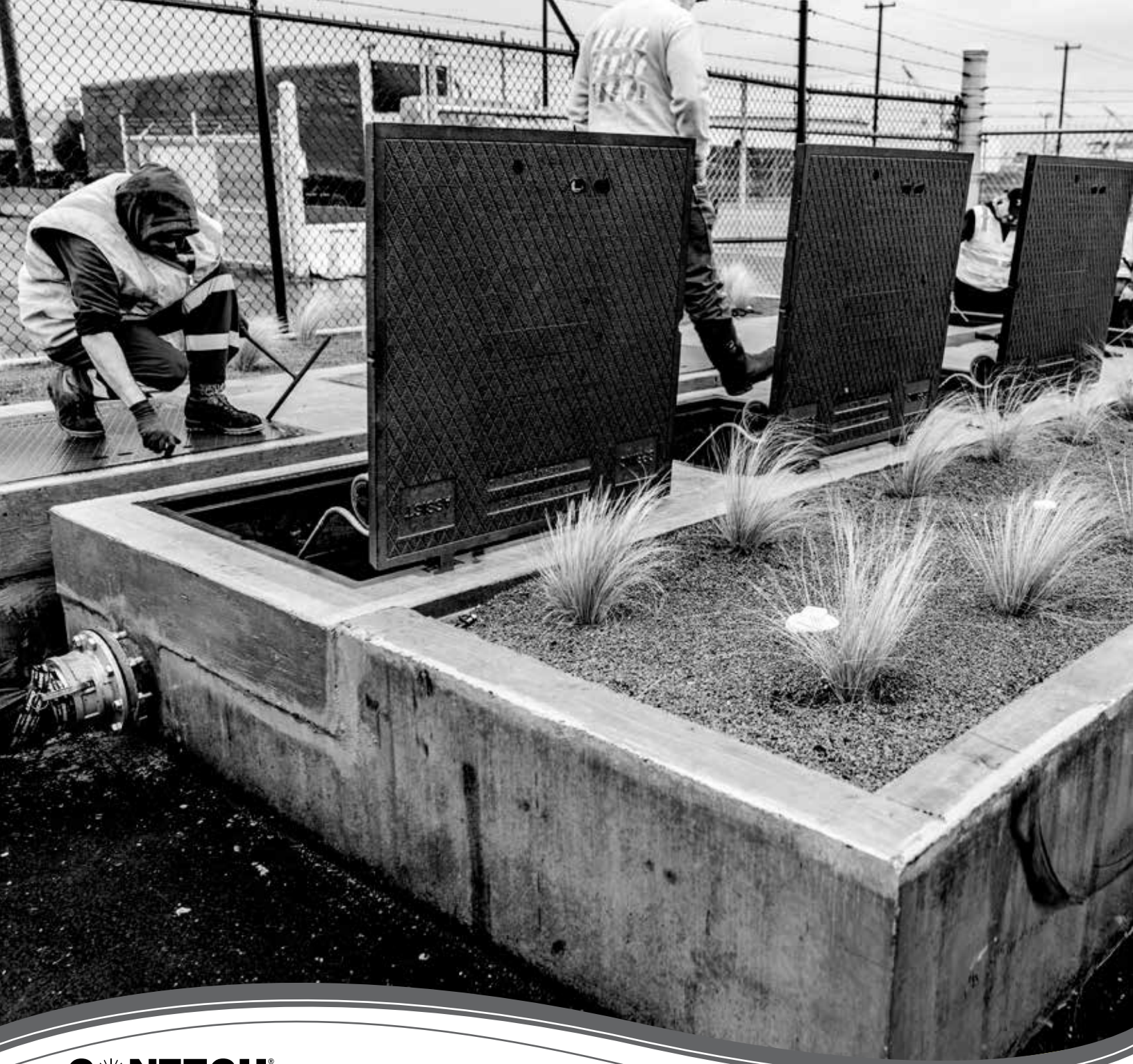
| For Office Use Only |
|---|
| (Reviewed By) |
| (Date) |
| Office personnel to complete section to the left. |

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

| Site Map # | GPS Coordinates of Insert | Manufacturer / Description / Sizing | Trash Accumulation | Foliage Accumulation | Sediment Accumulation | Total Debris Accumulation | Condition of Media 25/50/75/100 (will be changed @ 75%) | Operational Per Manufactures' Specifications (If not, why?) |
|---|---|---|---|---|---|---|---|---|
| | Lat:<br>Long: | MWS Catch Basins | | | | | | |
| | | MWS Sedimentation Basin | | | | | | |
| | | Media Filter Condition | | | | | | |
| | | Plant Condition | | | | | | |
| | | Drain Down Media Condition | | | | | | |
| | | Discharge Chamber Condition | | | | | | |
| | | Drain Down Pipe Condition | | | | | | |
| | | Inlet and Outlet Pipe Condition | | | | | | |

Comments:



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## SUPPORT

DRAWINGS AND SPECIFICATIONS ARE AVAILABLE AT WWW.CONTECHES.COM

Modular Wetlands Maintenance Guide 08/22

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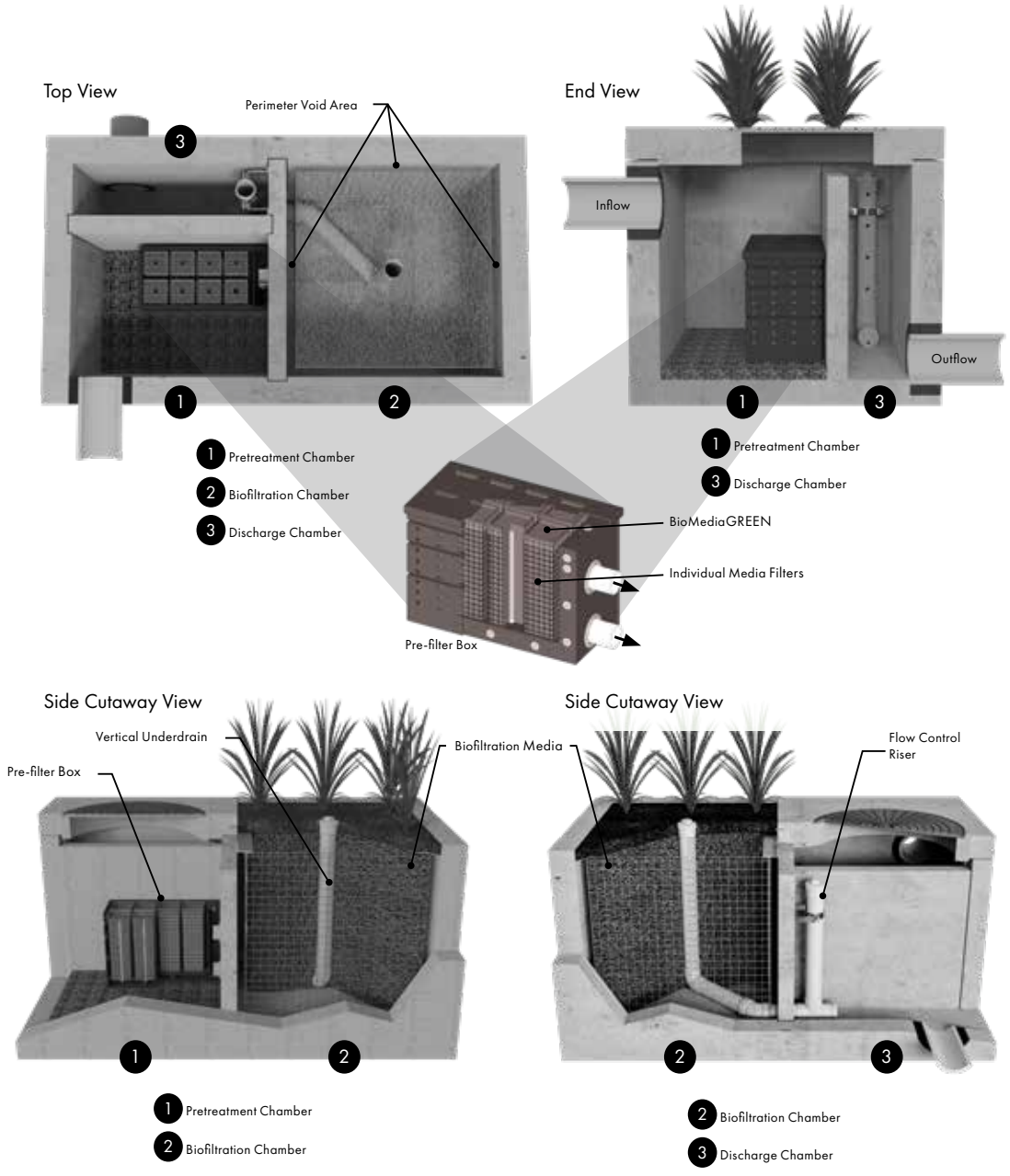
# Modular Wetlands® Linear Concrete Installation Manual




MODULAR WETLANDS®

## Overview

The Modular Wetland® Linear Biofilter is designed to remove high levels of trash, debris, sediments, nutrients, metals, and hydrocarbons. Its simple design allows for quick and easy installation. The system is housed in a standard pre-cast structure and can be installed at various depths to meet site-specific conditions.




## Introduction

This is the Modular Wetlands® Linear installation manual. Before starting, make sure there is enough room for installing and assembling the product. Inspect all materials for defects and gather the recommended tools listed on the following page. The contractor shall furnish all labor, equipment, materials, and incidentals required to conduct the installation in accordance with the contract documents.

## Instructions

### *Delivery & Unloading / Lifting*

- Contech shall deliver the unit(s) to the site in coordination with the Contractor.
- The Contractor may be required to provide spreader bars and chains/cables to safely and securely lift the base section, risers, and top section along with suitable lifting hooks, knuckles, shackles and eyebolts.
- Please see project specific drawings for weights and lifting details. Contact Contech for additional lifting details.

### *Inspection*

Inspection of the Modular Wetlands® Linear and all parts contained in or shipped outside of the unit shall be inspected at time of delivery by the site Engineer/Inspector and the Contractor. Any nonconformance to approved drawings or damage to any part of the system shall be documented on the Contech shipping ticket.

- Damage to the unit during and after unloading shall be corrected at the expense of the Contractor. Any necessary repairs to the Modular Wetlands® Linear unit shall be made to the acceptance of the Engineer/ Inspector.

### *Site Preparation*

- The Contractor is responsible for providing adequate and complete vault protection when the Modular Wetlands® Linear unit is installed prior to final site stabilization (full landscaping, grass cover, final paving, and street sweeping completed) to prevent construction debris or construction phase runoff from entering the unit.
- The Contractor shall adhere to all jurisdictional and/or OSHA safety rules in providing temporary shoring of the excavation.
- The Contractor or Owner is responsible for appropriately barricading the Modular Wetlands® Linear unit from traffic (in accordance with local codes).



- Each Modular Wetlands® Linear unit shall be constructed based on the locations and elevations according to the sizes shown on the approved drawings. Any modifications to the elevation or location shall be at the direction of and approved by the Engineer.
- The Modular Wetlands® Linear unit shall be placed on level compacted sub-grade with a minimum 6-inch gravel base. Compact undisturbed sub-grade materials to be per Geotechnical/Soils report. Unsuitable material below sub-grade shall be replaced to site engineer's approval. Place granular sub-base and compact to State and local standards as per the Engineers requirements.
- Once the base piece is set, the riser(s) and top section should be sealed onto the base section before backfilling, using a non-shrink grout, butyl rubber or similar waterproof seal.
- Pipe connections shall be aligned and sealed to meet the approved drawings with modifications necessary to meet site conditions and local regulations. The correct connection (inlet/outlet) will be marked on the Modular Wetlands® Linear unit.

- NOTE: The inlet and outlet pipe cannot protrude past the structures I.D. wall as it will interfere with the internal components.
- Once the Modular Wetlands® Linear unit is set, it should be protected from construction runoff entering it. Contractor will be responsible for cleaning if unit is contaminated by such construction runoff and associated pollutants and damaged (i.e. concrete wash water).
- Backfilling should be performed in a careful manner, bringing the appropriate fill material up in 6-inch lifts on all sides. Pre-cast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of the Modular Wetlands® Linear unit shall conform to ASTM specification C891 "Standard Practice for Installation of Underground Precast Utility Structures" unless specified otherwise in contract documents.
- If applicable, it is the responsibility of the Contractor to provide curb and gutter and transition to the Modular Wetlands® Linear unit for proper stormwater flow into the system through the throat, pipe or grate opening. A standard drawing of the throat and gutter detail is available in the following section; however the plans and contract documents supersede all standard drawings. Several variations of the standard design are available. Effective bypass for an offline Modular Wetlands® Linear unit is essential for correct operation (i.e. bypass to an overflow at lower elevation).

## *Installation*

1. Each Modular Wetlands® Linear unit shall be constructed based on the locations and elevations according to the sizes shown on the approved drawings. Any modifications to the elevation or location shall be at the direction of and approved by the Engineer.




*Position crane in a safe and optimal position for unloading. Ensure that the crane operator has the proper weights and distance to install location to allow for proper setup. The crane operator will provide instructions to the delivery driver on where to position the truck for offload.*

2. The Modular Wetlands® Linear unit shall be placed on level compacted sub-grade with a minimum 6-inch gravel base and mark the base. Compact undisturbed subgrade materials to be per Geotechnical/Soils report. Unsuitable material below sub-grade shall be replaced to site engineer's approval. Place granular sub-base and compact to State and local standards as per the Engineer's requirements.

3. Pipe material selection should be indicated on the Site Plan. Connect the pipe using a Kor-N-Seal, Press Seal, Fernco, or other approved watertight boot connection. In the case of concrete pipes, grout the connection watertight with non-shrink grout.




*The contractor is responsible to provide the appropriate rigging and lifting connectors. Spreader bars are recommended to prevent damage to the concrete vault. All lifting points on the concrete vault must be used for safe offloading. Guide ropes can be used to stabilize the vault during offloading.*

4. Lift the vault off of the delivery truck and safely move vault over the excavated area for installation. Before setting the vault ensure the hole is the right size, level, and properly sized.



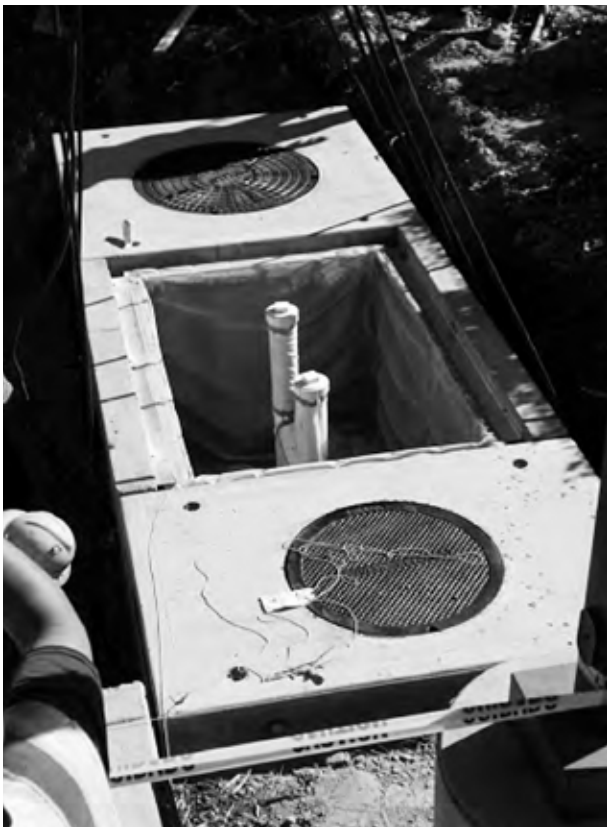
5. Position the concrete vault over the excavated area and slowly lower into position. Ensure the inlet and outlet sides of the vault are in the correct position and the correct elevations are verified.



6. Once the vault is set in place, check all four corners are in the correct position. Take tension off of the rigging to ensure the vault is set properly and the compacted rock backfill below is holding the weight of the vault.



7. Use a string and or level to make sure the vault is level in both directions. The vault cannot be more than 0.5% slope off from level in any direction. If the vault slopes more than 0.5%, pick back up, move to a safe area, re-level the rock below and reset until properly level.



8. After pipe connections are completed, backfill in 12 inch increments and compact per local and state requirements. If curb type configurations, pour and connect curb and gutter system as shown in the picture to the right.

   The last step is to install the wetland media that can be delivered in super sacks or in bulk based on preference. Install the plant propagation blocks as shown in the drawings below. Install the vegetation and cover with decorative rock and mulch.



### *Pipe Connections*

- Pipe material selection should be indicated on the Site Plan. Connect the pipe using a Kor-N-Seal, Press Seal, Fernco, or other approved watertight boot connection. In the case of concrete pipes, grout the connection watertight with non-shrink grout
- Inlet pipe(s) shall be stubbed in and connected to the precast manhole according to the Engineer's requirement or specifications. The Contractor is to grout all inlet pipes flush with the interior wall of the structure per plans and specifications.
- Outlet pipe shall be stubbed in and connected to the precast manhole according to the Engineer's requirement or specifications. The Contractor is to grout all inlet pipes flush with the interior wall of the structure per plans and specifications.
- For illustration a BAD example of a pipe installation is included below. The pipe is off-center, the pipe invert is not in the appropriate position, it is protruding beyond the inside wall, the grout is not clean and properly finished. This site was corrected by re-excavating and reconnecting the pipe properly.

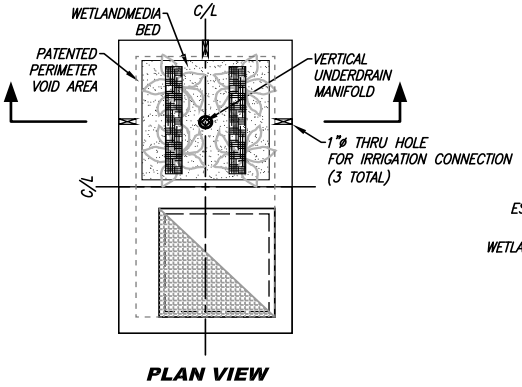


*Example of a BAD pipe installation. Protruding past the internal wall of the structure, poor grouting, and wrong position.*

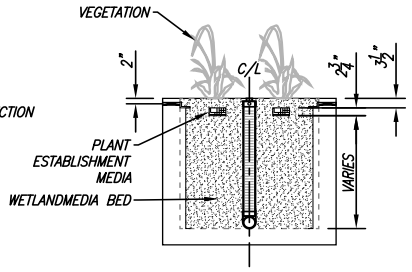


*Example of a GOOD pipe installation. Pipe flush with the internal wall of the structure, clean grouting, and proper position.*

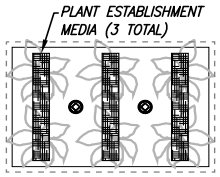
- Once the pipes are connected, carefully backfill around them, compacting in "lifts" that will not deflect, disturb or damage them.



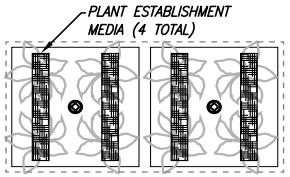

**PLAN VIEW**



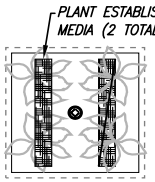

**SECTION VIEW**



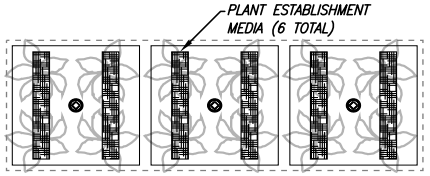

**MWS-L-6-8**



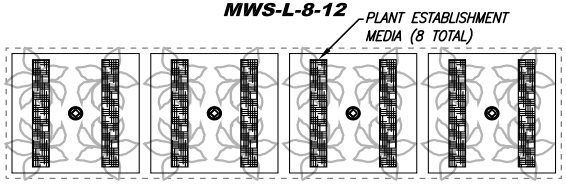

**MWS-L-8-8**



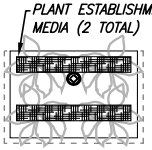

**MWS-L-4-8**



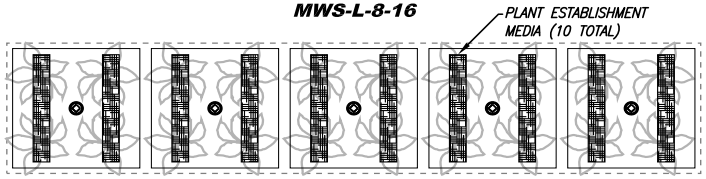

**MWS-L-8-12**



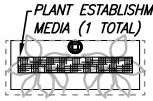

**MWS-L-8-16**



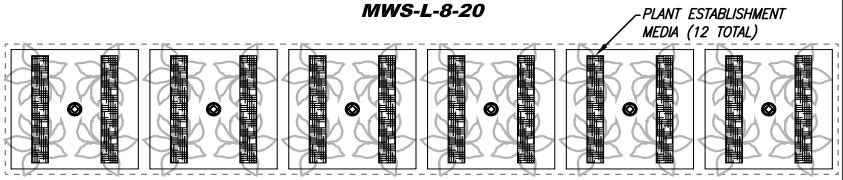

**MWS-L-4-6**




**MWS-L-8-20**




**MWS-L-4-4**




**MWS-L-8-24**

## VEGETATION AND IRRIGATION NOTES:

1. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
2. BEFORE SELECTING VEGETATION SEE BIO CLEAN PLANT HARDY ZONE RECOMMENDATIONS.
3. IRRIGATION THRU HOLE IS 1"ø AND IS DESIGNED TO BE CONNECTED TO A ½"ø IRRIGATION LINE. IRRIGATION THRU HOLE IS LOCATED ON CENTER OF WETLAND CHAMBER 2" DOWN FROM THE TOP OF THE SYSTEM.
4. IRRIGATION SYSTEM FOR MODULAR WETLAND SYSTEM CAN BE PLACED ON SAME VALVE AS SURROUNDING PLANTING AREAS AND REQUIRES NO SPECIAL WATERING NEEDS.

## INSTALLATION NOTES

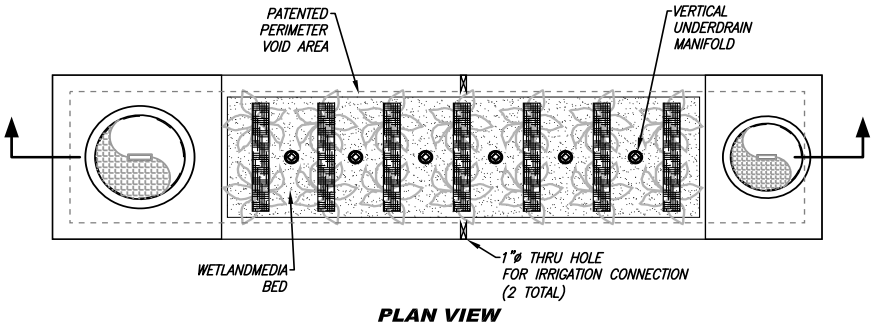
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

MODULAR WETLANDS
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,252; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

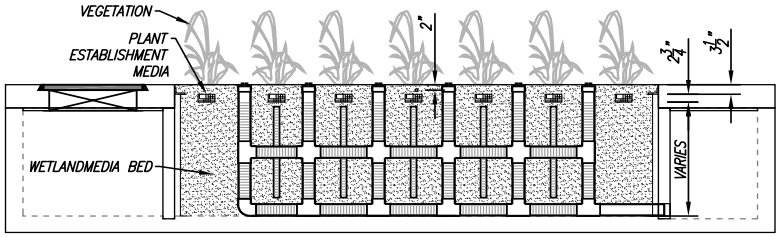
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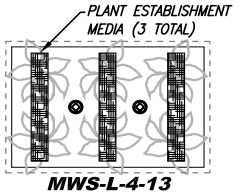
STORMWATER BIOFILTRATION SYSTEM
PLANTER INSTALLATION



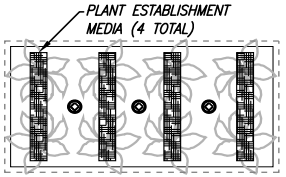

**PLAN VIEW**



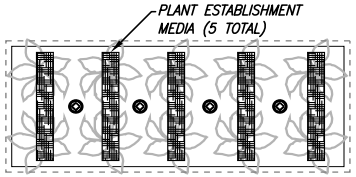

**SECTION VIEW**



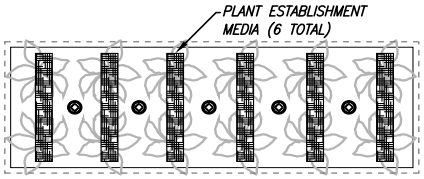

**MWS-L-4-13**



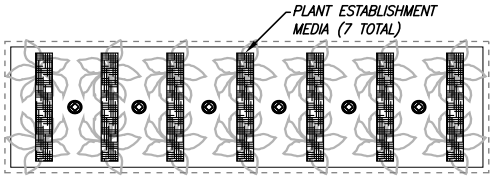

**MWS-L-4-15**




**MWS-L-4-17**




**MWS-L-4-19**




**MWS-L-4-21**

## VEGETATION AND IRRIGATION NOTES:

1. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
2. BEFORE SELECTING VEGETATION SEE BIO CLEAN PLANT HARDY ZONE RECOMMENDATIONS.
3. IRRIGATION THRU HOLE IS 1"ø AND IS DESIGNED TO BE CONNECTED TO A ½"ø IRRIGATION LINE. IRRIGATION THRU HOLE IS LOCATED ON CENTER OF WETLAND CHAMBER 2" DOWN FROM THE TOP OF THE SYSTEM.
4. IRRIGATION SYSTEM FOR MODULAR WETLAND SYSTEM CAN BE PLACED ON SAME VALVE AS SURROUNDING PLANTING AREAS AND REQUIRES NO SPECIAL WATERING NEEDS.

## INSTALLATION NOTES

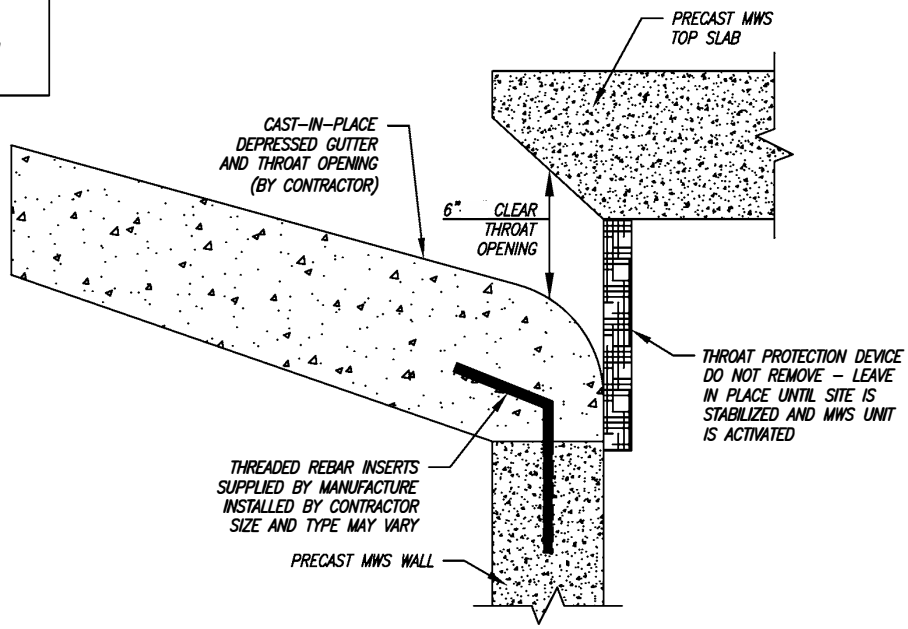
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

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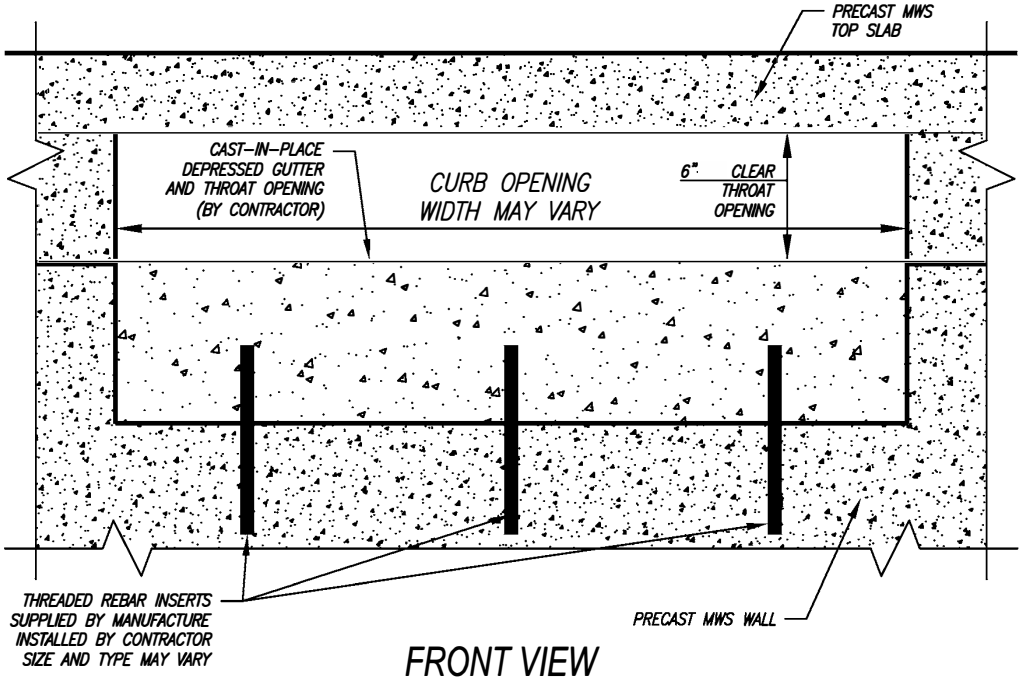
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STORMWATER BIOFILTRATION SYSTEM
PLANTER INSTALLATION




## SECTION VIEW
## STANDARD MODULAR WETLAND CURB OPENING




## FRONT VIEW
## STANDARD MODULAR WETLAND CURB OPENING

MODULAR WETLAND SYSTEMS INC.
P.O. BOX 869
OCEANSIDE, CA 92049
www.ModularWetlands.com

| | NAME | DATE |
|---|---|---|
| DRWN | John | 5/3/13 |
| EDITED | | |

TITLE: MWS LINEAR 2.0 CURB INLET DETAILS

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COMMENTS:

SIZE | DWG. NO. | REV

SCALE NTS UNITS INCHES SHEET 1 OF 1



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Modular Wetland Linear Install Guide 08/22

RIVERSIDE COUNTY
WATERSHED PROTECTION



# Riverside's Solution
## to Runoff Pollution

### What is Runoff?

When water from rain and outdoor water use runs off roofs, driveways, and sidewalks, it brings everything it touches with it. This runoff can include trash, fertilizer, pet waste, home solvents, and other pollutants which ends up in Riverside County's waterways.

### Water that goes into Riverside County's storm drains is NOT TREATED

Whether residents or businesses intentionally or accidentally let runoff flow into storm drains, it can harm our creeks, rivers, lakes, and eventually the ocean. While wastewater from toilets, sinks, and showers gets treated, water that flows into the storm drain goes untreated into our waterways.

## What Common Pollutants are Found in Runoff?

Here are some common pollutants and actions you can take to prevent them from flowing into Riverside County's storm drains and waterways.

# Pollutants and Prevention

## Pet Waste

Pet waste has harmful bacteria that can contaminate Riverside County's bodies of water and neighboring ecosystems. This can lead to residents getting sick, algal blooms, and plants and animals dying. Always pick up after your pet on walks and in your yard, especially before it rains.

## Trash

Litter like cigarette butts, candy and food wrappers/containers, and straws can harm our waterways and cause drainage issues. Make sure to place all trash in covered trash cans to prevent wind or rain from taking it into the storm drain system.

## Automotive Chemicals

Liquids like motor oil, fuels, lubricants, and antifreeze can damage water quality and harm wildlife if they get into our creeks, rivers, and lakes. Make sure to repair leaking vehicles as soon as possible and clean spills with absorbents available at home and auto supply shops. Used engine oil can be recycled at the Murrieta, Beaumont, or Moreno Valley ABOP and PaintCare Facilities or where the oil was purchased.

## Yard Clippings

If yard clippings aren't properly disposed of, they can cause erosion, flooding, and prevent stormwater drainage. Collect all clippings after doing yard work and properly dispose of them by composting or placing them in a green waste bin.

## Fertilizers and Pesticides

These can enter the storm drain after it rains or when landscaped areas are over irrigated. Limit your pesticide, fertilizer, and herbicide use by using non-chemical methods whenever possible. If they are necessary, follow the manufacturer's instructions and do not apply them 48 hours before predicted rain.

## Soapy Car Wash Water

Dirt and debris from your car, along with chemicals in the soap, can harm our creeks, rivers, and lakes if they flow untreated into our waterways. Wash your car over a gravel or grassy area, or take it to a commercial car wash to limit runoff pollution.

## Household Chemicals

Paint and other household chemicals like solvents, degreasers, and drain cleaners are hazardous to aquatic life and human health if they get into the storm drain system. Make sure to follow the manufacturer's instructions, clean spills with absorbents, and dispose of unused paints and household chemicals at the Murrieta, Beaumont, or Moreno Valley ABOP and PaintCare Facilities (rcwaste.org/hhw).

For more information about keeping our waterways clean, visit: **rcwatershed.org/about/stormwater-pollution-prevention**.

## Who We Are

Riverside County Watershed Protection is a partnership program between Riverside County, the Flood Control & Water Conservation District, Coachella Valley Water District, and 27 cities that manage watershed programs which protect, preserve, and enhance the quality of the water and the natural environment of our watersheds.

## What We Do

The partnership uses a combination of public education, best management practices, evaluation, and water quality monitoring to eliminate stormwater pollution in our waterways and comply with all federal, state, and local regulations. Our aim is to empower residents with information about pollution prevention and implement tactics that keep our watersheds healthy.

## Contact Us:

**To report pollution:**

Call **(800) 506-2555**

Visit **rcwatershed.org/get-involved/report-pollution**

For emergencies, dial **911**

RIVERSIDE COUNTY
WATERSHED PROTECTION

RIVERSIDE COUNTY
WATERSHED PROTECTION

# Automotive Maintenance & Water Pollution:

## What You Need to Know





### Be the Solution.
### Prevent Runoff Pollution.

**The water that flows into storm drains is not treated** before flowing into Riverside County's creeks, rivers, lakes, and eventually the ocean (unlike the sanitary sewer system). It should never contain washwater or pollutants like oil, gas, antifreeze, lubricants, and other hazardous substances generated by vehicles on the road, at body shops, or gas stations. If these pollutants are not properly contained and cleaned up right away, they can runoff into the storm drain and harm our waterways.

Preventing runoff pollution while serving your customers protects aquatic life, water quality, and keeps our waterways thriving. While conducting business activities, make sure to contain your work area, utilize control mechanisms like using as little water as possible, and properly dispose of all debris and wastewater.

## Automotive Maintenance Pollutant Sources

### Leaking Vehicles

Leaking vehicles can generate pollutants like gasoline, oil, antifreeze, and other substances.

### Body Repair & Painting

Repairing vehicles can generate pollutants like paint, oil, grease, washwater, metal, and other substances.

### Vehicle and Equipment Cleaning

Cleaning can generate pollutants like dust, dirt, oil, grease, paint, copper, and other substances.

### Gas Stations

Fueling areas can generate pollutants like gasoline, antifreeze, washwater, and other substances.

# Best Management Practices for Automotive Maintenance

Protect our waterways while keeping your shop in compliance with the law by implementing these BMPs (best management practices):

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## Contact Us

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Visit **rcwatershed.org/get-involved/report-pollution**

For emergencies, dial **911**

## Plan Ahead

- Inspect equipment every day and repair leaks right away.
- Identify all actions that can cause spills or release pollutants like changing oil, painting, replenishing air conditioning coolant, and more.
- Have a spill kit handy.

## Locate

- Locate and protect all storm drains nearby.
- Only do wet sanding and painting in enclosed areas which have vacuum hoods and filters.
- Clean and drain parts in a self-contained parts washer, unit, or solvent sink.

## Contain

- Drain vehicle fluids into closed containers for proper disposal.
- Place a drip pan under vehicles.
- Report any spills that have entered the street, gutter, or storm drain by calling 800-506-2555 or going to rcwatershed.org/get-involved/report-pollution.

## Collect

- Use absorbents like rags to clean up any spills right away. If your spill contains hazardous waste, make sure to properly dispose of the absorbent at a Riverside County household hazardous waste facility.
- Store car parts, batteries, oils, and other materials and waste off the ground, under overhead cover, and in labeled containers.
- Clean work areas using dry methods (use a vacuum or broom to sweep up debris).

## Properly Dispose

- Dispose of hazardous waste (motor oil, oil filters, oil-soaked absorbents or rags, antifreeze, and non-leaking batteries) at the Murrieta, Beaumont, or Moreno Valley ABOP and PaintCare Facilities. Visit rcwaste.org/hhw for more information.
- Recycle materials whenever possible.

For more information about stormwater-safe car maintenance, visit: **rcwatershed.org/residents/at-home/car-maintenance.**

RIVERSIDE COUNTY
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For more information about being a stormwater-safe dog owner, visit: rcwatershed.org/residents/at-home/dog-owners.

# Doo Good:

## DOG OWNERS AND WATER POLLUTION PREVENTION




## Why is it important to pick up dog doo?

Everything that flows into the storm drain goes **untreated** into Riverside County's waterways. If water touches dog waste on its way to the storm drain, fecal coliform bacteria can get into our streams, creeks, rivers, and the ocean and cause damage.

## Why is dog doo bad for our waterways?

Aside from polluting our waterways with bacteria, nutrients in dog doo like nitrogen and phosphorus cause algae to grow rapidly in waterbodies. This process, called eutrophication, reduces the available oxygen for aquatic life and can lead to significant animal death. It can also lead to waterway closures, harm drinking water quality, and spread diseases.

A single gram of dog doo can contain 23 million fecal coliform bacteria, and bacteria from dog doo accounts for up to 20% of the bacteria in urban waterways.

## Who is Riverside County Watershed Protection?

Riverside County Watershed Protection is a partnership program between Riverside County, the Flood Control & Water Conservation District, Coachella Valley Water District, and 27 cities that manage watershed programs. Through public education, best management practices, evaluation and water quality monitoring, this partnership aims to empower residents and businesses with pollution prevention information and keep our watersheds healthy. We strive to protect, preserve, and enhance the water quality and the natural environment of our watersheds.

## WHAT IS CONSIDERED HOUSEHOLD HAZARDOUS WASTE?

- **Gardening products:** pesticides, herbicides, poisons, fertilizers, and garden chemicals
- **Outdoor Products:** BBQ propane tanks, kerosene lamp oil, lighter fluid, and pool chemicals
- **Paint products:** paint, stain, varnish, adhesive, paint thinner, resin, epoxy, caulking, and wood preservatives
- **Household Products:** batteries, cooking oil, fluorescent tubes & bulbs, light ballasts, smoke detectors, and mercury thermostats

***All of these products must be properly disposed of at a Household Hazardous Waste Facility OR Antifreeze, Batteries, Oil & Paint Collection Facility.***



### TIPS FOR HANDLING AND STORING HOUSEHOLD HAZARDOUS WASTE PRODUCTS:

- **NEVER** mix any products together. Mixing products can be very dangerous.
- Keep products in their original containers with labels on.
- Follow storage directions that are provided on the product's label.



### PERMANENT HOUSEHOLD HAZARDOUS WASTE COLLECTION FACILITIES:

**Agua Mansa**
1780 Agua Mansa Road
Jurupa Valley
Open: Non-Holiday weekend Saturdays only
9:00 AM to 2:00 PM

**Lake Elsinore**
512 N. Langstaff Street
Lake Elsinore
Open: October-May:
9:00 AM to 2:00 PM
June-September:
7:00 AM to 12:00 PM

**Palm Springs**
1100 Vella Road
Palm Springs
Open: Non-Holiday weekend Saturdays only
October-May
9:00 AM to 2:00 PM
June-September
7:00 AM to 12:00 PM

### ANTIFREEZE, BATTERIES, OIL& PAINT COLLECTION FACILITIES:

**Beaumont - Hemet Area**
Lamb Canyon Landfill
16411 Lamb Canyon Road
Beaumont
Open: Monday through Saturday 6:00 AM to 4:30 PM

**Moreno Valley Area**
Badlands Landfill
31125 Ironwood Ave
Moreno Valley
Open: Monday through Saturday 6:00 AM to 4:30 PM

**Murrieta - Temecula Area**
County Road Yard
25315 Jefferson Avenue
Murrieta
Open: Non-Holiday weekend Saturdays only
9:00 AM to 2:00 PM

RIVERSIDE COUNTY
WATERSHED PROTECTION

# TIPS FOR EMPLOYEES ABOUT COMMON HOUSEHOLD HAZARDOUS ITEMS

Help your customers make eco-friendly decisions by offering these helpful tips!

**rcwatershed.org**





## GARDENING PRODUCTS

*Gardening products that contain harmful chemicals can pose a threat to our waterways when washed down the storm drain.*

**Tips for Usage:**

- To prevent water contamination, these products shouldn't be used before rainfall or before irrigation.
- When applying pesticides to plants, only spray the spots where the pest is most prevalent.







## OVERIRRIGATION

*Overirrigation is one of the ways we create runoff at home which can carry pollutants into our waterways.*

**Tips for Usage:**

- Water less frequently
- Fix leaking sprinklers
- Check that your sprinkler heads are not pointing towards the street or sidewalk
- Install smart sprinklers, which have water-saving features like scheduled irrigation and weather awareness

## BATTERY PRODUCTS

*Batteries must be safely disposed of at Antifreeze, Batteries Oil & Paint Collection Facilities OR Household Hazardous Waste Facilities.*

**Did you know?**

When batteries end up in the landfill, the metals and chemicals can leak into the ground and into our waterways. This applies to ALL batteries, including alkaline, rechargeable, and automotive.

## PAINT PRODUCTS



*Paint is formulated with many chemicals that require proper disposal at an Antifreeze, Batteries Oil & Paint Collection Facility OR a Household Hazardous Waste Facility.*

**Tips for Usage:**

- Paint products should **NEVER** be poured down the drain.
- Brushes used with water-based paint can be washed in the sink with water.
- Brushes used with oil-based paint should be cleaned using paint thinner. Paint thinner should be stored for reuse or disposed of at a Household Hazardous Waste Facility.
- Empty paint cans should be left to dry before disposal into the trash can.



RIVERSIDE COUNTY
WATERSHED PROTECTION

# Irrigation Runoff Stormwater Fact Sheet



## Report Irrigation Runoff or Stormwater Pollution

**800.506.2555**

### Be the Solution.
### Prevent Runoff Pollution.

**The water that flows into storm drains is not treated** before flowing into Riverside County's creeks, rivers, lakes, and eventually the ocean (unlike the sanitary sewer system). It should never contain washwater or pollutants like pesticides, fertilizer, dirt, leaves, and other hazardous substances generated by irrigation runoff. If these pollutants are not properly contained, they can runoff into the storm drain and harm our waterways.

Preventing runoff pollution while maintaining your property protects aquatic life, water quality, and keeps our waterways thriving. To take care of your green spaces, make sure to only use pesticides and fertilizers when absolutely necessary and never before rain, prevent overwatering, and sweep debris regularly.

## Irrigation Pollutant Sources

### Overwatering

Overwatering can cause dirt, pesticides, fertilizers, pet waste, and organic waste to flow into the storm drain.

### Pesticide, Fertilizer, or Herbicide Use

Pesticide, fertilizer, or herbicide use 48 hours before or during rain can lead to these chemicals going untreated into our waterways.

### Improper Maintenance Before Rain

Leaving pet waste, leaves, grass clippings, and chemicals on the ground (from property neglect or landscape maintenance) before or during rain can cause them to flow into the storm drain.

### Runoff From Commercial Properties

Commercial properties, like golf courses, can cause pesticides, dirt, oil, and other hazardous waste to runoff.

# Best Management Practices for Irrigation

Protect our waterways while maintaining your green spaces by implementing these BMPs (best management practices):

For more information about stormwater-safe irrigation practices, visit: **rcwatershed.org/residents/at-home/overwatering/**.

## Who We Are

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## What We Do

The partnership uses a combination of public education, best management practices, evaluation, and water quality monitoring to eliminate stormwater pollution in our waterways and comply with all federal, state, and local regulations. Our aim is to empower residents with information about pollution prevention and implement tactics that keep our watersheds healthy.

## Contact Us

**To report pollution:**

Call **(800) 506-2555**

Visit **rcwatershed.org/get-involved/report-pollution**

For emergencies, dial **911**

## Prevent Overwatering

- Only give your lawn and garden the amount of water it needs, and use drip irrigation, soaker hoses, or micro-spray systems. Do not water when it is raining and use an irrigation timer to pre-set watering times.
- Conduct a Sprinkler Spruce Up regularly to ensure overwatering and runoff aren't occurring. If you notice a leak in your irrigation system, repair it immediately.
- Redirect your downspout to a rain garden, dry creek bed, rain barrel, or underwatered part of your lawn.

## Plant Riverside County-Native Vegetation

- Plant native vegetation like foothill penstemon and red bush monkeyflower to reduce the amount of water, fertilizers, and pesticides needed.
- Plant fast-growing and dense ground covering plants like California fuscia and Angelita daisy to prevent erosion. For landscaping ideas visit: www.bewaterwise.com.

## Utilize Business Best Practices

- Wash golf carts and lawn mowers over permeable surfaces.
- Cover storm drains when conducting washing and maintenance activities to prevent washwater from flowing into the storm drain.
- If your golf course handles reportable quantities of hazardous waste, you are required to submit a Hazardous Materials Business Plan through the California Environmental Reporting System. Visit rcwaste.org/business/hw for more info.
- Keep stockpiles at least 50 feet from concentrated flows of stormwater, drainage courses, and inlets.
- Regularly inspect and maintain oil storage tanks, drums, and areas to keep them in good condition.
- Utilize a commercial water broom to wash hard surfaces like tennis courts, patios, parking areas, and sidewalks, and make sure washwater never enters the storm drain system.

# water efficient
## L A N D S C A P E S

In California, the largest use of all urban water is watering landscapes. When a landscape or irrigation system is poorly designed or poorly maintained, or the landscape consists of plants not suited to the dry and often hot California climate, water demand increases as a result of excessive evaporation, leaks, and runoff. Water consumption can be greatly reduced with careful planning, good plant selection, efficient irrigation systems, and good water management and maintenance practices.

Since California experiences frequent and sometimes prolonged droughts together with an ever increasing demand, there is a great need for us to use water efficiently. But this doesn't mean we have to give up our gardens. We can use water more efficiently and still have colorful, esthetically pleasing landscapes—including some turf areas for recreation.



This brochure is intended to help you create a landscape that is not only water efficient, but attractive, colorful, and low maintenance. The designs illustrated here are typical back yards, but the principles of water efficient gardening apply to front yards as well.

# Planning ahead

Planning is the key to a successful water wise landscape. It is very tempting to go to a garden center and buy plants because they catch your eye, but not knowing where to place them and how much water they need are the beginnings of an unnecessarily high water using landscape. By planning ahead, costly mistakes can be avoided.

Contact your local water provider to see if they offer any services such as water audits or landscape planning. Some agencies offer landscaping classes and provide water conservation devices. Some also have demonstration gardens where you can witness water efficient gardens in person, see how attractive they can be, and get ideas for your own site.

To get started, measure the landscape and draw the area and any existing landscape features to scale. This will give you an idea of the numbers of plants you will need, the size of the lawn and how much irrigation pipe, sprinkler heads, and mulch you will need to buy.

Consider the size, sun exposure, and slope of the area to be landscaped. Avoid lawns on slopes that are difficult to mow and water. If possible, reduce slopes in the landscape that encourage runoff and waste water.

Think about who will use the landscape and how they will use it. These factors determine the type of plants required and how it will be maintained. Don't forget the need for shade and privacy screening.

When drawing the actual planting plan, avoid the temptation to place too many plants for the area. A crowded garden will use more water, cost more, be prone to diseases, and require more maintenance.

Consult books such as *Sunset Western Landscaping Book* about garden design. Many books available are very good for useful advice and ideas. Some are written with the dry west in mind and focus on landscaping with the proper types of plants for warm, dry climates.

If this phase of the project is too difficult, hire a licensed landscape architect or designer. A landscape architect might be able to design the irrigation system for you or you can consult with an irrigation design specialist. Be sure to keep a copy of the landscape plans for future reference.

# How much grass do you need?

Lawns use more water than any other part of a landscape and they cover large amounts of acreage statewide. Oftentimes lawns are installed because an alternative was never considered. There are alternatives to lawns, so in the planning stage decide if lawn is really a requirement in your yard. Think of who will use it and how often, who will mow it, fertilize it, remove the thatch, etc.

Perhaps a lawn is not needed at all. If a grass area is really just space filler, consider alternatives such as hardscapes, rock gardens or an unthirsty groundcover. This is especially important on areas with slopes that tend to shed water faster than it can soak in. Water draining into street gutters and storm drains often discharges directly into streams and this runoff from landscapes frequently contains fertilizers, pesticides, and other pollutants.

If you choose to plant a turf area after considering these factors, minimize the size of the lawn and choose a grass type that doesn't require lots of water and fertilizer.

Warm season grasses such as Hybrid Bermuda Grass and St. Augustine Grass use much less water than cool-season grass such as Kentucky Bluegrass. Certain Dwarf Tall Fescues use somewhat less water than Bluegrass.

Warm season grasses typically have a short winter dormant period, but winter dormancy occurs when many people are not actively using their gardens and even dormant, warm season grass provides a usable surface for people and pets. If the look of dormant grass is objectionable, it can be overseeded with another type of grass for the winter.

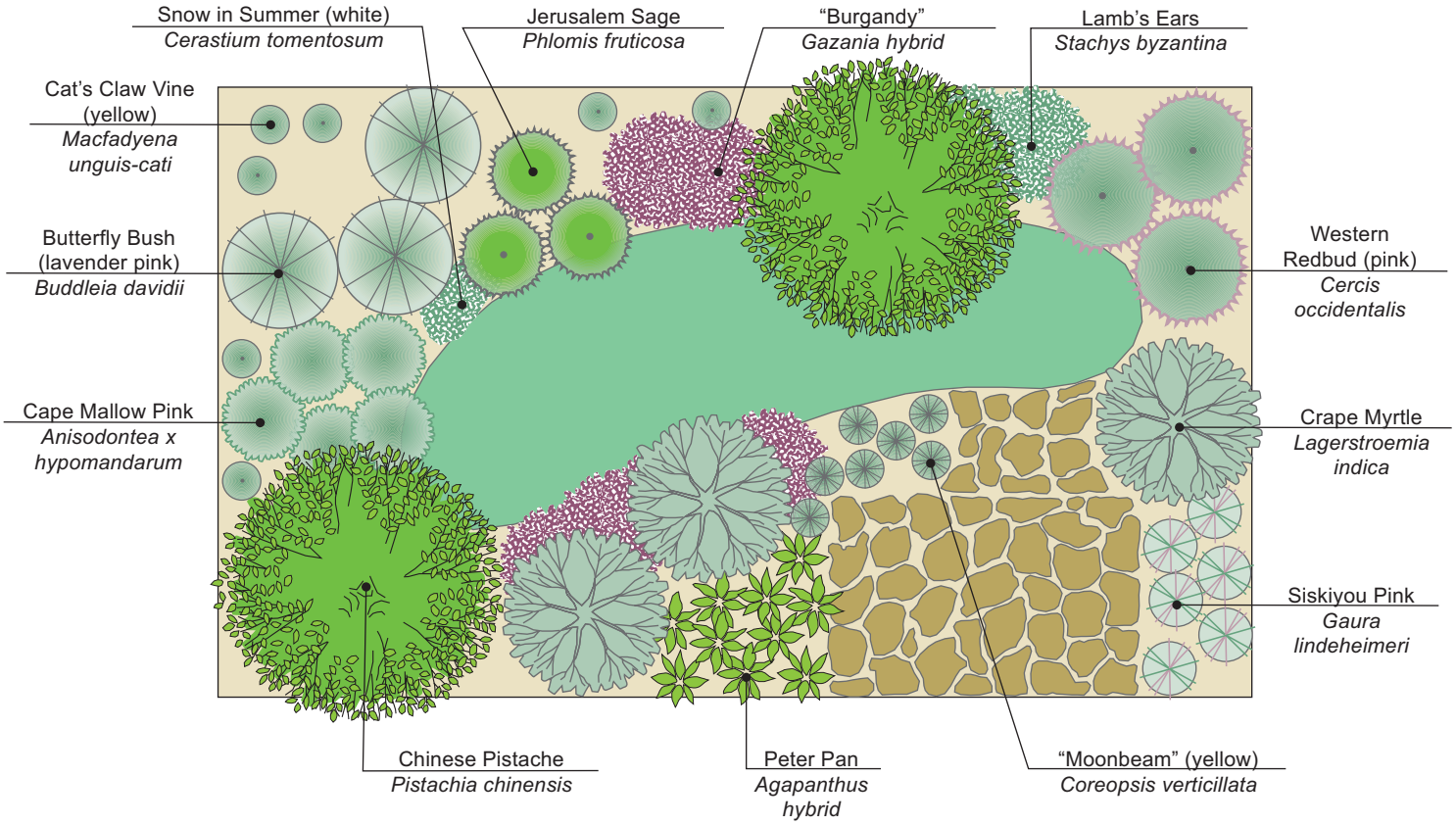
# Good choices make good landscapes

Once a decision regarding the turf area has been made, choose trees and large shrubs next. Make these choices carefully, they are the "backbone" of any landscape and poor choices will result in high water use, poor performance, and frequently costly maintenance or removal.

When selecting trees and large shrubs, choose varieties that will still fit into your yard when they mature. Learn what your climate zone is and buy plants that are suited to it. Choose deciduous trees for shade and evergreen trees for screening.

# water efficient landscape

**What's right about this landscape?**
Warm-season grass, permeable surface patio, water efficient plants with nearly year-round color, mulch in shrub areas, deciduous trees for summer shade and winter sun, a California native, shrubs attractive to hummingbirds and butterflies. This garden, with a landscaped area of 1,800 sq. ft., requires about 5,800 gallons of water to irrigate for the month of July in the Central Valley. A smaller lawn would make this landscape even more water efficient. A landscape of the same size with thirsty plants and a bluegrass lawn would require an additional 2,000 to 3,000 gallons of water for the month of July.




Try to group plants by water requirements, such as very low (e.g. drought tolerant California natives, such as Blue Oaks, Western Redbud), low (e.g. Rosemary, Lavender), medium (e.g. Photinia, Euonymus), and high (e.g. Australian Tree Fern, Umbrella Sedge). Keep the high water-using plants to a minimum as focal points.

For help with selecting trees, shrubs, and groundcovers consult a good gardening encyclopedia such as *Sunset Western Garden Book*, your local Cooperative Extension, or a reputable nursery. Your local Urban Forester or tree foundation can give valuable advice about which trees grow well in your area.

Another excellent reference is *A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California*, which is available on the Department of Water Resources Web site at:
**http://www.owue.water.ca.gov/docs/wucols00.pdf**

Beginning on page 45, this publication gives the water needs of landscape plants in the six major climate regions of California. Guides of this type are valuable in the design stage by aiding in the selection of plants for groupings with similar water needs. These groupings of plants of similar water requirements are also known as hydrozones.

## Irrigation

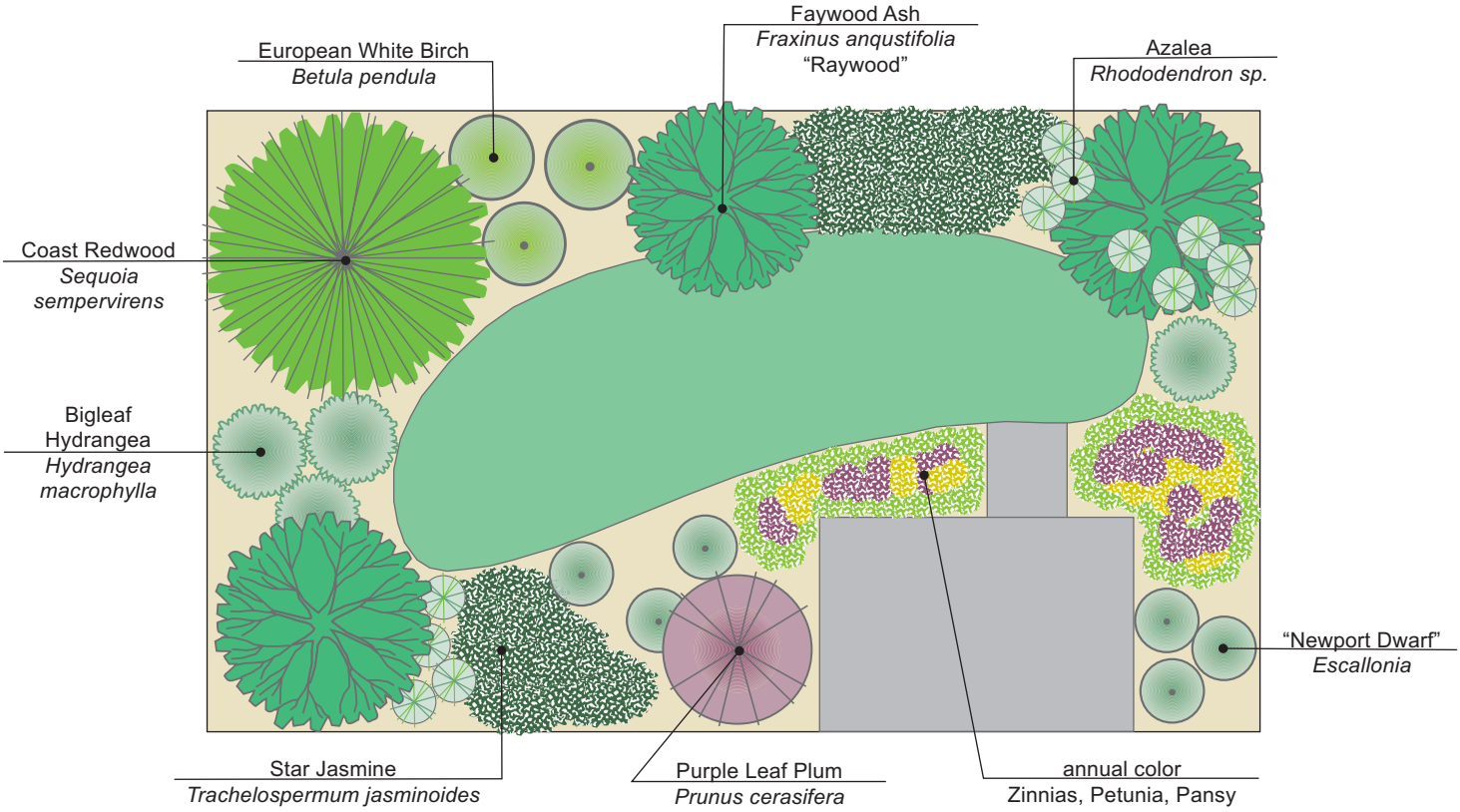
After the plants are chosen, design and install an efficient irrigation system—one that will deliver a sufficient amount of water where it's needed. If you need information or help to design an irrigation system, ask at an irrigation supply store or hire a licensed landscape contractor who specializes in irrigation systems to design and install it.

Several of the major irrigation equipment manufacturers sell inexpensive irrigation design manuals online and at supply stores. A good irrigation design manual will

# typical landscape

**What's wrong with this landscape? (from a water conservation point of view)**
Large lawn with cool-season grass, impervious patio, and a lot of high water using plants (Hydrangea, Azaleas, Birches, Annual color and Coast Redwood). This garden, with a 1,600 sq. ft. landscaped area, requires about 8,400 gallons of water to irrigate for the month of July in the Central Valley. This landscape requires over 2,500 gallons of water more per month (in July) than the previous example.

**What could be a better version?**
Although this landscape uses several water efficient plants, the water use is still high. Smaller lawn, warm season grass, less high water using plants, mulch, and avoiding large trees in smaller yards make landscapes much more resource efficient. For example, Redwoods need a lot of moisture and grow too large.




address important aspects of sprinkler design such as sprinkler layout, water pressure, choosing the right sprinkler for the job, head to head coverage, and matching precipitation rates. Some manufacturers offer free irrigation design services.

Always be sure to keep a drawing of the sprinkler layout and a list of parts used (including brand names and model numbers) for future reference. This will make any future repairs or additions much easier.

Use sprinklers that will apply water evenly. Use stream rotors on lawns and bubblers in shrub and tree areas. The better quality pop-up spray sprinklers work well in smaller areas, but avoid using sprinklers that create a fine mist because much of that water is lost to evaporation and overspray.

Check the operating pressure with a pressure gauge at an outdoor faucet so that you can select the right sprinkler for the job. Sprinklers are labeled to show how far they spray at different pressures. Operation at too high of pressure will create a lot of water-wasting mist and too little pressure will cause uneven coverage.

Microspray and drip irrigation are other good choices for tree and shrub areas. Microspray and drip also work well on container gardens and window boxes. Microspray and drip systems apply water slowly and just where it's needed.

When you water, apply it infrequently, deeply (throughout the root zone), and evenly. This will encourage deep rooting, which will make plants better able to withstand hot, dry spells.

Lawns require water about once or twice a week in warm weather. Trees and shrubs require watering less frequently. Because of this shrubs and trees should always be on separate zones from turf.

In the spring, fall, and winter all plants need much less water than is required in summer. Consequently, watering time should be much shorter and less frequently in the off peak seasons.

One way to make watering much easier is by using an irrigation controller, also called a sprinkler timer or clock. Timers can save gardeners a lot of time by watering automatically, but they can waste a lot of water if not reprogrammed to water less as the seasons change.

If an irrigation controller is to be used, be sure to purchase one with multiple functions. Buy one with extra stations in case you need to add irrigation zones later. Most importantly, adjust the timer monthly, weekly if needed, so that the irrigation time set for the summer is not set during the rest of the year.

During hot or cool spells most controllers can be easily adjusted without disturbing the original program. By using the "seasonal adjust" or "budget adjust" feature, frequent changes to the amount of time watering can easily be accomplished simply by pushing a button.

The amount of water applied can be increased or decreased in 10% increments. When considering that July is usually the peak demand for water, it can be considered to be the 100% mark.

For example, during April the irrigation could be turned on and the controller set for 60% of the amount it will be watered in July. This can be accomplished by pushing the seasonal adjust button until the display shows 60%. The controller can be adjusted upwards gradually as the weather warms.

Likewise in fall, the season adjust can be adjusted downward beginning in August for most areas of California. This can continue through October or November. By November the irrigation system can be turned off in most places in the state.

Rainfall may be enough for most areas, but if supplemental irrigation is required during the winter, use the manual “on” switch to run the irrigation when the landscape shows signs of water stress. The controller can also be reprogrammed to run less frequently than it would during the rest of the year. Consider installing a rain shut-off switch to prevent watering while it’s raining.

Use a soil probe or large screwdriver to check the soil moisture. It may look dry on the surface, but be moist underneath. If the soil is still moist, plants probably won’t need to be irrigated yet. Always observe how a change in the irrigation schedule affects the landscape.

# water wise plants

**There are many water wise plants to choose from that thrive in California’s mostly moderate climate. These include both many attractive natives and plants introduced from other Mediterranean-like climates. These unthirsty plants enable any gardener to create a water conserving landscape. In addition to the plants shown in these water efficient landscape designs, here is a list of a few more of the many water wise plants available.**

## SHRUBS

Blue Hibiscus, *Alyogyne huegelii*
Coyote Brush, *Baccharis pilularis*
Barberry, *Berberis x stenophylla*
Bush Anemone, *Carpenteria californica*
Bush Morning Glory, *Convolvulus cneorum*
Smoke Tree, *Cotinus coggygria*
Euryops, *Euryops pectinatus*
Pineapple Guava, *Feijoa sellowiana*
Texas Ranger, *Leucophyllum sp.*
Pomegranate, *Punica granatum*

## TREES

Madrone, *Arbutus menziesii*
Bottle Tree, *Brachychiton populneus*
Pindo Palm, *Butia capitata*
Australian Beefwood, *Casuarina stricta*
Honey Locust, *Gleditsia triacanthos*
Sweet Bay, *Laurus nobilis*
Interior Live Oak, *Quercus wislizenii*
Locust, *Robinia x ambigua*
Texas Mountain Laurel, *Sophora secundiflora*
Chaste Tree, *Vitex agnus-castus*

## GROUNDCOVERS

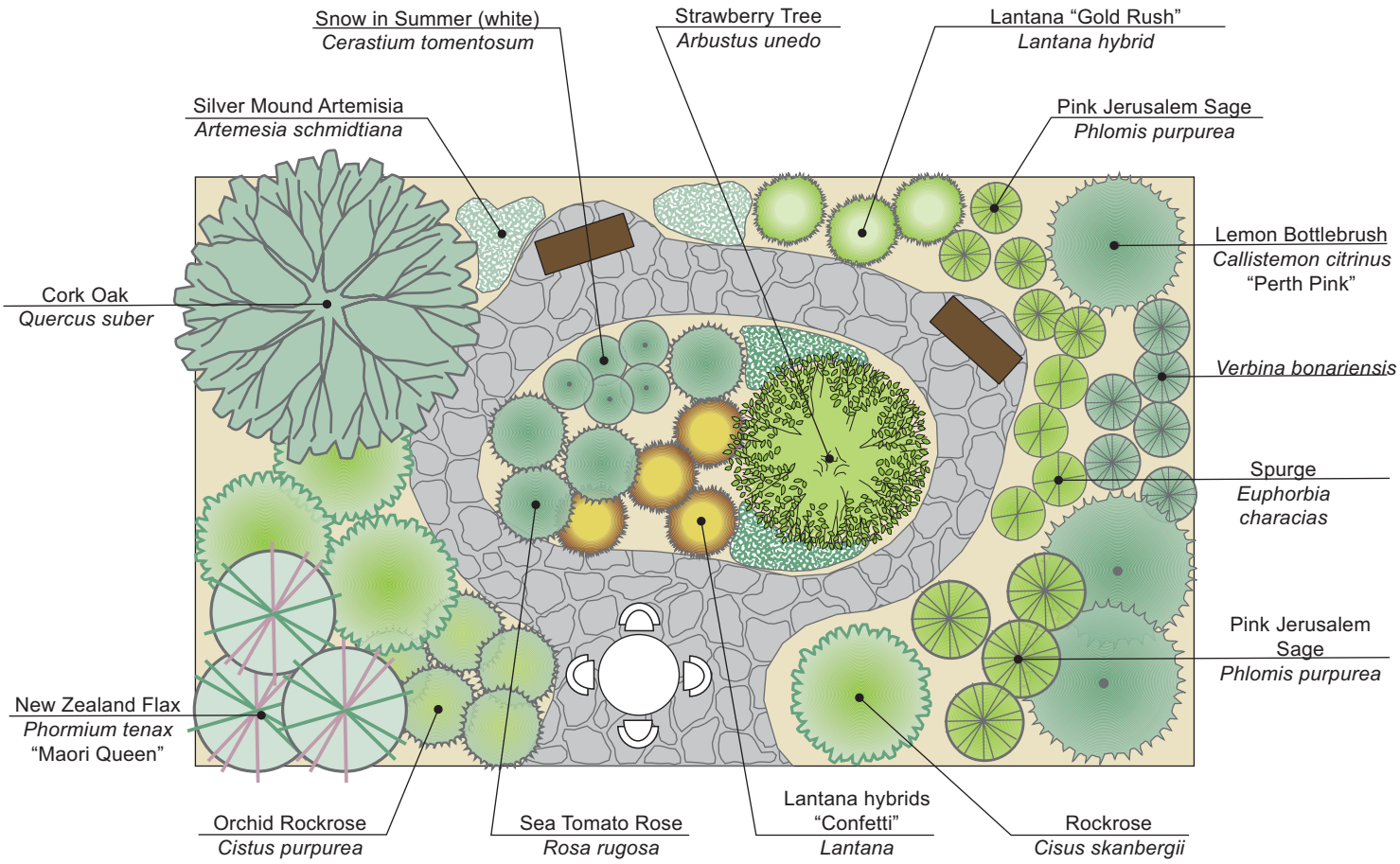
Bearberry, *Arctostaphylos uva-ursi*
Carmel Creeper, *Ceanthous griseus horizontalis*
Red Spike Ice Plant, *Cephalophylum sp.*
Chamomile, *Chamaemelum nobile*
Creeping Coprosma, *Coprosma x kirkii*
Trailing Lantana, *Lantana montedivensis*
Creeping Mahonia, *Mahonia repens*
Pork and Beans, *Sedum rubrotinctum*
Australian Bluebell Creeper, *Sollya heterophylla*
Wooly Thyme, *Thymus pseudolanuginosus*

## PERENNIALS

Yarrow, *Achillea millefolium*
Columbine, *Aquilegia hybrids*
Wormwood, *Artemisia* "Powis Castle"
Italian Arum, *Arum italicum*
Cast Iron Plant, *Aspidistra elatior*
Fortnight Lily, *Dietes iridioides*
Siberian Wallflower, *Erysimum x allionii*
Blanketflower, *Gaillardia grandiflora*
Sunrose, *Helianthemum nummularium*
Crown Pink, *Lychnis coronaria*

# strolling garden

**Turfless is effortless—well, almost.**
If you don't need grass, just a quiet place to enjoy nature and be outside, try installing a strolling garden. Many water efficient plants are not fussy and don't require a lot of maintenance. Occasional pruning to rejuvenate and improve shape is all that many of these plants need. Unthirsty plants, organic mulch, and a permeable gravel path make this garden a real water saver. This garden, with a landscaped area of about 900 sq. ft., requires about 1,550 gallons for July in the Central Valley and only about 1,000 gallons on the Coast during July.




Some features to look for in irrigation controllers are:

- multiple independent programs (for different types of plant zones)
- several start times, cycle and soak (for heavy or compacted soil or sloped areas)
- nonvolatile memory and battery backup (to keep the schedule current after a power failure)
- water budgeting in percentage (%) increments (to water according to what the plants really need)
- rain shut-off device (to save water when the landscape is watered by rain)

These irrigation guidelines are general and may not always reflect the needs of your particular site.

## The fun part

Once the irrigation system is installed, the lawn, trees, and shrubs can be planted. If your site has very sandy or heavy clay soil, amend the soil to increase the fertility and water holding capacity or to improve drainage. Plant shrubs according to the plan so that their leaves will just touch once they become established. This will ensure that the ground will be shaded by foliage but there will be adequate air circulation. This "room to breathe" will make appreciating the foliage and flowers much easier.

Set all shrubs and tree root balls somewhat high in the planting hole so that the top of the root ball will not settle below grade.

If young trees need staking, use two or three stakes tied loosely and just high enough on the trunk to keep the trunk from bending over. Remove them once the trees can stand on their own. While stakes can support a newly planted tree, if left too long, they will actually cause the tree to grow weakly. Shorten the staking poles so that they will not rub the bark of the new tree.

New lawns can be seeded, hydroseeded or planted with sod. There are advantages to all of these methods; therefore, budget, time of year, and availability of products will determine the right grass planting method for your landscape. A good landscaping book will outline the steps to preparing, planting, and maintaining a lawn.

After the plants are planted, cover the ground around trees and shrubs with a two-to-three-inch layer of organic mulch, keeping it away from the plant stems. Mulch will keep the soil cool and moist in warm weather and insulate it during winter. Mulch also has the added benefit of controlling weeds and enriching the soil by adding organic matter.

# Routine maintenance keeps a landscape looking great

Regular maintenance of a landscape will keep it looking great and resource efficient. By working on small tasks on a continuous basis the large tasks will be limited.

- Check the irrigation system frequently for leaks, broken sprinklers, and clogged emitters; repair with the correct parts.
- Adjust the sprinklers as needed. If water runs off the landscaped area before the irrigation cycle is complete, adjust the timer to run several times with a shorter duration each time. For example, instead of running it for 15 minutes continuously, adjust the timer to run three times that day for 5 minutes each time, with an interval in between to let the water soak in. This is especially important on slopes and high traffic areas.
- Check the soil moisture depth with a soil probe or large screwdriver. If you use a screwdriver, push it in to the soil until you feel resistance. That is the approximate depth of where the soil is dry. If the moisture extends well below the root zone cut back on the water somewhat by shortening the time of an irrigation cycle or adding more time between cycles.
- Observe how a decrease in water affects the landscape and make adjustments as needed.
- Refresh the mulch layer in the spring.
- Prune only when necessary to shape the plant or remove dead or diseased parts.
- If fertilizer is necessary, use a balanced fertilizer, avoiding high Nitrogen mixtures that will cause excessive growth and could impact groundwater quality.
- When you mow, "grasscycle" the clippings. The clippings left behind on the grass will break down without causing a buildup of thatch.
- Aerate lawns occasionally to improve water infiltration.
- In times of drought, deep soak shrubs and trees only after they show signs of water stress, and water only in off peak hours. If a drought becomes severe, community leaders may ask people to stop watering their lawns, but any trees planted in lawn areas will still need an occasional soaking to survive. Deep soak these trees as you would any other tree in the landscape by drip, bubbler or garden hose.

If a garden is comprised mostly of water efficient plants, the landscape can be sustained on minimal irrigation through a drought and will be able to recover when water conditions improve.

# The big picture

If good horticultural practices are followed, the dependence on chemicals in the garden can be reduced significantly. Mulching and grasscycling can greatly reduce the need for chemical fertilizers. Likewise, when less water is used, fertilizers and pesticides are not washed away. Less water controls excessive growth and reduces the amount of succulent new growth that is attractive to insect pests.

Since too much water causes many problems with plants, it makes sense to be water wise. It will save money and time, as well as give the gardener the satisfaction of doing his or her part in solving California’s real water challenge.

State of California
The Resources Agency
Department of Water Resources
**OFFICE OF WATER USE EFFICIENCY**
P.O. Box 942836
Sacramento, CA 94236-0001

**Phone:** (916) 651-9676
**Web site:** www.owue.water.ca.gov/landscape
**e-mail:** landscape@water.ca.gov

(A copy of this brochure is available in PDF format at
**www.owue.water.ca.gov/landscape/pubs/pubs.cfm**)

This brochure was written by Julie Saare-Edmonds, landscape specialist for DWR's Office of Water Use Efficiency. Design and layout was provided by Alice Dyer of DWR's Division of Planning and Local Assistance.

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RIVERSIDE COUNTY
WATERSHED PROTECTION



# Prevent Water Pollution:

## Landscape & Gardening Maintenance Guide

### Be the Solution.
### Prevent Runoff Pollution.

**The water that flows into storm drains is not treated** before flowing into Riverside County's creeks, rivers, lakes, and eventually the ocean (unlike the sanitary sewer system). It should never contain washwater or pollutants like pesticides, fertilizer, dirt, leaves, and other hazardous substances generated by landscape and gardening maintenance. If these pollutants are not properly contained, they can runoff into the storm drain and harm our waterways.

Preventing runoff pollution while maintaining your property protects aquatic life, water quality, and keeps our waterways thriving. While taking care of your lawn and garden, make sure to only use pesticides and fertilizers when absolutely necessary and never before rain, clean up spills immediately, and sweep debris regularly.

## Landscape & Gardening Pollutant Sources

### Overwatering

Dirt, pesticides, fertilizers, pet waste, and organic waste can run off into the storm drain when overwatering occurs.

### Lack of Maintenance Before Rain

Pet waste, leaves, grass clippings, and chemicals left on the ground (from property neglect or landscape maintenance) before or during rain can be washed into the storm drain.

### Pesticide, Fertilizer, or Herbicide Use Before Rain

Using pesticides, fertilizers, or herbicides 48 hours before or during rain can cause these chemicals to go untreated into our waterways.

# Best Management Practices for Landscape & Gardening Maintenance

Protect our waterways while maintaining your lawn and garden by implementing these BMPs (best management practices):

## Who We Are

Riverside County Watershed Protection is a partnership program between Riverside County, the Flood Control & Water Conservation District, Coachella Valley Water District, and 27 cities that manage watershed programs which protect, preserve, and enhance the quality of the water and the natural environment of our watersheds.

## What We Do

The partnership uses a combination of public education, best management practices, evaluation, and water quality monitoring to eliminate stormwater pollution in our waterways and comply with all federal, state, and local regulations. Our aim is to empower residents with information about pollution prevention and implement tactics that keep our watersheds healthy.

## Contact Us

**To report pollution:**

Call **(800) 506-2555**

Visit **rcwatershed.org/get-involved/report-pollution**

For emergencies, dial **911**

## Maintain Your Property

- Prevent overwatering/runoff by only giving your lawn and garden the amount of water it needs. Do not water when it's raining and if you find a leak in your sprinkler system, fix it right away.
- Use a broom (not a hose) to clean regularly. Collect leaves, clippings, and pruning waste and compost them or dispose of them in your organic waste bin.
- Pick up dog waste and dispose of it in a trash can before it rains.
- Schedule large projects for dry weather and do not apply pesticides, herbicides, fungicides or fertilizers before rain events.
- Prevent erosion and runoff pollution during projects by covering piles of soil and stockpiled materials with tarps.

## Sweep and Absorb Spills

- Clean solid material spills (i.e., mulch, soils, fertilizer) by sweeping or using a vacuum before disposing in the proper receptacle.
- Clean liquid spills (i.e., pesticides or herbicides) by using absorbents like rags.
- Dispose of hazardous waste (pesticides, garden chemicals, chemical-soaked rags) at collection centers. Visit rcwaste.org/hhw for more information.
- Report any spills that have entered the street, gutter, or storm drain by calling 800-506-2555 or going to rcwatershed.org/get-involved/report-pollution/.

## Plan Ahead & Use Less-Toxic Alternatives

- Only use pesticides, fertilizers, or herbicides when absolutely necessary and always follow the instructions on the label. Use less-toxic alternatives, like predatory insects and mulch, whenever possible.
- If chemical use is necessary, check the weather before and only apply them to your lawn or garden when it's not windy and rain is not predicted in the next 48 hours.

For more information about stormwater-safe gardening and landscape maintenance, visit: **rcwatershed.org/residents/at-home/gardening**.

RIVERSIDE COUNTY
WATERSHED PROTECTION



# Prevent Water Pollution:

## Proper Pool & Spa Maintenance Guide

### Be the Solution.
### Prevent Runoff Pollution.

**The water that flows into storm drains is not treated** before flowing into Riverside County's creeks, rivers, lakes, and eventually the ocean (unlike the sanitary sewer system). It should never contain washwater or pollutants like chlorine, salt water, diatomaceous earth, debris, and other hazardous substances generated by pools and spas. If these pollutants are not properly contained and cleaned up right away, they can runoff into the storm drain and harm our waterways.

Preventing runoff pollution while maintaining your pool and spa protects aquatic life, water quality, and keeps our waterways thriving. While taking care of your pool and spa, make sure to follow drainage requirements, clean up chemical spills immediately, and conduct proper maintenance.

## Pool & Spa Pollutant Sources

### Improper Drainage

Improperly draining pool or spa water in the storm drain or over landscaped areas can cause chlorine, sodium bromide, algae, diatomaceous earth, filter media, dirt, pesticides, pet waste, and other harmful substances to go into our waterways.

### Cleaning

Cleaning your pool or spa can produce toxic chemicals, acid, debris, and other harmful substances.

### Chemical Spills

Chemical spills that are not cleaned up immediately can leave behind chlorine, sodium bromide, hydrogen peroxide-based products, filter media, and other harmful substances.

### Construction

Pool and spa construction without proper containment and disposal methods in place can cause plaster, sediment, and other debris to run off into the storm drain.

# Best Management Practices for Pool & Spa Maintenance

Protect our waterways while maintaining your pool and spa by implementing these BMPs (best management practices):

## Who We Are

Riverside County Watershed Protection is a partnership program between Riverside County, the Flood Control & Water Conservation District, Coachella Valley Water District, and 27 cities that manage watershed programs which protect, preserve, and enhance the quality of the water and the natural environment of our watersheds.

## What We Do

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## Contact Us

**To report pollution:**

Call **(800) 506-2555**

Visit **rcwatershed.org/get-involved/report-pollution**

For emergencies, dial **911**

## Proper Drainage

**PREFERRED OPTION:** Pool and spa water should be disposed of in the sanitary sewer.

**SECOND OPTION:** Gradually release pool water over landscaped areas. Ensure water can be absorbed by soil without runoff, erosion, or flowing into yard drains.

**THIRD OPTION:** If the first two drainage methods are not possible, draining pool water into the street or storm drain is allowed only if water:

- pH is between 6.5 and 8.5 and residual chlorine does not exceed 0.1mg/L (parts per million).
- is clean, clear, and free of algae, algaecides, unusual coloration, and dirt.
- does not contain any filter media discharge, hydrogen peroxide-based products, or acid cleaning wastes.
- is at an ambient temperature and free of saline.

All trash and debris must be removed from the flow path between the pool (or spa) and storm drain. Make sure drain hose is not leaking and attentively monitor the drainage flow rate to prevent landscape erosion and runoff.

Some cities in Riverside County have ordinances that ban all pool water disposal into a storm drain. Check your city's stormwater page for more information.

## Maintenance

- Prevent mosquitos and algae by not letting dechlorinated water sit for over 72 hours.
- Conduct regular pool cleanings, maintain proper chlorine or sodium bromide levels, monitor pH levels, and take care of your pool's filtration and circulation systems.
- Store chemicals indoors and toss used diatomaceous earth into the garbage.
- Rinse pool and diatomaceous earth filters over landscaped areas where water and debris can easily soak into the ground.
- Cover landscape drains while draining pools or rinsing filters over a landscaped area.

For more information about stormwater-safe pool maintenance methods, visit: **rcwatershed.org/residents/at-home/swimming-pools.**

# Drainage System Maintenance SC-44



**Objectives**

- Cover
- Contain
- Educate
- Reduce/Minimize

## Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

**Targeted Constituents**

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

## Approach

### *Pollution Prevention*

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

### *Suggested Protocols*

*Catch Basins/Inlet Structures*

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

CASQA California Stormwater Quality Association

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

*Storm Drain Conveyance System*

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

*Pump Stations*

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

*Open Channel*

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

*Illicit Connections and Discharges*

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

*Illegal Dumping*

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

### *Training*

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).

- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

***Spill Response and Prevention***

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

***Other Considerations (Limitations and Regulations)***

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

## Requirements

***Costs***

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:

  - Purchase and installation of signs.

  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.

  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.

  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

***Maintenance***

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

## Supplemental Information

***Further Detail of the BMP***

*Storm Drain Flushing*

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

## References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

# Site Design & Landscape Planning SD-10



**Design Objectives**

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

## Description

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

## Approach

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

## Suitable Applications

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

## Design Considerations

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

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***Designing New Installations***

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

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

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

*Conserve Natural Areas during Landscape Planning*

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

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

*Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit*

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

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

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

*Protection of Slopes and Channels during Landscape Design*

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

### *Redeveloping Existing Installations*

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

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

### Other Resources

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

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

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

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

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

# Efficient Irrigation SD-12



**Design Objectives**

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

## Description

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

## Approach

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

## Suitable Applications

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

## Design Considerations

### *Designing New Installations*

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

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

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

### *Redeveloping Existing Installations*

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

## Other Resources

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

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

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

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

# Storm Drain Signage SD-13




**Design Objectives**

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

## Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

## Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

## Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

## Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

### *Designing New Installations*

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include “NO DUMPING

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– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

### *Redeveloping Existing Installations*

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

## Additional Information

### *Maintenance Considerations*

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

### *Placement*

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

## Supplemental Information

### *Examples*

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

## Other Resources

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

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

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

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

# Trash Storage Areas SD-32

## Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

## Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

**Design Objectives**

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

## Suitable Applications

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

## Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

### *Designing New Installations*

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

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- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

### *Redeveloping Existing Installations*

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

## Additional Information

### *Maintenance Considerations*

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

## Other Resources

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

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

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

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