Draft Initial Study/ Mitigated Negative Declaration

Arroyo Seco Water Reuse Project

City of Pasadena and City of South Pasadena, California

Prepared for | City of Pasadena Public Works Department
100 North Garfield Avenue
Pasadena, California 91101

Prepared by | Psomas
225 South Lake Avenue, Suite 1000
Pasadena, California 91101
T: 626.351.2000

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CITY OF PASADENA
100 NORTH GARFIELD AVENUE PASADENA, CA 91101

INITIAL STUDY

In accordance with the Environmental Policy Guidelines of the City of Pasadena, this analysis, the associated “Master Application Form,” and/or Environmental Assessment Form and supporting data constitute the Initial Study (IS) pursuant to the California Environmental Quality Act (CEQA) for the subject Arroyo Seco Water Reuse Project (Project). This IS provides the assessment for a determination whether the Project may have a significant effect on the environment.

SECTION 1.0 PROJECT INFORMATION

1. Project Title:	Arroyo Seco Water Reuse Project
2. Lead Agency Name and Address:	City of Pasadena[1] 100 North Garfield Avenue Pasadena, California 91101
3. Contact Person and Phone Number:	Christina Monde 661.510.6981
4. Project Location:	Project Includes Two Sites: (1) San Rafael Site: southwest of San Rafael Avenue and the Arroyo Seco Channel, City of Pasadena; and (2) San Pascual Site: southeast of San Pascual Avenue and the Arroyo Seco Channel, City of South Pasadena and City of Los Angeles
5. Project Sponsor's Name and Address:	City of Pasadena Public Works Department 100 North Garfield Avenue Pasadena, California 91101 City of South Pasadena Public Works Department 1414 Mission Street South Pasadena, California 91030
6. General Plan Designation:	Open Space (Pasadena/South Pasadena/Los Angeles)
7. Zoning:	Open Space (Pasadena/South Pasadena/Los Angeles)
8. Description of the Project:	

Project Location

The Project site encompasses a total of approximately 3.7 acres on two sites in the Lower Arroyo Seco that are situated adjacent to the Arroyo Seco Channel–the northern, San Rafael site (1.4 acres) in the City of Pasadena (Pasadena); and the southern, San Pascual site (2.2 acres), in the cities of South Pasadena (South Pasadena) and Los Angeles (Los Angeles) and both sites are with the County of Los Angeles (County). A proposed off-site water harvester and related infrastructure would be installed within the

[1] City of Pasadena is acting as CEQA Lead Agency pursuant to a Memorandum of Understanding between the City of Pasadena and City of South Pasadena. The Project would also include parcels under the jurisdiction of the City of Los Angeles and the Los Angeles County Flood Control District for which a construction and/or access easement would be required.

existing, gated, approximately 1,375-square-foot (sf), irregularly-shaped maintenance yard at the Arroyo Seco Golf Course in South Pasadena. Exhibit 1, Regional Location and Local Vicinity, and Exhibit 2, Aerial Photograph, illustrates the Project site locations and surrounding uses.

Both sites are comprised of vacant, open space lands primarily within the cities of Pasadena and South Pasadena, respectively, with a small portion of the San Pascual site within Los Angeles. Both sites are immediately adjacent to the concrete Arroyo Seco Channel (Channel) that is under the jurisdiction of the Los Angeles County Flood Control District (LACFCD). The open space areas were created during the channelization of the Arroyo Seco in the 1930s.The two sites are approximately 850 feet (0.16 mile) apart at the closest points.

The San Rafael site is situated southwest of the San Rafael Avenue overpass of the Arroyo Seco Channel, on the west side of the Channel, and adjacent to Pasadena's southern boundary. In addition to the property within Pasadena, the San Rafael site includes a linear feature that is within the limits of the San Rafael Creek easement under LACFCD jurisdiction. The San Pascual site is situated southeast of the San Pascual Avenue overpass of the Arroyo Seco Channel and on the east side of the Channel. The San Pascual site is bound by San Pascual Avenue on the north and Stoney Drive on the east. The sites are located on public parkland/open space, which is open daily from sunrise to sunset. The Project areas are fully accessible to the public via public and private transportation routes, and/or by various trails for pedestrians, bicyclists, and equestrians. Local vehicular access is provided via San Rafael Avenue, South Arroyo Boulevard, San Pascual Avenue, and Stoney Drive. The sites are regionally accessible via State Route 134 (SR 134), which is located approximately 1.25 mile north of the San Rafael site; and SR 110, which is located approximately 0.10 mile south of the San Pascual site.

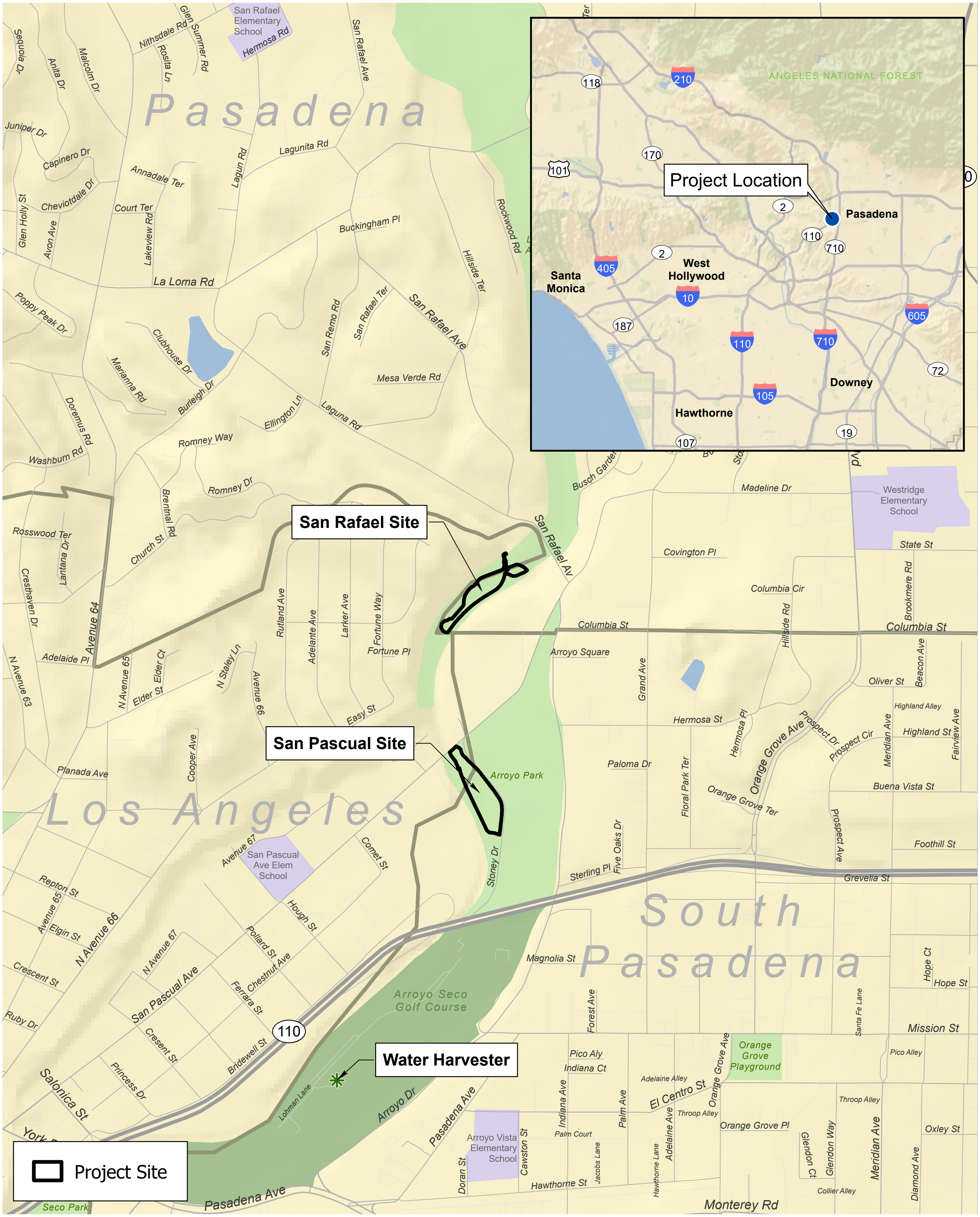
Project Background and Purpose

Water Quality Regulations and Requirements

The Project site is within the Upper Los Angeles River (ULAR) Watershed. The ULAR Watershed encompasses approximately 485 square miles of largely built-out urban land area. Runoff from this watershed drains to over 50 linear miles of the Los Angeles River and then to the Pacific Ocean. The Arroyo Seco, including its Reaches 1 and 2, is a major tributary to the Los Angeles River; Los Angeles River Reaches 1 and 2 are downstream of the Arroyo Seco's confluence with the Los Angeles River. On July 9, 2010, the Los Angeles Regional Water Quality Control Board (RWQCB) adopted resolution No. R10-007 incorporating a total maximum daily load (TMDL) for indicator bacteria in the Los Angeles River watershed; and the Basin Plan Amendment became effective March 23, 2023 (Bacteria TMDL). Establishing a TMDL is required pursuant to the listing of a waterway on the State's 303(d) List, or Impaired Waters List. During the 1998 Water Quality Assessment, several waters in the Los Angeles Watershed were identified on the 303(d) List due to high coliform (i.e., fecal bacteria) count. The identified impaired waters included Arroyo Seco Reaches 1 and 2, and Los Angeles River Reaches 1 and 2 (LARWQCB 2010).

The Municipal Separate Storm Sewer System (MS4) Permit Order No. R4-2012-0175 (Permit) for Los Angeles County allows for MS4 Permit compliance to be accomplished through development of Enhanced Watershed Management Programs (EWMP) (ULAR EWMP Group 2016a). The requirements of the Bacteria TMDL were incorporated into the MS4 Permit adopted by the Regional Board in December 2012 (ULAR EWMP Group 2016). These programs involve an extensive inventory of stormwater management in each watershed, modeling to establish a baseline understanding of hydrology and water quality dynamics and planning around a Reasonable Assurance Analysis (RAA) to demonstrate that planning will result in adequate receiving water protections to meet the requirements of the MS4 permit including all relevant compliance deadlines.

Through a collaborative approach, an EWMP for the ULAR Watershed Management Area was developed by the ULAR EWMP Group. The ULAR EWMP Group is comprised of the following 19 MS4 Permittees: the



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Regional Location and Local Vicinity

Exhibit 1

Arroyo Seco Water Reuse Project

N W E S

1,000 500 0 1,000 Feet

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Aerial Photograph

Exhibit 2

Arroyo Seco Water Reuse Project

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600 300 0 600 Feet

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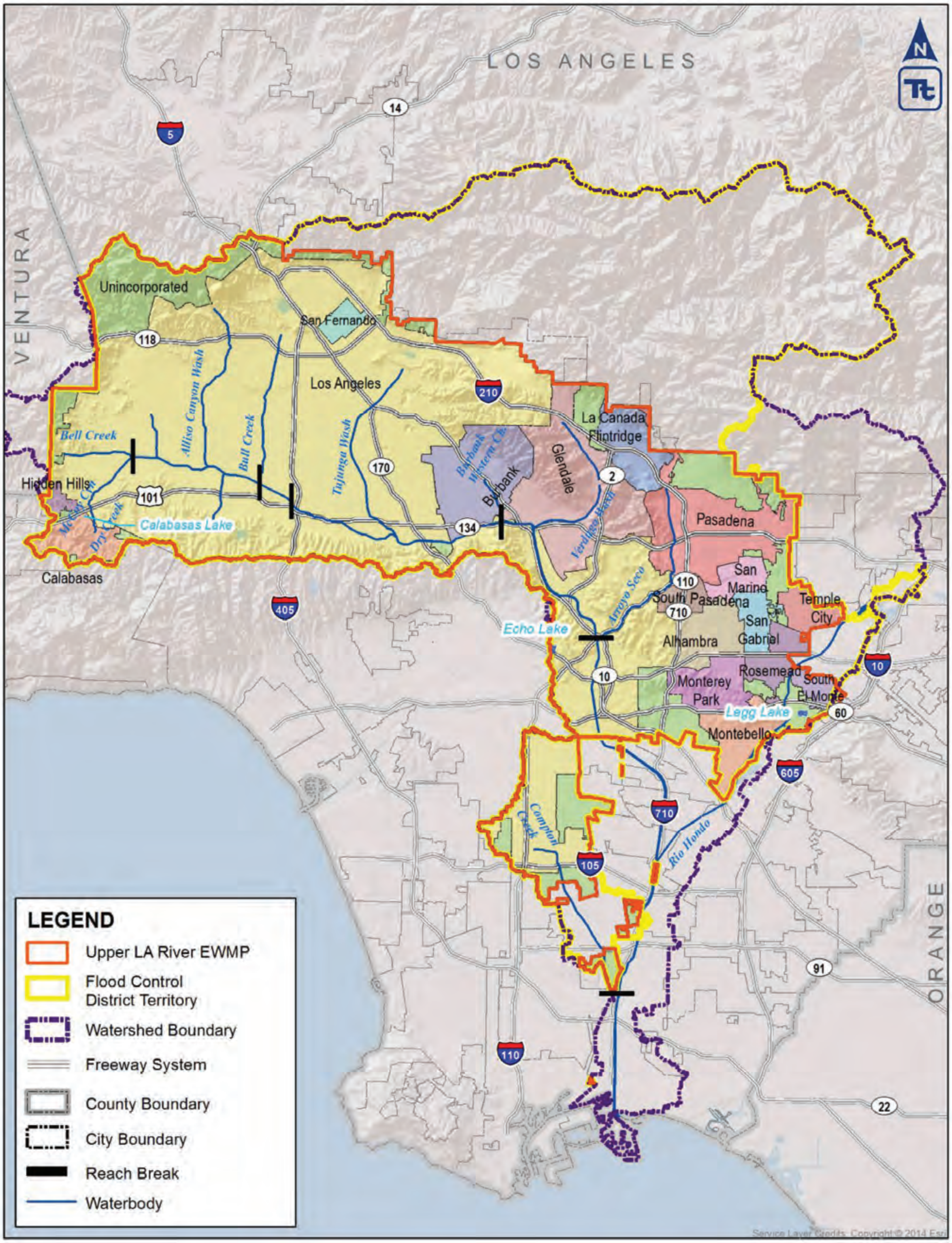
(Rev: 8-14-2023 JVR) R:\Projects\PAS_Pasaden\3PAS010750\Graphics\MND\ex_Aerial_Photograph.pdf cities of Los Angeles (lead coordinating agency), Alhambra, Burbank, Calabasas, Glendale, Hidden Hills, La Cañada Flintridge, Montebello, Monterey Park, Pasadena, Rosemead, San Fernando, San Gabriel, San Marino, South El Monte, South Pasadena, and Temple City; the County of Los Angeles (unincorporated County); and the LACFCD (ULAR EWMP Group 2015a). The cities of Pasadena and South Pasadena collectively make up about 46.7 square miles (9.7 percent) of the ULAR Watershed. Of the ULAR EWMP Group agencies, all or a portion of the cities of Los Angeles, Glendale, La Canada Flintridge, Pasadena, and South Pasadena; unincorporated County, and LACFCD drain into the Arroyo Seco (ULAR EWMP Group 2016a). Exhibit 3, Upper Los Angeles River Watershed and Enhanced Water Management Plan Area, depicts the overlapping geographic boundaries of the ULAR Watershed, LACFCD, and ULAR EWMP Group; and the jurisdictions within the ULAR EWMP Group.

The EWMP utilizes a multi-pollutant approach that maximizes the retention and use of urban runoff as a resource for groundwater recharge and irrigation, while also creating additional benefits for the communities in the ULAR Watershed. State and federal regulations establish compliance timelines to address water quality issues. The Los Angeles River watershed is subject to a Bacteria TMDL, as noted above, that requires compliance by 2037; as well as a TMDL for metals that requires compliance by 2028. Elevated bacteria concentrations can pose a potential health risk to people that recreate in the watershed (e.g., swimming, fishing); high levels of metals can negatively impact aquatic life (e.g., fish) in the rivers, creeks, and estuary. A key element of each EWMP is the RAA that is used to quantitatively demonstrate that the implementation strategy will address the water quality priorities and uses a modeling process to identify potential control measures. For the ULAR EWMP, the RAA was developed based on complying with the applicable criteria for “limiting pollutants” during 90th percentile storm conditions. Limiting pollutants are the pollutants that drive best management practice (BMP) capacity (i.e., control measures that address the limiting pollutant will also address other pollutants). The RAA for ULAR first identifies the control measures to attain zinc limits (during the zinc critical condition) and then identifies additional capacity, if any, needed to achieve Escherichia coli (E. coli) limits (ULAR EWMP Group 2016a).

The MS4 Permittees have the option to develop a Coordinated Integrated Monitoring Program (CIMP) to specify approaches for meeting the Permit’s Monitoring and Reporting Program (MRP) objectives; and ULAR elected to prepare a CIMP. The primary purpose of the ULAR CIMP is to outline the process for collecting data to meet the goals and requirements of the MRP; the ULAR CIMP is designed to provide the information necessary to guide water quality program management decisions. The Final CIMP provides a discussion of the monitoring locations, constituents, monitoring frequency, and general monitoring approach; and meets the requirements of the MS4 Permit and all associated TMDL monitoring requirements (ULAR EWMP Group 2015b).

Based on testing done prior to and as part of the CIMP, the ULAR Group adopted a Load Reduction Strategy (LRS) to achieve compliant TMDL waste load allocations (WLAs) for each watershed. The schedule for developing and implementing LRSs was phased across the Los Angeles River watershed. For the Arroyo Seco watershed, the schedule requires achievement of the identified WLAs by September 2023. Because the ULAR EWMP Group elected to use an LRS approach, it qualifies for a second phase of Bacteria TMDL implementation in the Arroyo Seco watershed that would allow achievement of the bacteria WLA by March 2030 (ULAR EWMP Group 2016b). The Arroyo Seco watershed is one of 13 watersheds wholly or partially within the ULAR EWMP area. Exhibit 4, Arroyo Seco Watershed, depicts the Arroyo Seco watershed’s boundary, the limits of the EWMP relative to the Arroyo Seco watershed, the jurisdictions associated with the Arroyo Seco watershed, and the general location of outfalls along the Arroyo Seco within the EWMP area.

The Arroyo Seco LRS was developed using the outfall-based approach outlined in the Bacteria TMDL, which emphasizes reductions of bacteria loading from storm drain outfalls that discharge to the Los Angeles River. The outfalls to be addressed were based on quantitative analysis (i.e., modeling). The Arroyo Seco LRS identifies implementation actions for two categories of outfalls: (1) priority outfalls, which have relatively consistent problematic discharges that drive the total contaminant loading; and (2) outlier outfalls, which



Source: Upper Los Angeles River Watershed and Enhanced Watershed Management Plan Group 2016a

Upper Los Angeles River Watershed and Enhanced Watershed Management Plan Area

Exhibit 3

Arroyo Seco Water Reuse Project

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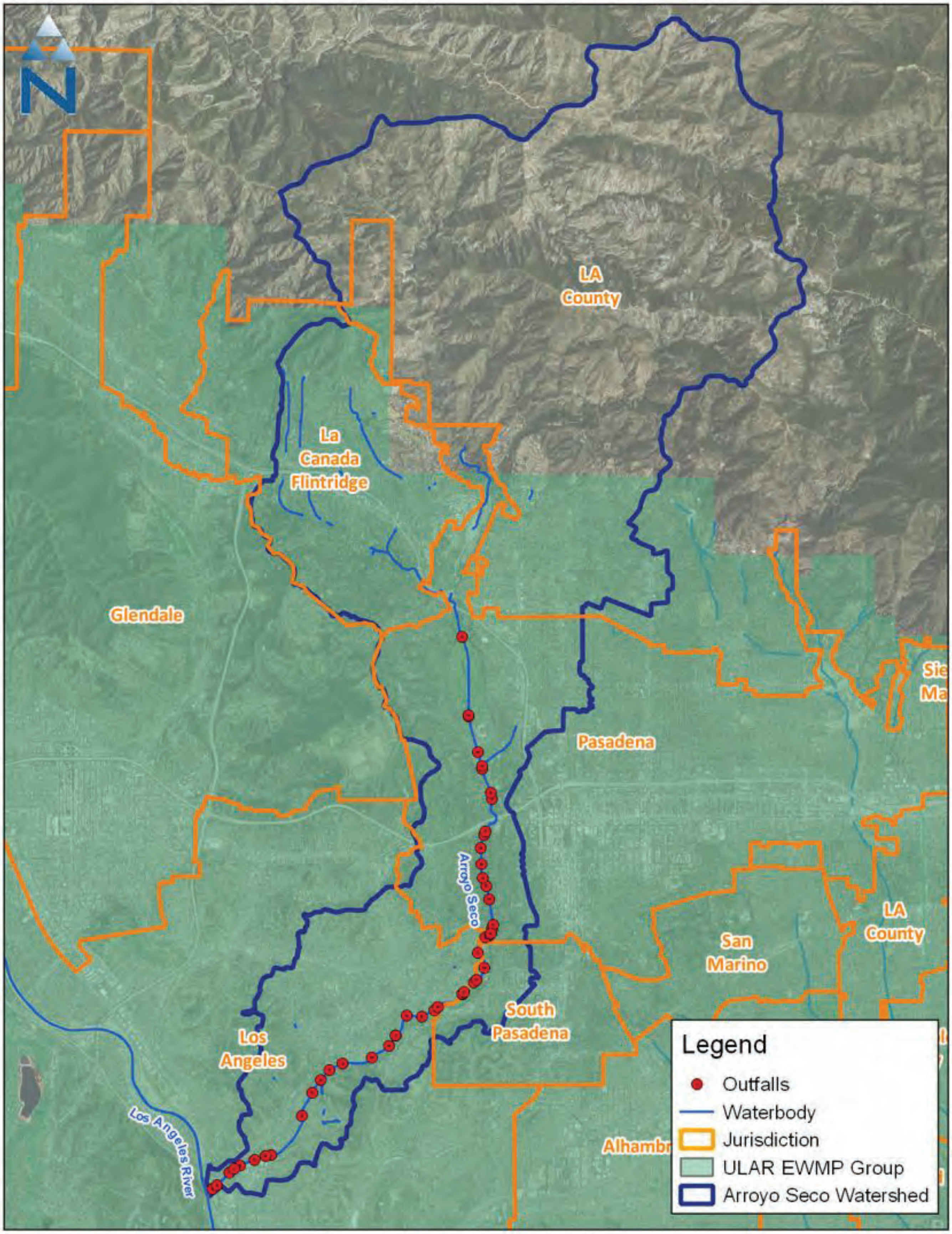

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Source: Upper Los Angeles River Enhanced Watershed Management Plan Group 2016b

Arroyo Seco Watershed

Exhibit 4

Arroyo Seco Water Reuse Project

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One of these is outfall AS-41, which is the San Rafael Creek outfall into the Arroyo Seco. San Rafael Creek runs approximately one-half mile from the outlet of Johnston Lake within a largely earthen-bottom canyon that parallels Laguna Road to the upstream end of the approximately 190-foot-long concrete-lined channel (BI0562-Line F). The naturalized portion of San Rafael Creek is entirely on private lands and the concrete-lined portion is owned by LACFCD and operates as a regional storm drain that discharges into the Arroyo Seco Channel via outfall AS-41. The proposed LRS action for AS-41 is to remove 100 percent of the dry weather flows from discharging directly into the Arroyo Seco. A total of 99 percent of the approximately 697-acre AS-41 drainage area is within Pasadena; therefore, the implementation actions to address AS-41 must be led by the City of Pasadena (ULAR EWMP Group 2016b). Exhibit 5, Arroyo Seco Outfall Drainage Areas, depicts the drainage areas of the priority and outlier outfalls in the Arroyo Seco watershed. Exhibit 6, San Rafael and San Pascual Drainage Areas, depicts the total drainage area for the Project and associated jurisdictions.

It is noted that at the same time various jurisdictions within the ULAR EWMP Group are working to meet water quality targets on the required timeline, the Group is pursuing development of a LRS Adaptation Plan. This would be based on data-driven scientific study to improve the LRS and better protect public health and support recreational beneficial use goals related to bacteria. The core elements of the Adaptation Plan will include:

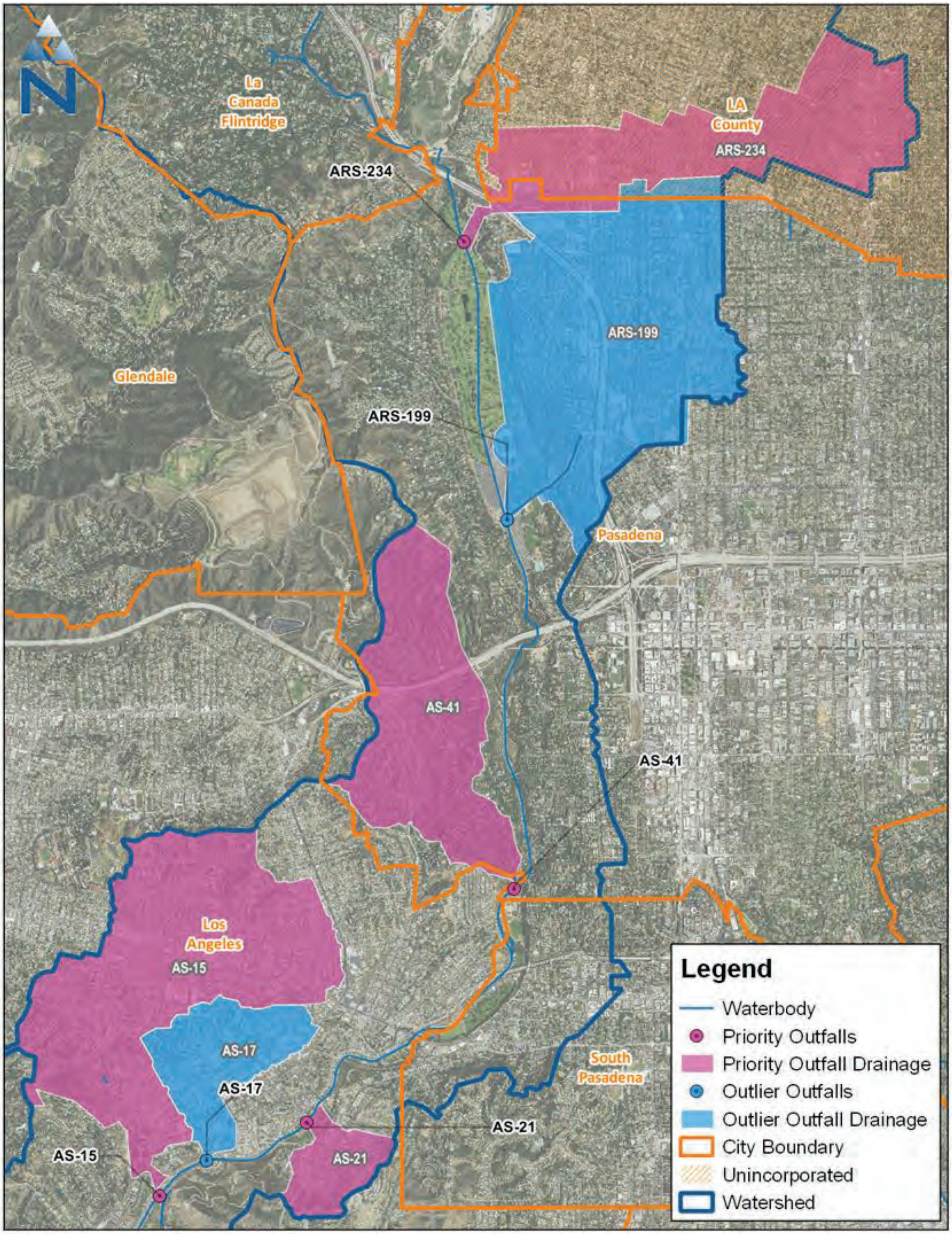
1) Incorporation of existing data gathered through the LRS and other related programs to reprioritize areas of concern to focus implementation actions;
2) Identification of data gaps and additional monitoring needs, including monitoring locations and parameters, such as additional analyses for human markers and specific source identification monitoring; and
3) Within areas of concern, identification of the most effective abatement efforts, focused on source control and feasible/effective locations for structural BMPs and dry weather controls designed to provide multiple benefits.

Recent studies and knowledge gained have shown this requires a focus on human sources; therefore, adaptation of the LRS will focus on prioritizing actions to identify and abate sources of human waste for a more effective implementation plan. The comprehensive screening and targeting of human waste control strategies are expected to result in significant long-term pathogen reduction benefits during both dry and wet weather. The LRS Adaptation Plan will integrate with other ongoing efforts and studies in the ULAR region. The Project would focus on dry and wet weather structural controls and is designed to provide multiple benefits (SGCOG 2019).

Funding

Under the Bacteria TMDL, addressing the San Rafael Creek outfall (AS-41) became an unfunded State mandate for Pasadena. Pasadena conducted source investigations, video-monitored several storm drains for illicit connections, and performed water quality monitoring and soil percolation tests. The Project would be funded from several different sources, described below.

A grant opportunity became available from Proposition (Prop) 68 (California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access for All) of 2018 funds through the Urban Counties Per Capita Program. Senator Portantino's office become involved in the budget process, as a local project was desired. In the 2019-2020 California State Budget (June 2019), a total of $3.5 million was set aside for a joint project between Pasadena and South Pasadena for use in the Arroyo Seco. Pasadena and South Pasadena decided to pursue a dual-part project between the cities that would better enable achieving compliance with



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Source: Upper Los Angeles River Enhanced Watershed Management Plan Group 2016b

Arroyo Seco Outfall Drainage Areas

Exhibit 5

Arroyo Seco Water Reuse Project

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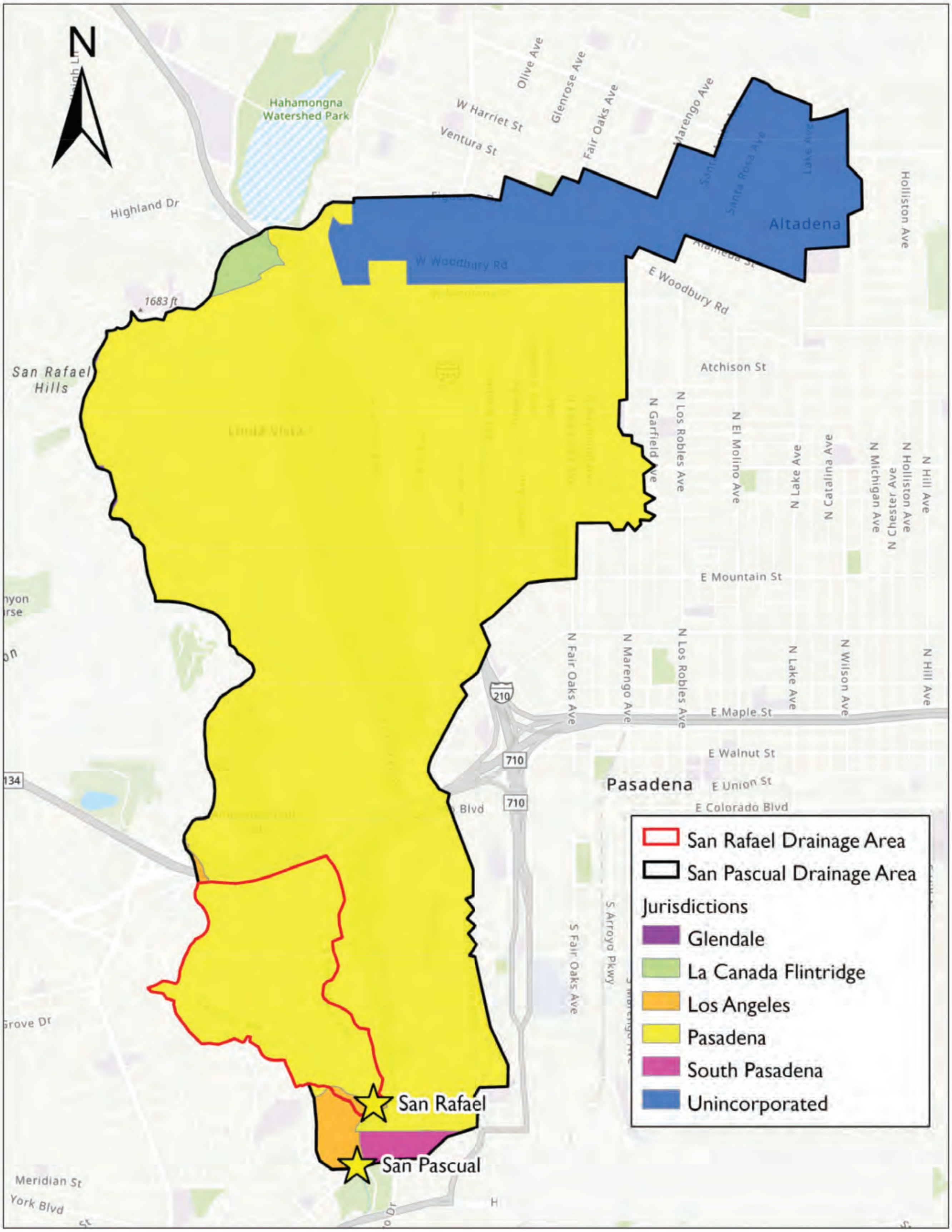

Source: ULAR Watershed Management Group, City of Pasadena, City of South Pasadena 2022

San Rafael and San Pascual Drainage Areas

Exhibit 6

Arroyo Seco Water Reuse Project

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(07/06/2023 SAK) R:\Projects\PAS\3PAS010750\Graphics\MND\Ex_San_Rafael-San_Pascual_Drainage_Areas.pdf the Los Angeles River TMDLs for both bacteria and metals (zinc). Pasadena and South Pasadena entered into a Memorandum of Understanding (MOU) in October 2020 that defines each city's roles and responsibilities in carrying out the Project, from design to long-term operation.

In 2018, Los Angeles County voters approved Measure W, a special parcel tax funding the Safe, Clean Water Program. This program provides local, dedicated funding to increase local water supply, improve water quality, and protect public health. The cities of Pasadena and South Pasadena jointly developed a scope to submit to the County of Los Angeles to apply for funding from the Safe, Clean Water Program. In September 2021, the Safe, Clean Water Program awarded the Project approximately $4.8 million regional (competitive) funds towards the design and construction phases. Consistent with Safe, Clean Water Program requirements, the Project would provide the following community benefits, in addition to meeting the State-mandated water quality standards: enhanced habitat and park space, improved flood protection, improved waterway access, recreational opportunities, reduced heat island effects, and increased shade and trees. The Project has also been granted $420,000 in local Measure W funds. Finally, Pasadena would contribute $950,000 from the City's Sewer Fund toward the Project.

Development of Project Scope

In Fall 2019, a site reconnaissance tour was held with attendees from Pasadena, South Pasadena, Arroyo Seco Foundation, and consultants Stillwater Sciences and TRC Companies, to discuss a variety of possible Project elements at both the San Rafael and San Pascual sites. At the time of the 2019 site tour, preliminary concepts for both sites had been considered but site-specific, quantitative modeling of any potential concepts consistent with the LRS had not been performed. Throughout Project development, both sites' construction, maintenance, and public use access; jurisdiction(s); easement(s); existing conditions; feasibility to achieve the TMDL based on current scientific practice; and attainment of grant funding objectives and timelines were considered.

Consideration of different elements as well as pursuit of additional funding continued, although the COVID pandemic limited options for in-person collaboration and on-site activity necessary for a project of this complexity and diverted staff resources in the affected cities. In this time, a feasibility study was prepared and a conceptual design developed providing the basic design components. It is noted that in the preliminary concept, the San Rafael site was located entirely on the east side of San Rafael Creek and included partial removal of concrete to create a gravity-fed soft-bottom drainage as part of the initial runoff diversion. During preparation of more detailed engineering design on the San Rafael site, it became apparent that the size of the area east of the Creek would not be large enough without encroaching onto private property. Eventually it was determined to move most of the San Rafael facilities to the west side of the Creek. However, this eliminated the stream component paralleling a portion of San Rafael Creek due to engineering constraints, including but not limited to topography on the west side and related space constraints and to also provide safe public access over the Creek. Instead, a rock-lined stream downstream of the diversion point and adjacent to and west of the Creek is proposed. The currently proposed Project scope analyzed in this IS/MND is described below.

<u>**Project Description**</u>

Project Overview

The proposed Project consists of two regional stormwater capture and treatment facilities, also referred to as BMPs, located within existing underutilized open space areas near the Arroyo Seco Channel in Pasadena and South Pasadena. The Project would provide water quality benefits for multiple jurisdictions within the 5,005-acre drainage area of the two BMP sites (refer to Exhibit 6) consisting primarily of residential, commercial, industrial, and transportation land uses.

The combined performance of the two facilities (BMPs) must meet the performance metrics established for the Project in the Safe, Clean Water Program transfer agreement, summarized in Table 1, Safe, Clean Water Program Goals and Targets for the Project.

TABLE 1
SAFE, CLEAN WATER PROGRAM GOALS AND TARGETS FOR THE PROJECT

Goal	Summary	Target	
1. Improve water quality and attainment of water quality requirements.	The stormwater capture and treatment facility would provide water quality improvements to address water quality requirements described in the Upper Los Angeles River Enhanced Watershed Management Program.	Runoff Treated (average annual)	27 af
2. Increase drought preparedness by capturing more stormwater and/or urban runoff to store, clean, reuse, and/or recharge groundwater basins.	The facility would capture and treat urban runoff and stormwater runoff from the San Rafael Creek and Arroyo Seco Channel.	Zinc Reduction	65%
5. Invest in infrastructure that provides multiple benefits.	This project is a multi-benefit project that improves water quality, provides water supply, and integrates native habitat.	N/A	N/A
6. Prioritize nature-based solutions.	Landscape plans will include additional native trees, shrubs, and grasses to be installed at select spots impacted by the construction throughout the Project sites. The swales will be sized to convey all the flows from the surface drainage.	Landscape Plans	1 each
7. Provide a spectrum of project sizes from neighborhood to regional scales.	The Project would construct a regional stormwater capture facility.	Design Plans	1 each

af: acre-feet; N/A not applicable

Source: Craftwater Engineering, Inc. 2023 (January 10). *Hydrology and Hydraulics Report, San Rafael Treatment Basin Stormwater Capture Project*. Los Angeles, CA: Craftwater Engineering, Inc.

While both the San Rafael and San Pascual sites are separate, they are similar in concept and have been designed to be hydrologically connected. Runoff in San Rafael Creek would be diverted into the San Rafael site and, depending on flows, then be discharged into the Arroyo Seco Channel. This water would flow downstream in the Arroyo Seco Channel and be diverted into the San Pascual site. After exiting the San Pascual BMP, the treated water would flow downstream in the Channel. This water then would go through additional treatment via the proposed water harvester situated approximately one-half mile downstream of the San Pascual outlet in the maintenance yard of South Pasadena’s Arroyo Seco Golf Course (Golf Course). South Pasadena has had existing infrastructure (including a concrete dike in the Channel) and water rights to divert dry weather flows[2] from the Arroyo Seco for irrigation of the golf course for many decades; however, the infrastructure has since been abandoned due to pollutants fouling the distribution system. The harvested water would be stored and reused for irrigation of the Golf Course. The Project would expand the historic use of stormwater for irrigation at the Golf Course by reutilizing and expanding the capacity of the existing dike and irrigation system to allow it to capture both dry and wet weather flows. This would reduce reliance on potable water for Golf Course irrigation by South Pasadena.

The major mechanisms by which the Project would achieve the water quality targets are through diversion, runoff/pollutant capture, filtration, recharge, and release. For both sites, to identify the most effective stormwater capture configuration at the Project sites, decision support modeling has been conducted to identify the optimal BMP configuration using a balanced approach that incorporates design storm hydrologic targets as well as long-term water quality considerations. The Los Angeles County Watershed Management Modeling System (WMMS) was used within the Loading Simulation Program C++ (LSPC) to simulate the contaminant loading, runoff volume, and flow rates associated with a long-term, 10-year continuous time

2 Dry-weather flows are defined as any flows that occur in a period which is at least 24 hours since the last rainfall occurrence.

series. LSPC was also used to estimate runoff volume and peak flow for the 85th percentile storm to each diversion point. For the San Pascual site, a custom BMP modeling was also used to improve upon certain modeling limitations in EPA's System for Urban Stormwater Treatment and Analysis Integration (SUSTAIN).

The Project has been designed to address zinc concentrations as the primary pollutant and copper concentrations as the secondary pollutant, and thereby meet the State-mandated (i.e., TMDL) water quality requirements for both bacteria and metals, as zinc is a limiting pollutant for bacteria. The Project would capture and treat 100 percent of the dry-weather flows in accordance with the LRS and Bacteria TMDL. The Project would additionally provide habitat, water conservation, and recreation benefits, while meeting timing and budget constraints. Table 2, Comparison Between Modeled Project Performance and Targeted Performance, summarizes the individual and combined performance to the target metrics in the Safe, Clean Water Program transfer agreement.

TABLE 2
COMPARISON BETWEEN MODELED PROJECT PERFORMANCE AND TARGETED PERFORMANCE

Metric	San Rafael	San Pascual	Project Total	SCWP Target
Average Annual Runoff Volume Treated (af)	38.8	534	**572.8**	***27.0***
Average Annual Zinc Load Reduction Compared to Divertible Load	81%	74%	**80%**	***65%***
Average Annual Water Capture for Water Supply (af)	N/A	320	**320**	***100***

af: acre-feet; N/A not applicable; SCWP: Safe, Clean Water Program
Source: Craftwater Engineering, Inc. 2023 (January 10). *Hydrology and Hydraulics Report, San Rafael Treatment Basin Stormwater Capture Project*. Los Angeles, CA: Craftwater Engineering, Inc.

As shown in Table 2, the expected performance of the combined San Rafael and San Pascual BMPs meets and exceeds the Safe, Clean Water Program targets.

<u>Proposed Components Summary</u>

Diversion structures generally apply to 'off-line' regional projects where stormwater is diverted from a major water conveyance and directed to that project at a predetermined maximum rate. The San Rafael and San Pascual sites would each have a diversion structure with a maximum diversion rate of 25 cubic feet per second (cfs), or a total Project diversion rate of 50 cfs. The Project includes use of treatment wetlands as a major feature of both BMPs. Treatment wetlands are constructed ecosystems that remove pollutants by mimicking natural processes to slow, detain, capture, and absorb and infiltrate water in a manner that protects, enhances, and/or restores habitat, green space, and usable open space. Other components of the BMPs include post-treatment filtration systems, infiltration basins, inlets, outlets, drains, new or restored trails, new pedestrian bridge/cap (over San Rafael Creek), native landscaping, and hardscape elements including reclaimed wood log benches, post-and-rail fencing, concrete seatwalls, and informational signs. Existing paths along the edge of the Channel would be rehabilitated and expanded as needed to provide vehicular access to the diversion structures for operation and maintenance activities. The Project would also create a watershed education opportunity regarding its contributions towards protecting the water quality in the Arroyo Seco. An estimated two to three informational signs, total for both sites, would be installed in and around the new treatment wetlands and improved trails to provide park user education. The proposed water harvester would be housed within an approximately 12-foot by 24-foot (288 square foot [sf]) prefabricated building with a small (approximately 1,000 gallon) aboveground storage tank (AST) situated adjacent to the building. These pieces of infrastructure would be installed on a concrete pad and located immediately south of the existing water reservoir within the maintenance yard. The water harvester and related infrastructure would be accessible via the existing paved road branching off Lohman Lane, which parallels the west side of the Golf Course.

The Project was designed to maximize avoidance of trees, particularly native and/or protected species (including native shrubs protected by the South Pasadena Tree Ordinance). The trees protected under each jurisdictions' tree ordinance within the Project site boundaries were surveyed by a Certified Arborist. Additionally, the California Department of Fish and Wildlife (CDFW) asserts jurisdiction over native trees that are within the bed and bank of a streambed or partially overhang a streambed. CDFW jurisdiction can overlap with the other jurisdictions. Trees with CDFW jurisdiction is discussed further in Section 2.4, Biological Resources, related to impacts to jurisdictional features under the Clean Water Act.

Some protected trees can include non-native species and some trees are present on the sites that are not protected due to species, size, or other qualification consistent with the applicable ordinance. The Project engineer and arborist coordinated closely to define the disturbance footprint at each site to reduce tree impacts to the maximum extent feasible. A total of 195 trees or shrubs (shrubs of a scale or trunk size, dependent on species, that are considered trees) (hereinafter collectively referred to solely as trees) were surveyed within the San Rafael and San Pascual sites as being under the jurisdiction of either Pasadena, South Pasadena, or Los Angeles. Of these, a total of 142 trees, including 42 protected trees (i.e., subject to respective city tree ordinances), would be removed or would experience encroachment. Tree encroachment is assumed to result in a tree loss and is therefore considered as an impact for purposes of this IS/MND. However, in reality, encroachment may or may not result in a tree loss or other negative outcomes. Most of the affected trees are located at the San Pascual site, which has dense existing vegetation. The remaining 53 trees would be protected in place during construction. Table 3, Summary of Trees, provides the number of existing trees, total proposed tree removals, total protected tree removals, and required tree replacements broken down by each city within the Project site but not including trees under CDFW jurisdiction.

TABLE 3
SUMMARY OF TREES

Jurisdiction	Existing Trees within Site	Total Tree Removals	Protected Tree Removals	Required Tree Replacements
San Rafael Site				
Pasadena	29	6	6	20
San Pascual Site				
South Pasadena	141	121	27	128
Los Angeles	25	15	9	36
San Pascual Subtotals	*166*	*136*	*36*	*164*
Project Totals	***195***	***142***	***42***	***184***
Source: Psomas				

Based on application of each city's tree ordinance, the Project is expected to require a total of 184 replacement trees in various sizes ranging from 15-gallon to 36-inch boxes. Additionally, based on anticipated removal of 3 trees under CDFW jurisdiction that do not overlap removals identified for the cities (i.e., would only be regulated by CDFW) an additional 9 replacement trees are expected to be required as part of Clean Water Act permitting, specifically the Streambed Alteration Agreement. This results in an estimated tree replacement total of 193 trees.

As shown in Table 3, there were total of 195 existing trees surveyed within the Project sites. The Project's landscape concept proposes to plant a total of 193 native trees as well as native shrubs and groundcovers as part of landscaping activities. This would result in an estimated net total of 246 trees on the San Rafael and San Pascual sites, in addition to new native understory (i.e., shrubs and groundcover) plantings. No trees or other vegetation would be removed or trimmed as part of water harvester installation. These figures are estimated and would be finalized as part of permitting processes with the affected agencies. However, all required tree replacements to fully meet each agency's requirements would be planted and would be located within the San Rafael and San Pascual sites. Also, it is noted there was a brushfire at the San Pascual site in late July 2023. Some of the existing trees, appearing to be primarily non-native Mexican fan palms (*Washingtonia robusta*), were burned by the fire to varying degrees. However, for purposes of this IS/MND, the existing condition of the San Pascual site is described in its pre-fire conditions. Tree impacts are discussed further in Section 2.4 of this IS/MND.

Further details of the proposed facilities at each BMP site is presented below.

<u>San Rafael Site BMP</u>

The San Rafael site BMP would consist of the following components, which are discussed further below:

- 16-foot-wide cap/bridge over San Rafael Creek;
- Diversion structure at San Rafael Creek;
- Rock-lined stream;
- A 0.25-acre man-made treatment wetland;
- Pipeline(s), meter(s), valve(s), filter(s), and manhole(s); and
- Landscape and hardscape elements, including new trees and other vegetation, trail expansions, and informational signage.

The San Rafael site is situated adjacent to the confluence of AS-41 and the Arroyo Seco Channel. The San Rafael BMP would divert dry weather flows and stormwater from LACFCD's BI0562-Line F reinforced concrete storm drain (San Rafael Creek) into the proposed facilities for treatment before the portion not infiltrated is discharged into the Arroyo Seco Channel. The San Rafael Creek design flow provided by LACFCD is 1,560 cfs. Exhibit 7, San Rafael Bird's Eye View; Exhibit 8, San Rafael Concept Plan; and Exhibit 9, San Rafael Site Plan, provide different views and levels of detail of the proposed BMP at the San Rafael site. Exhibit 10, San Rafael Demolition Plan, shows details of existing demolition and grubbing within the site as well as existing features to be protected in place; and Exhibit 11, San Rafael Grading Plan, shows the limit of grading and the existing and proposed elevations with the Project.

The Project was designed to maximize avoidance of trees, particularly native and/or protected species. As discussed further in "Construction Scenario" below, additional staging and laydown areas are defined beyond the Project footprint; however, these areas were limited to areas without trees. As shown in Table 3, a total of 29 trees were surveyed within the disturbance footprint of the San Rafael site, all of which are within City of Pasadena. Implementation of the San Rafael BMP would involve removal of 6 protected trees–all blue elderberry (*Sambucus nigra* ssp. *caerulea*), a native species–and the remaining 23 trees would be protected in place during construction and have been integrated into the site design. The Project's landscape concept proposes planting 61 native trees as well as native shrubs and groundcovers at the San Rafael site. Exhibit 8 provides an illustration of the landscape concept for the San Rafael site. Refer to Section 2.4, Biological Resources, for further details regarding tree impacts and mitigation.

During wet weather events, modeled hourly flow rates for the San Rafael drainage area range from less than 200 cfs to nearly 1,200 cfs. A diversion structure is proposed as a drop inlet at the Creek bottom with a 6.3 cfs gravity diversion. As shown on Exhibits 9 and 10, diverted water would flow along a proposed rock-lined stream that would parallel San Rafael Creek, pass beneath the pathway in a 60-inch-diameter drain, daylight on the south side of the pathway into a proposed sediment forebay, and then pass a proposed riprap berm into a proposed rock-lined stream. The flows would pass through a proposed culvert into the

Source: MIG, Inc. 2023

San Rafael Bird's Eye View

Exhibit 7

Arroyo Seco Water Reuse Project

PSOMAS

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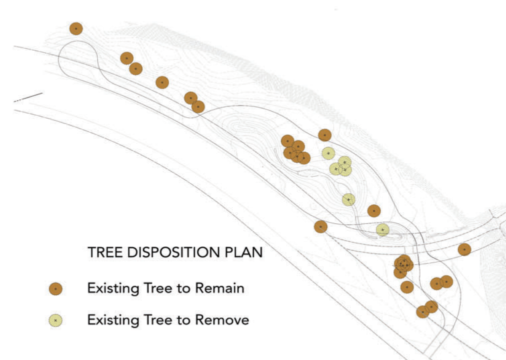
LEGEND

1. Decomposed Granite Path
2. Decomposed Granite Driveway
3. Reclaimed Wood Log Bench
4. Informational Sign
5. Headwall
6. Concrete Channel Cover and Bridge
7. Existing Bridge



TREE DISPOSITION PLAN

- Existing Tree to Remain
- Existing Tree to Remove

Source: MIG, Inc. 2023

San Rafael Concept Plan

Exhibit 8

Arroyo Seco Water Reuse Project

PSOMAS

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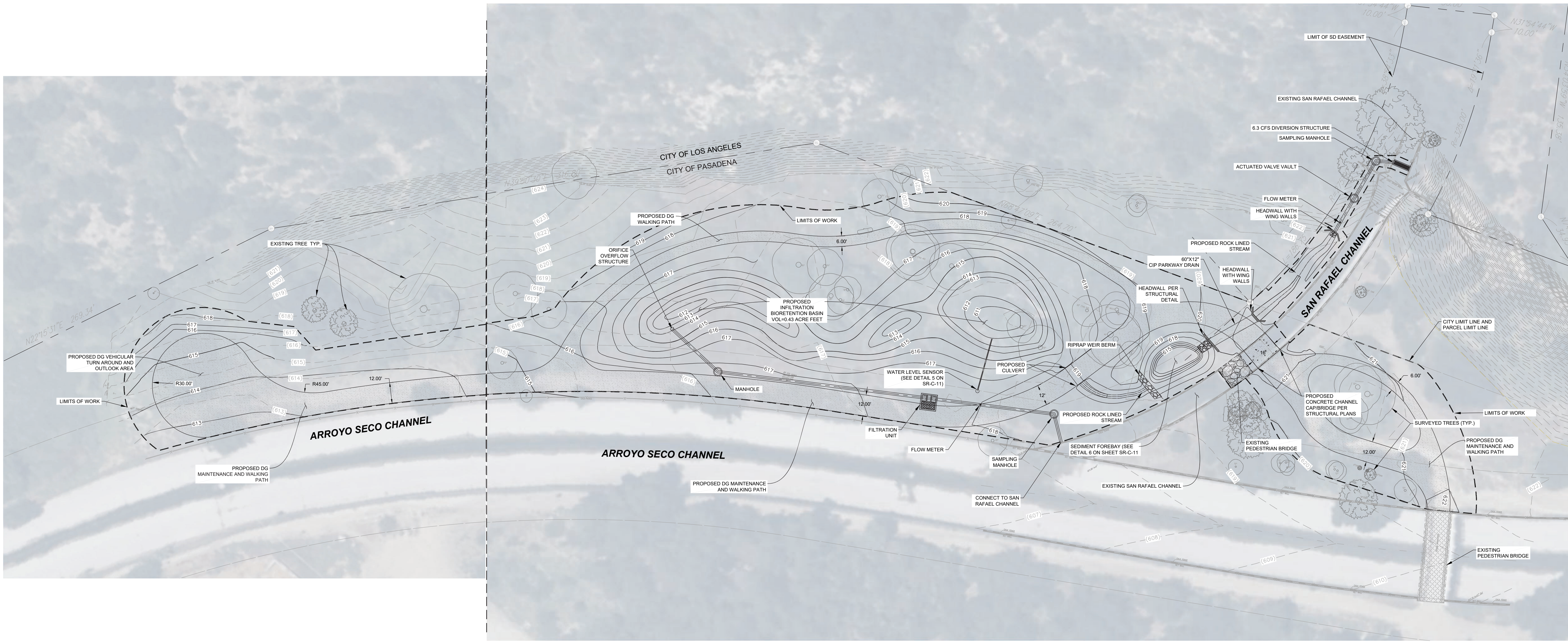

Source: Craftwater Engineering, Inc. 2023

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San Rafael Site Plan

Exhibit 9

Arroyo Seco Water Reuse Project

PSOMAS

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Source: Craftwater Engineering, Inc. 2023

San Rafael Demolition Plan

Exhibit 10

Arroyo Seco Water Reuse Project

PSOMAS

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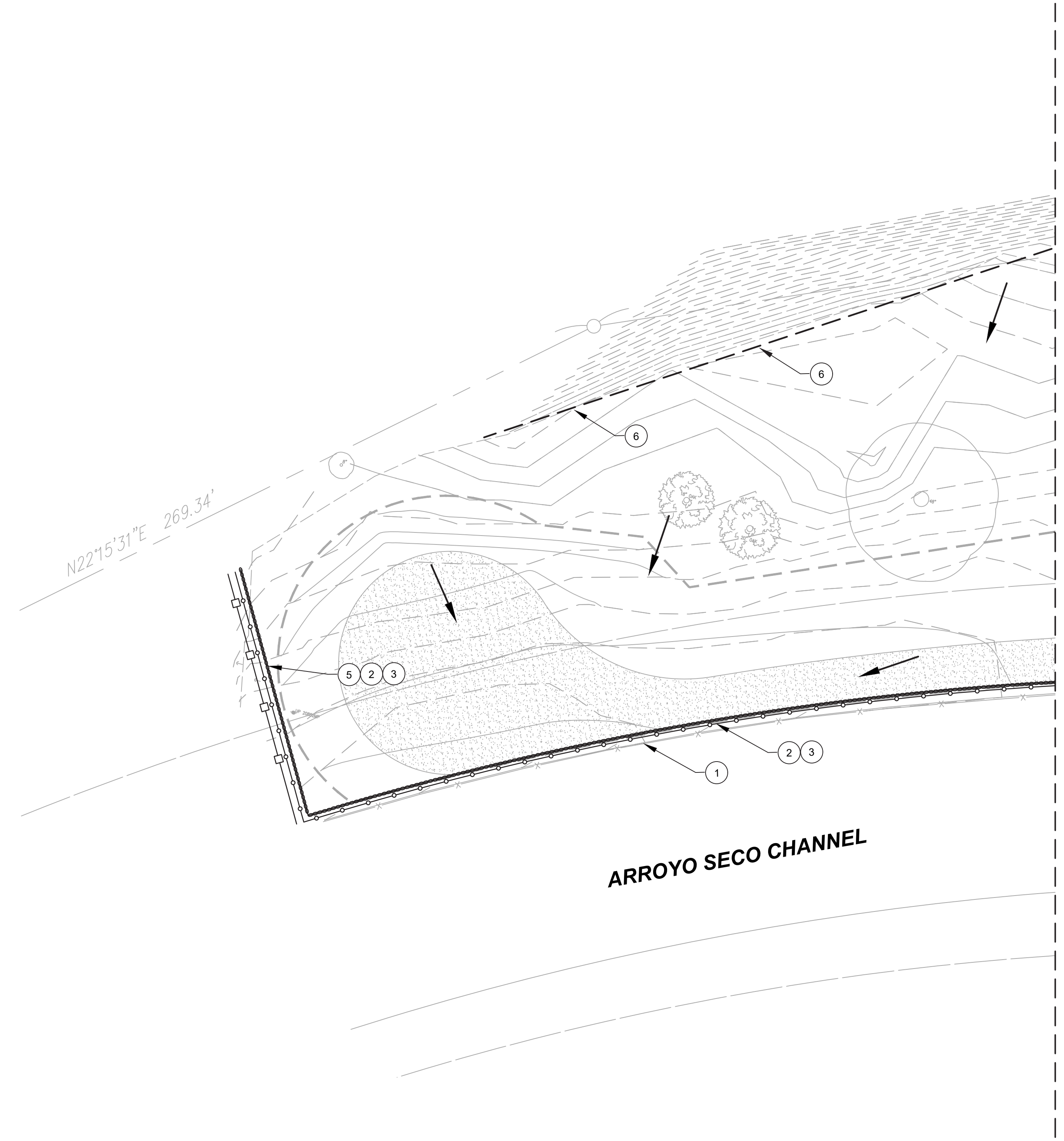


LEGEND

- CONSTRUCTION FENCE AND WIND SCREEN
- SILT FENCE
- FIBER ROLLS
- GRAVEL BAGS
- STORMWATER FLOW DIRECTION
- CONSTRUCTION EQUIPMENT STORAGE AREA
- MATERIAL STORAGE AREA
- STOCKPILE AREA
- STABILIZED CONSTRUCTION ENTRANCE/EXIT

CONSTRUCTION NOTES

1	USE THE EXISTING FENCE AS THE CONSTRUCTION FENCE. INSTALL WIND SCREEN.
2	INSTALL SILT FENCE PER LADPW SC-1.
3	INSTALL SANDBAG BARRIER, 3 HIGH, PER CASQA SC-8
4	PROPOSED BIORETENTION SUMP AREA DEWATERING SYSTEM TO BE DESIGNED AND INSTALLED BY DEWATERING ENGINEER.
5	INSTALL 6' HIGH CONSTRUCTION FENCE AND WIND SCREEN.
6	INSTALL FIBER ROLLS AT THE TOE OF THE SLOPE PER LADPW SC-5.
7	INSTALL STABILIZED CONSTRUCTION ENTRANCE/EXIT PER LADPW TC-1.
8	PROVIDE AND MANAGE PORTABLE RESTROOMS AND DOUBLE CONTAINMENT PER LADPW WM-9. FINAL LOCATION TO BE DETERMINED BY CONTRACTOR.
9	PROVIDE AND MANAGE CONSTRUCTION EQUIPMENT STORAGE AREA PER SLADPW NS-8, NS-9, AND NS-10. FINAL LOCATION TO BE DETERMINED BY CONTRACTOR.
10	PROVIDE AND MANAGE MATERIAL STORAGE AREA PER LADPW WM-1 AND WM-2. FINAL LOCATION TO BE DETERMINED BY CONTRACTOR.
11	PROVIDE AND MANAGE STOCKPILE AREA PER LADPW WM-3. FINAL LOCATION TO BE DETERMINED BY CONTRACTOR.

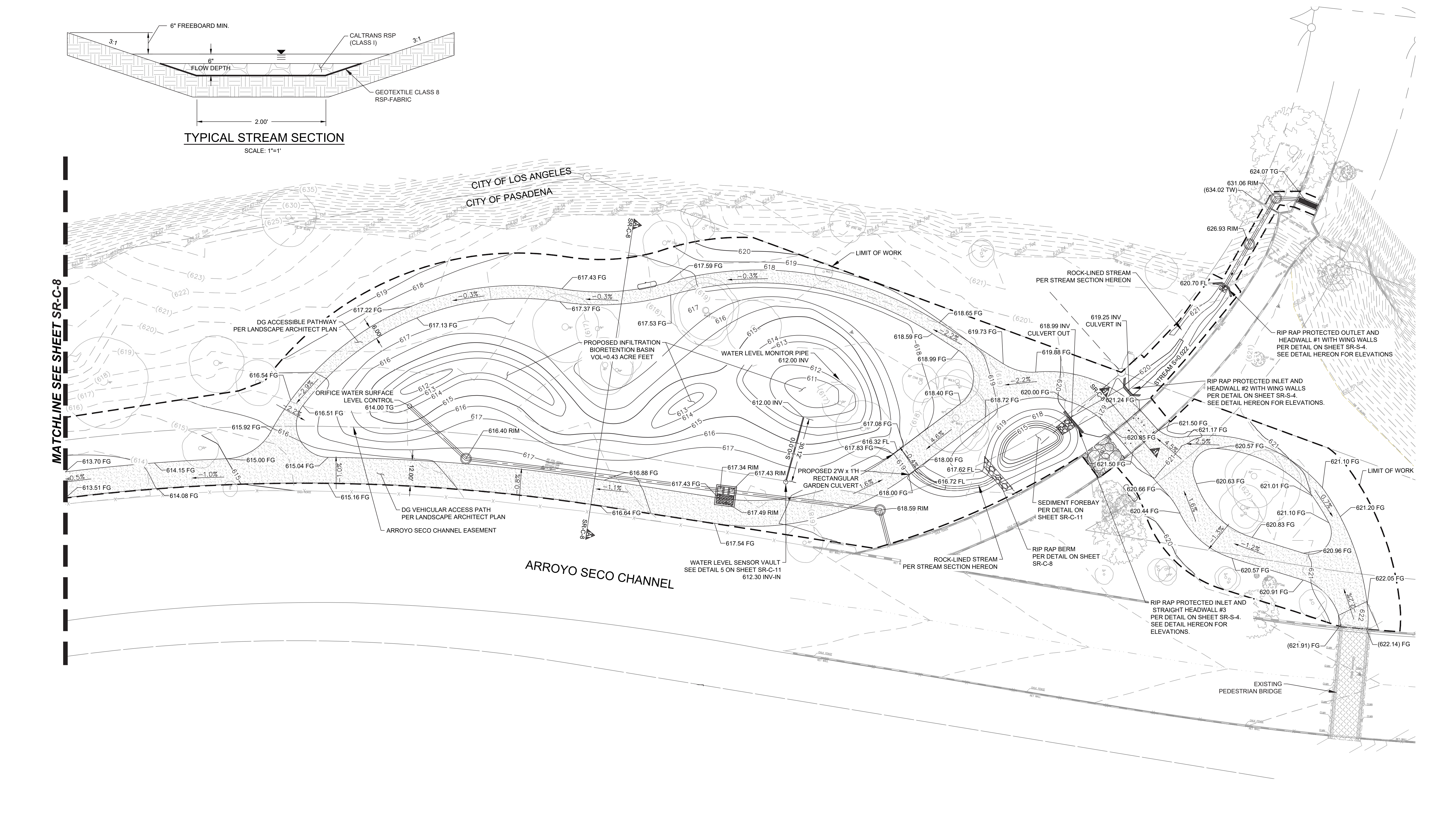
Source: Craftwater Engineering, Inc. 2023

San Rafael Grading Plan

Exhibit 11a

Arroyo Seco Water Reuse Project

PSOMAS



Source: Craftwater Engineering, Inc. 2023

San Rafael Grading Plan

Exhibit 11b

Arroyo Seco Water Reuse Project

PSOMAS

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D:\Projects\3PAS010750\Graphics\MND\Ex_San_Rafael_Grading_Plan_B.ai proposed treatment wetland. The basin would occupy a total footprint of 0.25 acre and have a total volume of 0.437-acre-foot (af) with 0.068 af reserved for infiltration only. The San Rafael BMP would include dual infiltration and filtration treatment in the basin. In a combined treatment configuration, diverted flows would first enter the basin to be treated through infiltration only. When the water level is above the filter outlet, the water would be filtered prior to being discharged. If the diverted flow volume is larger than the filtered flow, the excess flow would still contribute to filling the basin until the basin is full. The proposed San Rafael BMP configuration is expected to provide full capture of the 85th percentile 24-hour design storm peak flow and runoff volume. Other BMP infrastructure that would be installed to operate, maintain, and monitor the San Rafael BMP include reinforced concrete pipe (RCP), sampling manholes, flow meters, water level sensor, jellyfish filter, and actuated valves. While these components are shown on the engineering plans, they would be hidden from view as much as feasible by location (e.g., underground) or screening.

The Arroyo Seco Trail runs along both sides of the Arroyo Seco Channel immediately upstream of the San Rafael confluence; and an existing traffic-rated bridge crosses the Channel approximately 225 feet downstream of the San Rafael Avenue overpass. This bridge would provide access to the San Rafael BMP. There is also an existing pedestrian/equestrian bridge over the San Rafael Creek. The Project would maintain this bridge and construct a new, 16-foot-wide traffic-rated concrete bridge over the Creek to facilitate pedestrian, equestrian, and maintenance vehicle (only) access to the site. The new bridge would be the primary circulation route proposed for all visitors, including the public and maintenance staff.

The existing trail network in and around the San Rafael site is the sole existing recreational feature. The Project would improve the section of Arroyo Seco Trail along the length of the San Rafael site and provide new pathways to and around the treatment wetlands as stabilized decomposed granite (DG) trails (refer to Exhibits 7 through 9). A portion of the new or improved trails would be designed to allow maintenance vehicle access, as well as equestrian and pedestrian use; and a portion of the new trails would be designed to be pedestrian-only paths. This would expand public access for passive recreation opportunities throughout the San Rafael site, enhance the existing trail network connecting Pasadena and South Pasadena, and contribute to regional trail connectivity through the length of the Arroyo Seco.

<u>San Pascual Site BMP</u>

The San Pascual Site BMP would consist of the following components, which are discussed further below:

- Pretreatment device with hydrodynamic separator;
- Pump station;
- Two (0.73-acre total) sequential treatment wetlands;
- Headwalls and wingwalls, pipeline(s), meter(s), valve(s), filter(s), manhole(s), and utility pole; and
- Landscape and hardscape elements, including new trees and other vegetation, trail expansions, and informational signage.

The San Pascual site is situated at the intersection of San Pascual Avenue and Stoney Drive and is occupied by a densely vegetated parcel with an existing treatment wetland that has not been properly maintained and is no longer functioning to its full capacity. The San Pascual BMP would divert dry weather flows and stormwater from the Arroyo Seco Channel (LACFCD's Concrete Conduit Section 2) at an existing diversion structure that already directs flows into the San Pascual site. The flows would enter the proposed treatment facilities before the portion not infiltrated is directed to the existing outlet pipe at the south end of the site connecting to the Arroyo Seco Golf Course. Exhibit 12, San Pascual Bird's Eye View; Exhibit 13, San Pascual Concept Plan; and Exhibit 14, San Pascual Site Plan, provide different views and levels of detail of the proposed BMP at the San Pascual site. Exhibit 15, San Pascual Demolition Plan, shows details of existing demolition and grubbing within the site as well as existing features to be protected in place; and Exhibit 16, San Pascual Grading Plan, shows the limit of grading on the site and the existing and proposed elevations with the Project.

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Source: MIG, Inc. 2023

San Pascual Bird's Eye View

Exhibit 12

Arroyo Seco Water Reuse Project

PSOMAS

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LEGEND

1. Decomposed Granite Path
2. Concrete Path
3. Reclaimed Wood Log Bench
4. Informational Sign
5. Concrete Seatwall
6. Vehicular Gate
7. Post and Rail Fence

TREE DISPOSITION PLAN

- Existing Tree to Remain
- Existing Tree to Remove

Source: MIG, Inc. 2023

San Pascual Concept Plan

Exhibit 13

Arroyo Seco Water Reuse Project

PSOMAS

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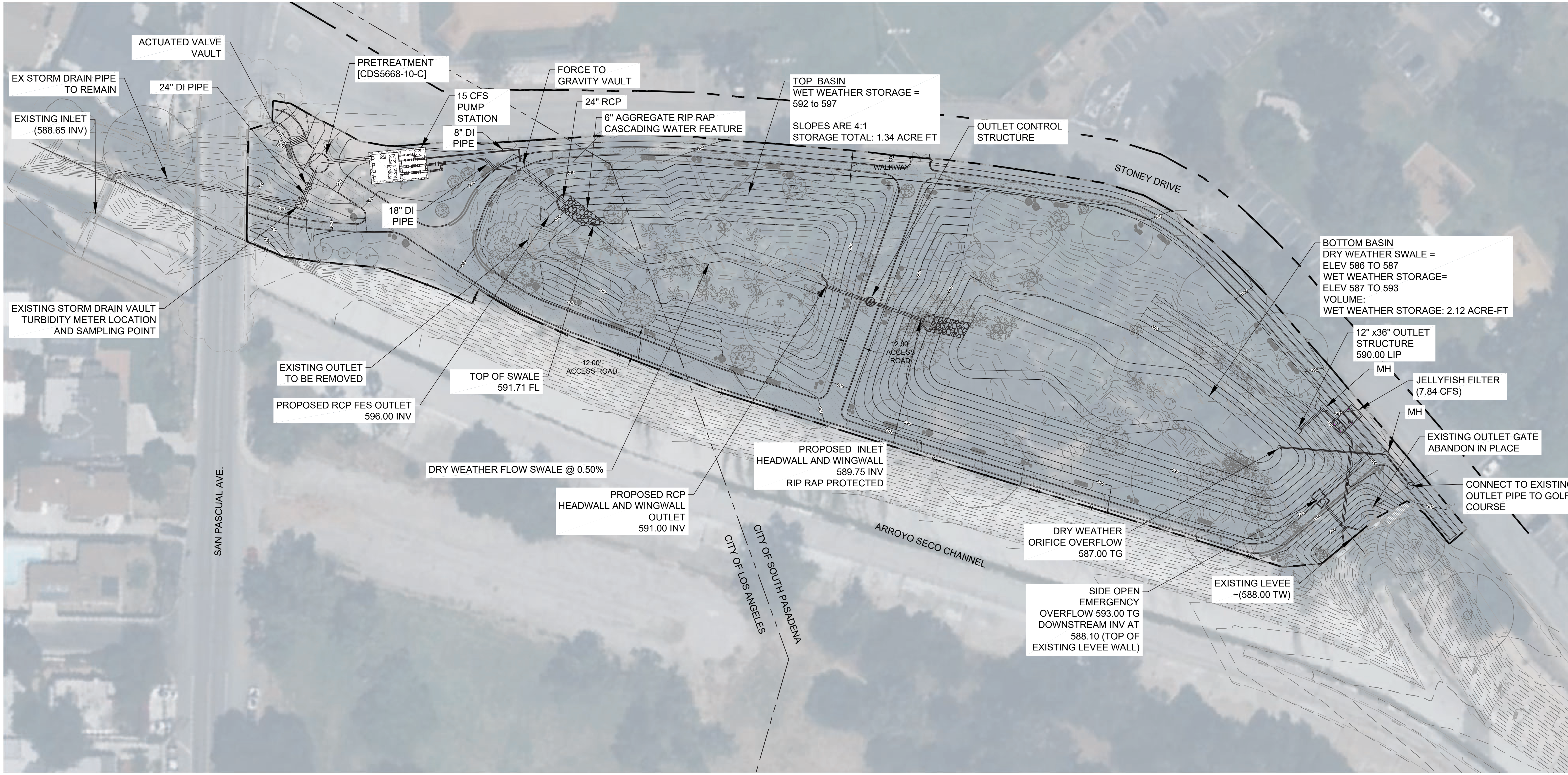


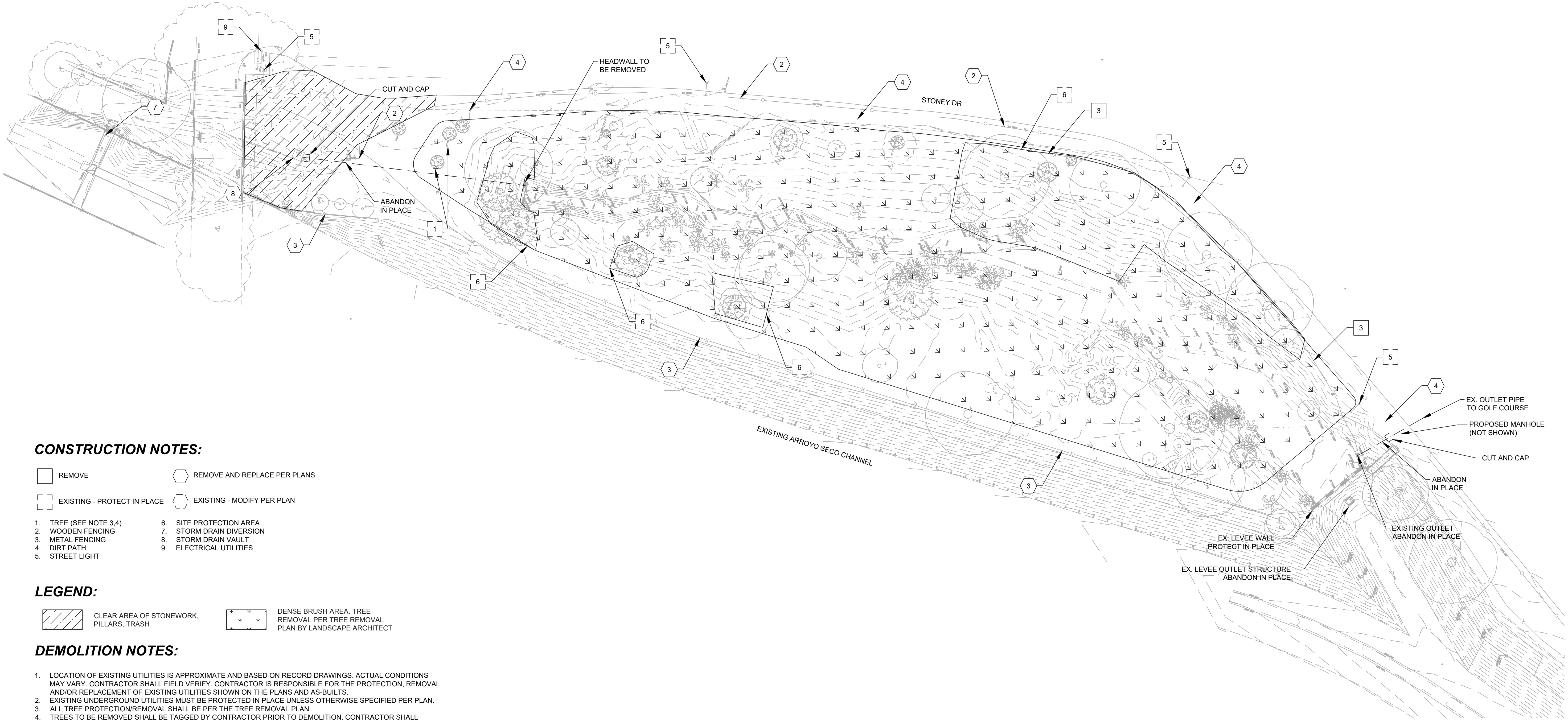
Source: Craftwater Engineering, Inc. 2023

San Pascual Site Plan

Exhibit 14

Arroyo Seco Water Reuse Project

PSOMAS



CONSTRUCTION NOTES:

REMOVE

REMOVE AND REPLACE PER PLANS

EXISTING - PROTECT IN PLACE

EXISTING - MODIFY PER PLAN

1. TREE (SEE NOTE 3,4)
2. WOODEN FENCING
3. METAL FENCING
4. DIRT PATH
5. STREET LIGHT
6. SITE PROTECTION AREA
7. STORM DRAIN DIVERSION
8. STORM DRAIN VAULT
9. ELECTRICAL UTILITIES

LEGEND:

CLEAR AREA OF STONEWORK, PILLARS, TRASH

DENSE BRUSH AREA. TREE REMOVAL PER TREE REMOVAL PLAN BY LANDSCAPE ARCHITECT

DEMOLITION NOTES:

1. LOCATION OF EXISTING UTILITIES IS APPROXIMATE AND BASED ON RECORD DRAWINGS. ACTUAL CONDITIONS MAY VARY. CONTRACTOR SHALL FIELD VERIFY. CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION, REMOVAL AND/OR REPLACEMENT OF EXISTING UTILITIES SHOWN ON THE PLANS AND AS-BUILTS.
2. EXISTING UNDERGROUND UTILITIES MUST BE PROTECTED IN PLACE UNLESS OTHERWISE SPECIFIED PER PLAN.
3. ALL TREE PROTECTION/REMOVAL SHALL BE PER THE TREE REMOVAL PLAN.
4. TREES TO BE REMOVED SHALL BE TAGGED BY CONTRACTOR PRIOR TO DEMOLITION. CONTRACTOR SHALL REMOVE TREES AFTER APPROVAL FROM THE CITY. NEW TREES SHALL BE INSTALLED PER THE LANDSCAPE PLANTING PLANS.
5. CONTRACTOR TO FIELD VERIFY UTILITY LINE PRIOR TO EXCAVATION.
6. REMOVE AND REINSTALL IRRIGATION LINES AND IRRIGATION CONTROL VALVES AS NEEDED. ANY IRRIGATION LINES NOT SHOWN ON THE DEMOLITION PLANS THAT ARE IMPACTED BY CONSTRUCTION SHALL BE REMOVED AND REPLACED IN KIND. ADJUST SPRINKLER HEAD ELEVATIONS TO MATCH NEW FINISHED GRADES SHOWN ON THE GRADING PLAN.

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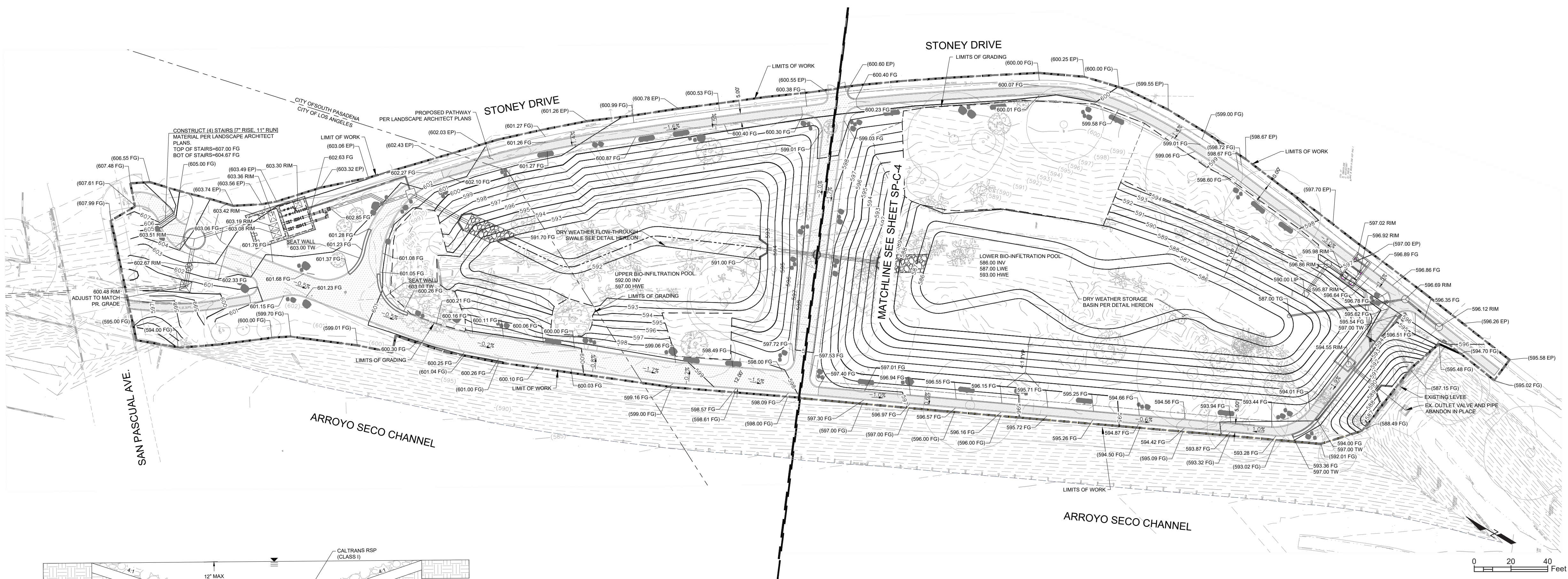
Source: Craftwater Engineering, Inc. 2023

San Pascual Demolition Plan

Exhibit 15

Arroyo Seco Water Reuse Project



GRADING NOTES:

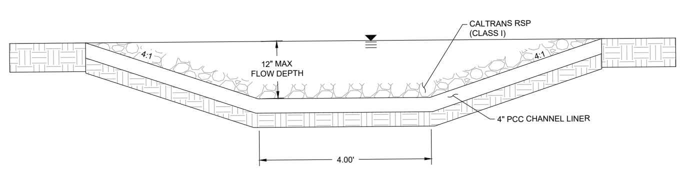
1. PROPOSED GRADING SHALL MATCH EXISTING GRADES AT THE LIMIT OF WORK. WHERE PROPOSED GRADES MEET EXISTING GRADES, CONTRACTOR SHALL BLEND GRADES TO PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING AND NEW WORK AND ENSURE NO PONDING AREAS ARE CREATED.

2. GRADE ALL AREAS TO DRAIN

3. PROPOSED WALKWAYS SHALL BE CONSTRUCTED WITH A CROSS SLOPE OF NO MORE THAN 2.0% AND A LONGITUDINAL SLOPE OF NO MORE THAN 5.0%.

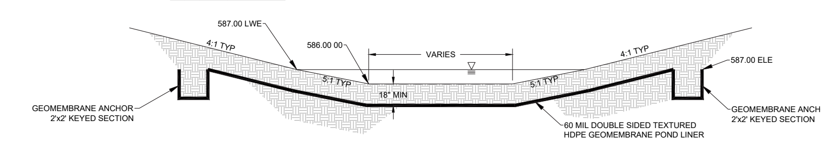
4. CONTRACTORS SHALL MAINTAIN POSITIVE DRAINAGE AWAY FROM ALL BUILDING FOUNDATIONS AND STRUCTURES.

5. CONTRACTOR SHALL ADJUST UTILITY ELEMENTS MEANT TO BE FLUSH WITH GRADE (I.E. UTILITY MANHOLES, CATCH BASINS, ETC.) THAT ARE AFFECTED BY SITE WORK OR GRADE CHANGES, WHETHER SPECIFICALLY NOTED ON THE PLANS OR NOT.



TYPICAL DRY WEATHER SWALE SECTION

SCALE: NTS



TYPICAL DRY WEATHER STORAGE BASIN SECTION

SCALE: NTS

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Source: Craftwater Engineering, Inc. 2023

San Pascual Grading Plan

Exhibit 16

Arroyo Seco Water Reuse Project

PSOMAS

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As discussed above, the Project was designed to maximize avoidance of trees. As discussed further in "Construction Scenario" below, additional staging and laydown areas are defined beyond the Project footprint; however, these areas were limited to areas without trees. As shown in Table 3, a total of 166 trees were surveyed within the disturbance footprint of the San Pascual site. Implementation of the San Pascual BMP would involve removal of 136 trees, which includes 36 protected trees. Most of the existing trees being removed at San Pascual that are not protected under a tree ordinance (100 trees) are Mexican fan palms (83 trees), which represent the primary species mapped in the non-native ornamental woodland present in the central portion of this site. All trees being removed and not covered under a tree ordinance are both non-native and invasive plant species.

Of the 36 protected trees to be removed, 27 are within South Pasadena's jurisdiction and 9 are within Los Angeles' jurisdiction and all are native species. The remaining 30 existing trees, both native and non-native, would be protected in place and have been integrated into the site design. The Project's landscape concept proposes planting 132 additional native trees as well as native shrubs and groundcovers. Exhibit 14 provides an illustration of the landscape concept for the San Pascual site. Refer to Section 2.4, Biological Resources, for further details regarding tree impacts and mitigation.

As shown on Exhibit 6, the San Pascual site drains a large tributary area (over 5,000 acres). The area includes 863 acres of impervious area and generates an average annual runoff of 1,305 af. As noted above, the diversion structure would be an existing inlet with a 15.0 cfs pumped diversion into a pretreatment device. A pumped, rather than gravity, diversion was selected to minimize excavation and costs. Stormwater runoff transports sediment, metals, nutrients, trash, and debris that can compromise the performance of the stormwater facility and pollute downstream receiving waters. Pretreatment would be an integral component of the treatment train strategy to extend the life of the system. A hydrodynamic separator is proposed to be installed at the San Pascual diversion point. One hundred percent of floatables and neutrally buoyant debris larger than the screen aperture (2.4 millimeters) would be collected and settle in the isolated sump of the system. At least 80 percent of particles that are 130 microns or larger in size would be removed for the proposed diversion flow. With the chambered system, hydrocarbons float to the top of the water surface and would be prevented from being transported downstream.

As shown on Exhibits 14 and 15, diverted, pre-treated water would pass through a proposed pump station and then be directed into two sequential proposed treatment wetlands–herein referred to as the top basin and bottom basin. The top basin would have 1.34 af of wet weather storage capacity and the bottom basin would have 2.12 af of wet weather storage capacity, with a combined footprint of 0.73 acre providing 3.46 af of wet weather storage. A cascading water feature with protective aggregate rip rap along the northern end of each basin wall would lead to a dry weather flow swale present along the basin bottom. An outlet control structure is proposed to connect the two basins, with an outlet at the south end of the top basin and an inlet at the north end of the bottom basin. The bottom basin would have dry weather overflow and emergency overflow outlets. The San Pascual BMP would direct and store dry weather flows for irrigation reuse and infiltrate a portion of wet weather flows. The basins have been designed such that incoming flows are distributed evenly between the two basins. If the top basin cannot accept any more flow, runoff would continue to accumulate in the bottom basin. All possible diversion rates were analyzed for an optimized filtration and infiltration configuration that balances water supply and water quality benefits from the San Pascual BMP. The San Pascual BMP would also provide dual infiltration and a 7.84 cfs filtration capacity.

Based on the infiltration rate of 3.3 inches per hour, capture of the 85th percentile design volume was determined not to be feasible at the San Pascual BMP given the previously developed footprint. Therefore, this site would be designated as a dry-weather BMP under the Safe, Clean Water Program scoring criteria. With a 15 cfs diversion rate, the San Pascual BMP was estimated to treat 534 af of average annual runoff (dry and wet weather flows). This site would experience 230 af of average annual dry weather flows. Table 4, Average Annual Performance of the San Pascual BMP (AF), summarizes the long-term performance based on modeling of this BMP design.

TABLE 4
AVERAGE ANNUAL PERFORMANCE OF THE SAN PASCUAL BMP (AF)

Stormwater Filtration	Irrigation Reuse	Groundwater Recharge	Water Supply Benefit	Total Runoff Treated
214	30	258	320	534

af: acre-feet
Source: Craftwater Engineering, Inc. 2022 (September). *San Pascual Stormwater Capture Facility; Stormwater Capture Study Technical Memorandum*. Los Angeles, CA: Craftwater Engineering, Inc.

The proposed San Pascual BMP can treat 100 percent of dry-weather flows, as required under the Safe, Clean Water Program, while also removing over 70 percent of divertible pollutants. The annual irrigation water demand has been estimated at 30 af/year for the Arroyo Seco Golf Course. The San Pascual BMP has been designed to provide the total estimated annual irrigation water to the Golf Course, thereby reducing demand on potable water supplies.

Other BMP infrastructure that would be installed to operate, maintain, and monitor the San Pascual BMP include ductile iron (DI) pipe, manholes, inlet and outlet headwalls and wingwalls, jellyfish filter, turbidity meter, sampling point, and actuated valve vault. While these components are shown on the engineering plans, they would be hidden from view as much as feasible by location (e.g., underground) or screening. As indicated on Exhibit 14, some existing engineering features would be abandoned in place. Also, a new wooden utility pole would be installed near the existing utility pole at the northern end of the San Pascual site and used to connect electric (i.e., SCE) service; all power lines connecting to this utility pole would be installed underground in the remainder of the site. Additionally, a two-inch-diameter water line would be installed across Stoney Drive between the San Pascual site and Arroyo Park. The water line would have a meter and backflow preventer onsite and would connect to an existing six-inch-diameter water line on the east side of Stoney Drive. The off-site water line would be installed via trenching; due to the small size of the proposed pipeline the width and depth of the trench would likely be less than one foot. The surface would be returned to its existing condition after installation of the water line is completed. The purpose of this water line would initially be to provide irrigation water to the newly planted landscaping; after the landscaping is established the on-site irrigation infrastructure would be removed but the water line would remain as a quick connection point in the event of extended drought conditions, “hot spots” in the landscape that require temporary supplemental water, and/or for maintenance needs.

The Project would improve the existing pedestrian/equestrian trail along the eastern side of the site, which is the sole existing recreation feature at the San Pascual site. The Project would also provide new pathways to and around both basins as stabilized DG trails (refer to Exhibits 12 through 14). A portion of the new trail would be designed to allow maintenance vehicle access, as well as equestrian and pedestrian use; and a portion of the new trails would be designed to be pedestrian-only paths. A vehicular gate would be installed on the east side of the site where the two basins are divided, for maintenance access only. The Project would expand public access for passive recreation opportunities throughout the San Pascual site, enhance the existing trail network connecting Pasadena and South Pasadena, and contribute to regional trail connectivity.

<u>Construction Activities</u>

Project construction would begin in Summer 2024 and occur over a total period of approximately 17 months in a single phase, with semi-consecutive construction of the San Rafael and San Pascual BMPs. It is noted that for purposes of air quality modeling, construction was estimated to begin in Spring 2024.The San Rafael construction period would be approximately 9 months and the San Pascual construction period would be approximately 13 months. Construction at the San Pascual site would be initiated after demolition, site preparation, and grading activity at San Rafael are complete, which is expected to require about 4 months.

Therefore, there would be construction activity at San Rafael only for 4 months, construction at both sites simultaneously for 5 months, and construction at San Pascual only for 8 months.

Project construction is anticipated to occur from Monday through Friday, between the hours of 7:00 AM and 5:00 PM, without activity on weekends or federal holidays. The Project is anticipated to be fully operational in Summer 2025. Construction equipment would vary by phase and include, but not be limited to: an excavator(s), bulldozer(s), tree trimmer, skid steer/bobcat loader(s), mobile crane, and compact roller. Asphalt paver and cement trucks would visit the sites as needed to implement the Project. Equipment staging and parking for construction workers would be on public property, either on-site or on the surrounding areas.

Exhibit 17, Project Construction Footprints, illustrates the Project disturbance footprints and the potential staging and laydown areas in the vicinity of the Project for each BMP site. Table 5, Summary of Disturbance and Staging Areas (AC), provides the acreage of the disturbance, or grading, footprint and the staging and laydown area(s) for each BMP site.

TABLE 5
SUMMARY OF DISTURBANCE AREAS (AC)

BMP Site	Disturbance (Grading) Footprint	Staging and Laydown Area
San Rafael	1.5	0.30
San Pascual	2.2	0.25
Totals	**3.7**	**0.54**
ac: acres Notes: Some totals may not add due to rounding. The San Pascual staging area is paved/disturbed.		

Construction would not require staging along adjacent public roadways or other areas that would disrupt existing traffic patterns. There may be occasions where large construction equipment or construction materials are transported across Stoney Drive (i.e., between the staging/laydown area and the site), requiring temporary traffic control. Also, as discussed above, a two-inch-diameter water line would be installed across Stoney Drive via trenching. This would involve temporary closure of one lane of the road at a time. However, no street or other lane closures, or street improvements, would be required to implement the Project.

As shown in Exhibit 17, for the San Rafael site, four separate, irregularly-shaped, areas at the Project footprint boundary have been identified for staging. Because of the steep slopes adjacent to the north and west and the Arroyo Seco Channel to the east, available space for construction activity at the San Rafael site is limited. The staging areas at the San Rafael site encompass 0.30 acre. The primary access point for construction traffic at the San Rafael site would be via San Pascual Avenue, then north through the paved parking lot at San Pascual Stables and continuing west along the unpaved road immediately north of the stables towards the Channel. A temporary bridge would span the Arroyo Seco Channel at this point to provide access to the west side of the Channel. The bridge is necessary to have access to the San Rafael site that would accommodate the potential weight of all anticipated construction vehicles. The abutments on either side of the temporary bridge would not touch the limits of the Channel itself and would be removed at the end of construction. A safe path for equestrian and pedestrian traffic at the northern (upstream) end of the San Rafael site during construction would be made available to the maximum extent feasible. There would be brief periods where the existing trail alignment on the west side of the Channel at the bridge crossing would be restricted to public access for safety and/or to allow the proposed improvements in this portion of the site to be completed. The City of Pasadena has been in communication with the San Pascual

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San Rafael Site Construction Footprint

Exhibit 17a

Arroyo Seco Water Reuse and Natural Stream Restoration Project

PSOMAS

(Rev: 11-17-2023 JVR) R:\Projects\PAS_Pasaden\3PAS010750\Graphics\MND\ex_Impacts_SanRafael.pdf

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San Pascual Site Construction Footprint

Exhibit 17b

Arroyo Seco Water Reuse and Natural Stream Restoration Project

N W E S

120 60 0 120 Feet

PSOMAS

(Rev: 11-17-2023 JVR) R:\Projects\PAS_Pasaden\3PAS010750\Graphics\MND\ex_Impacts_SanRafael.pdf

Stables and would continue to communicate regarding equestrian access at both sites throughout the construction period.

For the San Pascual site, the paved parking lot with approximately 18 spaces that serves the adjacent ballfields in the southeast corner of San Pascual Avenue and Stoney Drive, in South Pasadena, has been identified as a staging and laydown area. This would result in closure of this parking lot to public and other municipal use during the construction period. The staging areas at the San Pascual site encompass 0.25 acre. There is additional parking for the ballfields and Arroyo Park along Stoney Drive and in the Arroyo Park paved parking lot, as well as street parking available on San Pascual Avenue. At least a single lane for vehicular traffic along Stoney Drive at the San Pascual site as well as a safe detour for equestrian and pedestrian traffic would be available at all times through the construction period. The main point of ingress and egress for construction traffic, including private worker vehicles, at the San Pascual site would be via San Pascual Avenue and Stoney Drive.

For the water harvester, installation would involve constructing a concrete pad slightly larger than the 288-sf prefabricated building and an approximate 5-foot by 5-foot (25 sf) concrete pad for the AST. Excavation for the concrete pads is estimated to be in the order of 1 foot deep. The existing concrete paving would be removed and a foundation appropriate for the water harvester building and AST would be constructed. Power for the water harvester would be via a connection to the existing Southern California Edison (SCE) facilities present within the maintenance yard. Trenching to lay the electric connection to the south or southeast exterior of the main building in the yard, a distance of 10 to 15 feet, would be on the order of 3 feet deep. It is possible the pumps in the existing reservoir would need to be replaced. If this is necessary, the existing pumps are on rails and would be pulled out and replaced in kind. No dewatering of the reservoir would be required. Ingress and egress for construction traffic associated with installation of the water harvester and related infrastructure would be via Lohman Lane.

Construction and demolition debris would be disposed at Scholl Canyon Landfill, located approximately 2.5 miles northwest of the site, at 3001 Scholl Canyon Road in Glendale. Also, consistent with the City of Pasadena's *Construction and Demolition Waste Management Ordinance* (Section 8.62 et. seq. of the PMC), a minimum of 75 percent of the construction and demolition debris generated during construction would be diverted through recycling or reuse. Prior to diversion, an estimated 600 cubic yards (cy) of demolition debris, 3,000 cy of greenwaste, and 6,000 cy of excavated soil would be generated from construction of both sites. Grading and excavation at both sites would range from 2 to 15 feet in depth. Assuming use of 14-cy haul trucks, construction of the San Rafael site would generate an estimated 300 one-way truck trips over the course of 4 months, or an average of 3 to 4 one-way truck trips per day. Construction of the San Pascual site would generate an estimated 600 one-way truck trips over the course of 5 months, or an average of 6 one-way truck trips a day.

Construction requires working on portions of the San Rafael Creek under LACFCD jurisdiction. The LACFCD requires that the hydraulics of the existing infrastructure not be negatively affected, and that access is maintained. The cities would be required to enter into an operation and maintenance agreement with the LACFCD for continued access to the constructed diversion structures.

Project Operation

Public Use and Access

The recreation features proposed as part of the water conservation Project would be available for public use from sunrise to sunset, which is consistent with the Arroyo Seco as a whole. The proposed Project would provide expanded and improved physical facilities and open space resources to existing users of the Lower Arroyo Seco. However, the Project is not anticipated to directly increase use of the Lower Arroyo Seco area as a destination. It is expected that existing users of the Arroyo Seco area would use the proposed Project features, as they are similar to passive and active recreation features existing in the area.

Operation and Maintenance

Long-term maintenance of the proposed systems is vital to its continued operation. The responsible party for the operation and maintenance (O&M) of Project would be both Pasadena and South Pasadena for the San Rafael and San Pascual sites, respectively. The two cities would coordinate to ensure efficient maintenance and operation of the proposed BMPs. Anticipated long-term O&M tasks at one or both sites would include, but not be limited to:

- Diversion Structure – Inspection and Cleaning
- Wet Well – Wet and Dry Season Inspection and Cleaning
- Storage – Wet and Dry Season Inspection and Cleaning
- Pump Station – Inspection and Cleaning
- Stormwater Harvesting Device – Inspection & Cleaning
- Pretreatment Device – Vacuum
- Post-Treatment Filter Device – Vacuum
- Valve Maintenance
- Control Panel Maintenance
- Water Harvester Maintenance

Long-term maintenance is expected to involve, on average, a single visit to both sites and the water harvester per month by a two- to four- person crew during a one-day (e.g., up to eight-hour) visit. The maintenance performed during each visit would vary depending on the equipment status and the season (wet or dry). It is expected that maintenance personnel would travel to and from the sites in one to two vehicles – such as a pickup truck, or pickup truck and a vacuum truck, for instance. Occasional visits for more intensive maintenance activity or to respond to equipment issues may occur. This is an estimate of the O&M program for purposes of this IS/MND, as the final maintenance plan would be completed at the end of construction when actual brands and part information are available. The maintenance plan would include details on equipment needed during O&M activities and standard practices and procedures.

The Project would also have a vector (i.e., mosquito) minimization plan based on guidelines outlined in the California Department of Public Health's Checklist for Minimizing Vector Protection in Stormwater Management Sources. As part of design process, Pasadena has coordinated with the Greater Los Angeles County Vector Control District to review the design documents and ensure the system meets all requirements and minimizes the potential for vector increases.

Monitoring

Pasadena is required to demonstrate Project performance to the LARWQCB for acceptance towards the water quality objectives. A full monitoring plan would be developed as a part of the 100 percent design documentation and implemented as part of routine O&M activity. The preliminary constituents of concern identified for monitoring are metals (copper, lead, and zinc), bacteria, nitrogen compounds, and trash; and flow, pH, and temperature would also be monitored.

Discretionary Actions

City of Pasadena

The Project would require the following reviews and/or discretionary approvals by Pasadena:

- Approval of the Arroyo Seco Water Reuse Project,
- Adoption of the Arroyo Seco Water Reuse Project IS/MND,
- Urban Forestry Advisory Committee Review[3], and
- Award of contract for construction of the Arroyo Seco Water Reuse Project, and
- Other discretionary and ministerial permits and approvals that may be deemed necessary, including but not limited to, grading permit, foundation permit, and building permit.

City of South Pasadena

Pursuant to the MOU between Pasadena and South Pasadena executed in 2020, South Pasadena would rely on Pasadena's actions as Lead Agency under CEQA, including approval of the Project and adoption of the IS/MND, and to award and oversee the contract for construction of the Project. However, South Pasadena would be required a to issue of a tree removal permit for Project implementation.

City of Los Angeles

Similar to the MOU with South Pasadena, the City of Los Angeles has entered into an agreement with Pasadena and would rely on Pasadena's actions to implement the Project. This agreement establishes that Pasadena can have access to construct that portion of the San Pascual site within Los Angeles without additional discretionary actions by Los Angeles. The agreement also establishes that South Pasadena and Pasadena would have access to operate and maintain the portion of the San Pascual site within Los Angeles in perpetuity.

See Section 10, below, for a list of other public agencies whose approval is required.

9. Surrounding Land Uses and Setting:

Exhibits 1 and 2 illustrate the Project site locations and surrounding uses. Land uses surrounding the San Rafael site include the soft-bottom portion of San Rafael Creek and an undeveloped slope with single-family residential on the hilltop to the north (Los Angeles zoning of R1-1 [One-Family Zone]) at an elevation of approximately 40 feet above the site; the Arroyo Seco Channel, Arroyo Seco open space, and San Pascual Avenue to the east; San Pascual Stables located at 221 San Pascual Avenue, South Pasadena, to the south and southeast across the Arroyo Seco Channel; and undeveloped slopes and single-family residential (Los Angeles zoning of R1-1) on the hilltop to the west at elevations 160 to 200 feet above the San Rafael site. The nearest sensitive receptors to the San Rafael site are the residences on the hilltop to the north near the South San Rafael Avenue and Laguna Road intersection.

Land uses surrounding the San Pascual site include San Pascual Avenue and single-family residential (Los Angeles zoning of R1-1) on San Ramon Drive to the north; the Burke, Clarich, Nelson Fields (649 Stoney Drive, South Pasadena) and Arroyo Park (614 Stoney Drive, South Pasadena) beyond Stoney Drive to the east; Stoney Drive and the Arroyo Seco Channel to the south; and San Pascual Park (930 San Pascual Avenue, Los Angeles) across the Arroyo Seco Channel to the west; and single-family residential (Los Angeles zoning of R1-1) on North Avenue 67 to the northwest. The nearest sensitive receptors to the San

[3] UFAC (Urban Forestry Advisory Committee) review is not a discretionary action, but this body's review is used as part of Pasadena's discretionary decision-making regarding removal of trees on public lands.

Pascual site are the residences located across San Pascual Avenue approximately 60 ft to the north at the nearest points and approximately 120 ft to the northwest at the nearest points.

Land uses surrounding the water harvester site include the Arroyo Seco Golf Course to the north, east, and west; and Lohman Lane and the Arroyo Seco Channel to the west.

10. Other public agencies whose approval is required:

- California Department of Fish and Wildlife (Clean Water Act/Streambed Alteration Agreement);
- California Department of Parks and Recreation (Prop 68 Urban Counties Per Capita Program);
- Greater Los Angeles County Vector Control District (Mosquito Abatement);
- Los Angeles County (Measure W / Safe, Clean Water Program);
- Los Angeles County Flood Control District (Major Modification Permit, Discharge Permit, Use and Maintenance Agreement);
- Los Angeles County Department of Public Health (Cross Connection and Water Pollution Control Program);
- Los Angeles Regional Water Quality Control Board (Clean Water Act / Section 401 Water Quality Certification);
- State Water Resources Control Board (Construction General Permit); and
- U.S. Army Corps of Engineers (Clean Water Act / Section 404 Permit).

This IS/MND is intended to serve as the primary environmental document pursuant to CEQA for actions associated with the Project, including all discretionary approvals required to implement the Project, including those made by responsible, trustee, and other public agencies. In addition, this IS/MND is the primary reference document for the formulation and implementation of a mitigation monitoring and reporting program for the Project, in accordance with Section 15097 of the State CEQA Guidelines.

11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resource Code Section 21080.3.1? If so, has consultation begun?

Consultation pursuant to Section 21080.3.1 of the *Public Resources Code* and Assembly Bill (AB) 52 has been completed with the California Native American tribes affiliated with Pasadena, and who have requested consultation. Refer to Section 2.18, Tribal Cultural Resources, of this IS/MND for a complete discussion of the Native American consultation process for the Project.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this Project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Greenhouse Gas Emissions	☐ Public Services
☐ Agriculture and Forestry Resources	☐ Hazards and Hazardous Materials	☐ Recreation
☐ Air Quality	☐ Hydrology and Water Quality	☐ Transportation
☐ Biological Resources	☐ Land Use and Planning	☐ Tribal Cultural Resources
☐ Cultural Resources	☐ Mineral Resources	☐ Utilities and Service Systems
☐ Energy	☐ Noise	☐ Wildfire
☐ Geology and Soils	☐ Population and Housing	☐ Mandatory Findings of Significance

DETERMINATION:

On the basis of this initial evaluation:

I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.	
I find that, although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A MITIGATED NEGATIVE DECLARATION will be prepared.	X
I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.	
I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.	
I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.	

Jillian K Neary
Prepared By

11/17/2023
Date

Christina Monde
Reviewed By

11-17-23
Date

Jillian K. Neary
Printed Name

Christina Monde
Printed Name

Negative Declaration/Mitigated Negative Declaration adopted on: ________________

Adoption attested to by: ________________________ ________________
Signature Date

____
Printed Name

EVALUATION OF ENVIRONMENTAL IMPACTS:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact' is appropriate if there is substantial evidence that an effect is significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an Environmental Impact Report (EIR) is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Unless Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less than Significant Impact." The Lead Agency must describe the mitigation measures and briefly explain how they reduce the effect to a less than significant level (mitigation measures from Section 21, "Earlier Analysis," may be cross-referenced).

5) Earlier analysis may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. See CEQA Guidelines Section 15063(c)(3)(D). Earlier analyses are discussed in Section 21 at the end of the checklist.

    a) Earlier Analysis Used. Identify and state where they are available for review.

    b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

    c) Mitigation Measures. For effects that are "less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier documents and the extent to which address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used, or individuals contacted should be cited in the discussion.

8) The explanation of each issue should identify the following:

    a) The significance criteria or threshold, if any, used to evaluate each question; and

    b) The mitigation measure identified, if any, to reduce the impact to less than significant

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SECTION 2.0 ENVIRONMENTAL CHECKLIST FORM

2.1 AESTHETICS

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐

WHY? A scenic vista is generally defined as a viewpoint that provides panoramic or focused views of a highly valued landscape or scenic resource for the benefit of the general public. The EIR for the Pasadena General Plan provides the following description of the existing scenic features and visual resources in the City: "The City of Pasadena affords a variety of views of scenic landscapes and built environments. The San Gabriel Mountains, near the north City boundary, dominate the skyline from most of the City. The San Rafael Hills are along the western City boundary, and the Verdugo Mountains are further to the west. In addition, the Arroyo Seco corridor and Eaton Canyon traverse the western and eastern portions of the City, respectively. The City also offers scenic views of distinct architecture in the built environment, such as the Old Pasadena Historic District, Pasadena City Hall, Castle Green, St. Andrew Catholic Church bell tower, and Bungalow Heaven" (City of Pasadena 2015a). For purposes of this analysis, views by visitors on trails and other accessible open space areas within and of the Lower Arroyo Seco are considered views of a valued landscape and thus a scenic vista for analysis of the San Rafael site. The largely undeveloped, naturalized condition of the Lower Arroyo Seco, with built features being both low profile and widely spaced, is a prominent feature that contributes to the visual setting that many find valuable. However, the San Rafael site is situated at the southern tip of the Lower Arroyo Seco and is proximate to more developed or active recreation features such as San Pascual Stables and South Pasadena city parklands. South Pasadena's current General Plan defines that the "hillsides and ridgelines…provide a scenic backdrop for the entire community".

The Project's water capture and treatment concept, including use of materials, was designed to present a naturalized visual and ecological condition at the surface while meeting State-mandated water quality targets. Although the Project would not introduce large or otherwise view-obscuring structures into the landscape, it would construct new nature-based water treatment infrastructure in two locations; construct a new 16-foot-wide bridge/cap over San Rafael Creek; improve and expand DG trails; and install new or replacement hardscape including reclaimed wood log benches, post-and-rail fencing, concrete seatwalls, and informational signs. The primary treatment component at both sites are the basins and, at San Rafael, a rock-lined stream. As discussed in Section 1.0, other BMP infrastructure that would be installed to operate, maintain, and monitor the BMPs include components such as piping, manholes, meters, sensors, pretreatment unit, filtration units, and actuated valves. While these components are shown on the engineering plans, they would be hidden as much as feasible by location (e.g., underground) or screening. Additionally, an estimated two to three informational signs would be installed in and around the new treatment wetlands and improved trails to provide park user education. The signage design and installation would be consistent with the Lower Arroyo Seco Master Plan. A new wooden utility pole would be installed near the existing utility pole at the northern end of the San Pascual site; all power lines connecting to this utility pole would be installed underground in the remainder of the site. Visual renderings have been prepared for the San Rafael and San Pascual BMPs. See Exhibit 7, San Rafael Bird's Eye View; Exhibit 8, San Rafael Concept Plan; Exhibit 12, San Pascual Bird's Eye View; and Exhibit 14, San Pascual Concept Plan, in Section 1.0 of this IS/MND. The bird's eye views (Exhibits 7 and 12) provide a comparison of the existing view and a simulation of the proposed view.

The water harvester would be enclosed in a 288-sf building and have a small (1,000 gallon) AST located adjacent to the building; and would be within the existing, gated maintenance yard. The interior of the maintenance yard is minimally visible from most directions due to panels in the chain link fence and the presence of several mature trees immediately outside the yard fencing. The yard interior is visible from the portion of the Golf Course and Lohman Lane immediately southwest of the yard, where the access gate and drive are located. The harvester building would be partially visible from this vantage point. However, the condition of the yard interior would not be considered scenic, and the proposed building would replace an existing shipping container adjacent to the reservoir.

The Project was designed to maximize avoidance of mature trees, particularly native tree and shrub (per the South Pasadena Tree Ordinance) species, and shrubs of a size and/or shape to be counted. A total of 195 trees were surveyed within the disturbance footprints of the San Rafael and San Pascual sites. Of these, a total of 142 trees would be removed, and the remaining 53 trees would be protected in place during construction. Of the 142 trees that would be impacted, a total of 42 are protected trees and all are native species. The Project proposes to plant a total of 193 native trees as well as native shrubs and groundcovers as part of landscaping activities, in addition to retaining 53 existing trees that would be protected in place during construction. This would result in an estimated net total of 246 trees on the San Rafael and San Pascual sites. The native and/or protected tree removals within the Project's footprint at each site must occur to accommodate the new water treatment infrastructure. At the San Pascual site, there is very dense existing vegetation related to the historic treatment wetland installed at this site that has not been properly maintained. Due to the limited space along the Arroyo Seco to implement the proposed BMPs and existing dense vegetation on the San Pascual site, some native and/or protected tree removals would be unavoidable.

Tree removals could create visual breaks in the tree canopy while new native trees grow to an average size, which can require between approximately 10 to 20 years, depending on the tree species installed (e.g., willows grow much faster than oaks) and site-specific weather conditions in the future. In the interim, views in and of portions of the San Rafael and San Pascual sites would be altered by intermittent canopy openings, immature trees and/or shrubs/understory vegetation, and changes to existing built features. The alterations to the existing condition in the near term would be more apparent at the San Pascual site. Whereas at the San Rafael site the area would likely appear more densely vegetated at the completion of construction because there is sparse existing vegetation.

When considered together, the above-described Project components and related change in views of the San Rafael and San Pascual sites would be consistent with the existing setting in both areas. Specifically, views of and through the San Rafael site would be naturalized with no tall or otherwise view-obstructing features except for a net increase in trees, whose canopies, with time, would partially obscure views of the slopes adjacent to the site. However, views of these slopes are not contributing elements, by themselves, of the scenic vista assumed to be present throughout the Lower Arroyo Seco. Further, the proposed features at the San Rafael site would expand public access to the west side of the Arroyo Seco Channel and thereby provide views towards the east into the Lower Arroyo Seco, for a greater number of visitors. The San Pascual Site is a former treatment wetland location, and its footprint and infrastructure would be similar to the past use of this site. Views of and through the San Pascual Site would be naturalized with no tall or otherwise view-obstructing features. Views of the slopes immediately to the northwest along the Arroyo Seco Channel and of the San Gabriel Mountains further in the distance would not be reduced with Project implementation.

Although there would be short-term changes in views, during the 17-month construction period, that some may find unattractive, the long-term change in views is considered a beneficial impact of the Project. As such, implementation of the proposed Project would not result in a substantial adverse effect on a scenic vista. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒

WHY? There are portions of two designated State scenic highways in the Project area: (1) the Angeles Crest Highway (State Route [SR] 2) is located north of Arroyo Seco Canyon and transects the extreme northernmost portion of Pasadena and (2) a segment of SR-110 from approximately East California Boulevard in Pasadena, to Pasadena's southern City boundary, and through South Pasadena is identified as a Historic Parkway (the Arroyo Seco Historic Parkway) (Caltrans 2023). Additionally, SR-110 from Colorado Boulevard in Pasadena, through South Pasadena, to U.S. Highway 101 in downtown Los Angeles is also identified as a National Scenic Byway by the Federal Highway Administration (USDOT 2020). Although a segment of SR-110 passes as near as approximately 500 feet to the south of the San Pascual site, this site is not visible due to the dense evergreen vegetation present on either side of the highway. The southern portion of the Arroyo Seco Soccer Field, its tall sports field lighting, and a portion of the Arroyo Seco Channel can briefly be seen from SR-110 when traveling south. However, the San Pascual site is not clearly visible, although the tops of trees on the site may contribute to the general view to the north from this segment of the highway. Therefore, due to distance and/or intervening topography or vegetation, the Project sites are not within the viewshed of the Angeles Crest Highway or the Arroyo Seco Historic Parkway (SR-110). There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐

WHY? The Project sites are located in an urbanized area. However, this threshold will be addressed in this IS/MND. As discussed under Threshold 2.1(a) above, although there would be short-term changes in visual quality that some may find unattractive and construction activity would be visible for approximately 17 months. The intent of the proposed Project is to improve the long-term visual quality of both sites while incorporating the required water quality infrastructure. Moreover, the proposed Project would not conflict with applicable zoning and other regulations governing scenic quality established in the jurisdictions of Pasadena, South Pasadena, or Los Angeles. As such, implementation of the proposed Project would not substantially degrade the existing visual character or quality of public views of the Lower Arroyo Seco. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

WHY? There would be no new sources of light or glare with Project implementation. No new light fixtures would be installed, and all proposed landscape materials would be comprised of non-reflective materials. The recreation features proposed as part of the water conservation project would be available for public use from sunrise to sunset, which would be consistent with the Arroyo Seco as a whole. Additionally, the Project is not anticipated to directly increase use of the Lower Arroyo Seco area as a destination. Therefore, it would not change the number or timing of vehicles coming into and out of the Lower Arroyo Seco in the Project area. As there would be no added vehicular traffic, there would be no additional sources of glare due to reflected sunlight from car windshields and headlights. There would be no impact, and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to aesthetics, and no mitigation is required.

2.2 AGRICULTURE AND FORESTRY RESOURCES

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒

WHY? The Lower Arroyo Seco provides passive and active recreation features, built environment resources such as La Casita del Arroyo and San Pascual Stables, natural open space uses, and is transected by the LACFCD's Arroyo Seco Channel. The entirety of the Arroyo Seco, south of Devil's Gate Dam, is identified as Urban and Built Up Land on the most recent maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency. The City contains no Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) (FMMP 2020). There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒

WHY? The Project site is zoned as Open Space by Pasadena, South Pasadena, and Los Angeles. Accordingly, there is no agricultural zoning, and Williamson Act contracts are not applicable to the Project sites. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220[g]), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104[g])?	☐	☐	☐	☒

WHY? There is no forest land, timberland, or any Timberland Production Zones, on the Project sites; therefore, the Project would not result in the loss of forest land, timberland, or Timberland Production areas. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒

WHY? There are no forest land (as defined Public Resources Code section 12220[g]), timberland (as defined by Public Resources Code section 4526), or Timberland Production (as defined by Government Code section 51104[g]) areas within the Arroyo Seco, including the San Rafael and San Pascual sites. A total of 142 trees would be removed as part of the Project, with most removals at the San Pascual site due to the density of existing vegetation. However, neither this site nor any part of the Arroyo Seco is managed to produce timber or other forest products. Therefore, the Project would not result in the conversion or loss of forest land as defined by the State. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

WHY? As discussed in Threshold 2.2(a), there is no designated Farmland in the Arroyo Seco. Therefore, the Project would not indirectly result in the conversion of farmland to a non-agricultural use. Likewise, as discussed in Thresholds 2.2(c) and 2.2I, there are no forestry resources that would be converted to non-forest use by the Project. There would be no impact and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to agricultural and forestry resources, and no mitigation is required.

2.3 AIR QUALITY

ENVIRONMENTAL SETTING

The Project site is in the Los Angeles County portion of the South Coast Air Basin (SoCAB) and, for air quality regulation and permitting, is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The SoCAB is a 6,600-square-mile area bound by the Pacific Ocean to the west, the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east, and the San Diego County line to the south. The SoCAB includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties, in addition to the San Gorgonio Pass area of Riverside County. The SoCAB's terrain and geographical location (e.g., a coastal plain with connecting broad valleys and low hills) determine its distinctive semi-arid climate, which is characterized by moderate temperatures, oceanic influence, and precipitation that is limited to a few storms during the winter (November through April).

Regional air quality is defined by whether the area has attained State and federal air quality standards, as determined by air quality data from various monitoring stations. Areas that are considered "nonattainment" are required to prepare plans and implement measures that will bring the region into "attainment". When an area has been reclassified from nonattainment to attainment for a federal standard, the status is identified as "maintenance", and there must be a plan and measures established that will keep the region in attainment for the next ten years. For the California Air Resources Board (CARB), an "unclassified" designation indicates that the air quality data for the area are incomplete and there are no standards to support a designation of attainment or nonattainment. Table 6, Attainment Status of Criteria Pollutants in the South Coast Air Basin, below summarizes the attainment status of the SoCAB for the criteria pollutants.

TABLE 6
ATTAINMENT STATUS OF CRITERIA POLLUTANTS IN THE SOUTH COAST AIR BASIN

Pollutant	State	Federal
O_3 (1-hour)	Nonattainment	No Standards
O_3 (8-hour)	Nonattainment	Extreme Nonattainment
PM10	Nonattainment	Attainment/Maintenance
PM2.5	Nonattainment	Serious Nonattainment
CO	Attainment	Attainment/Maintenance
NO_2	Attainment	Attainment/Maintenance
SO_2	Attainment	Attainment
Lead	No Standard	Attainment/Nonattainment*
All others	Attainment/Unclassified	No Standards

O_3: ozone; PM10: respirable particulate matter with a diameter of 10 microns or less; PM2.5: fine particulate matter with a diameter of 2.5 microns or less; CO: carbon monoxide; NO_2: nitrogen dioxide; SO_2: sulfur dioxide.

* Los Angeles County is classified nonattainment for lead; the remainder of the SoCAB is in attainment of the State and federal standards.

Sources: SCAQMD 2016, USEPA 2022

Both the State and federal government have established health-based ambient air quality standards (AAQS) for seven air pollutants. These pollutants include ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), coarse particulate matter with a diameter of 10 microns or less (PM10), fine particulate matter less than 2.5 microns in diameter (PM2.5), and lead. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety. The AAQS described above are shown in Table 7, California and National Ambient Air Quality Standards, on the following page.

TABLE 7
CALIFORNIA AND NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards	Federal Standards Primary[a]	Federal Standards Secondary[b]
O_3	1 Hour	0.09 ppm (180 µg/m^3)	–	–
	8 Hour	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3)	Same as Primary
PM10	24 Hour	50 µg/m^3	150 µg/m^3	Same as Primary
	AAM	20 µg/m^3	–	–
PM2.5	24 Hour	–	35 µg/m^3	Same as Primary
	AAM	12 µg/m^3	12.0 µg/m^3	15.0 µg/m^3
CO	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	–
	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	–
NO_2	AAM	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as Primary
	1 Hour	0.18 ppm (339 µg/m^3)	0.100 ppm (188 µg/m^3)	–
SO_2	24 Hour	0.04 ppm (105 µg/m^3)	–	–
	3 Hour	–	–	0.5 ppm (1,300 µg/m^3)
	1 Hour	0.25 ppm (655 µg/m^3)	0.075 ppm (196 µg/m^3)	–
Lead	30-day Avg.	1.5 µg/m^3	–	–
	Calendar Quarter	–	1.5 µg/m^3	Same as Primary
	Rolling 3-month Avg.	–	0.15 µg/m^3	
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per km – visibility ≥ 10 miles	**No Federal Standards**	
Sulfates	24 Hour	25 µg/m^3		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)		
Vinyl Chloride	24 Hour	0.01 ppm (26 µg/m^3)		

O_3: ozone, ppm: parts per million, µg/m^3: micrograms per cubic meter, –: No Standard; PM10: respirable particulate matter with a diameter of 10 microns or less, AAM: Annual Arithmetic Mean, PM2.5: fine particulate matter with a diameter of 2.5 microns or less, CO: carbon monoxide, mg/m^3: milligrams per cubic meter, NO_2: nitrogen dioxide, SO_2: sulfur dioxide, km: kilometer.

[a] National Primary Standards: The levels of air quality necessary, within an adequate margin of safety, to protect the public health.
[b] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

Note: More detailed information in the data presented in this table can be found at the CARB website (www.arb.ca.gov).

Source: CARB 2016.

Existing Air Quality Conditions

Air quality data for the Project sites is represented by the Pasadena South Wilson Avenue Monitoring Station located at 752 South Wilson Avenue, Pasadena, 91101. The monitoring station is located approximately 2.5 miles northeast of a point approximately halfway between the two sites. Pollutants measured at the Pasadena South Wilson Avenue Monitoring Station include O_3, $PM_{2.5}$, and NO_2. The monitoring data for the 2019 to 2021 period presented in Table 8, Air Quality Levels Measured at the Pasadena South Wilson Avenue Monitoring Station, were obtained from CARB (CARB 2023). Federal and State air quality standards are presented with the number of times those standards were exceeded.

TABLE 8
AIR QUALITY LEVELS MEASURED AT THE PASADENA SOUTH WILSON AVENUE MONITORING STATION

Pollutant	California Standard	National Standard	Year	Max. Level[a]	Days State Standard Exceeded	Days National Standard Exceeded
O_3 (1 hour)	0.09 ppm	None	2019	0.120	11	NA
			2020	0.163	41	NA
			2021	0.104	12	NA
O_3 (8 hour)	0.070 ppm	0.070 ppm	2019	0.098	24	24
			2020	0.115	60	60
			2021	0.087	25	25
PM10 (24 hour)	50 μg/m^3	150 μg/m^3	2019	–	–	–
			2020	–	–	–
			2021	–	–	–
PM10 (AAM)	20 μg/m^3	None	2019	–	–	–
			2020	–	–	–
			2021	–	–	–
NO_2 (1 Hour)	0.18 ppm	0.100 ppm	2019	59.1	0	0
			2020	61.2	0	0
			2021	77.3	0	0
PM2.5 (24 Hour)	None	35 μg/m^3	2019	41.8	N/A	3
			2020	67.7	N/A	6
			2021	63.6	N/A	6

NA Not applicable

–: Data Not Reported or insufficient data available to determine the value; O_3: ozone; ppm: parts per million; PM10: respirable particulate matter with a diameter of 10 microns or less; μg/m^3: micrograms per cubic meter; AAM: Annual Arithmetic Mean; NO_2: nitrogen dioxide; CO: carbon monoxide; PM2.5: fine particulate matter with a diameter of 2.5 microns or less; SO_2: sulfur dioxide. N/A indicates that there is no applicable standard.

[a] California maximum levels were used.

Source: CARB 2023.

The Pasadena monitoring data in Table 8 above shows that ozone (O_3) is the air pollutant of primary concern in the Project area. At the monitoring station, the state 1-hour O_3 standard was exceeded 11-41 days/year during the monitoring period. The State and federal 8-hour O_3 standards were exceeded 24-60 days within the same time period. O_3 is a secondary pollutant and is not directly emitted from a source; it occurs as the result of photochemical reactions from ozone precursors, which include VOCs and NO_2 and sunlight. The $PM_{2.5}$ federal standard was also exceeded for 3-6 days for the three-year period.

Sensitive Receptors

Sensitive receptors include, but are not limited to, children, the elderly, persons with preexisting respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. The nearest sensitive receptors are park users in the Lower Arroyo Seco that would intermittently be present in the vicinity of either BMP site or the water harvester location. The nearest off-site sensitive receptor to the San Rafael site is a residence on the hilltop approximately 100 feet to the north of the site near the South San Rafael Avenue and Laguna Road intersection at an elevation of approximately 40 feet above the site. The nearest off-site sensitive receptors to the San Pascual site are the residences located across San Pascual Avenue approximately 60 ft to the north at the nearest points and approximately 120 ft to the northwest at the nearest points.

Impact Analysis

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐

WHY? CEQA requires a discussion of any inconsistencies between a project and applicable general plans and regional plans (Section 15125[d] of the State CEQA Guidelines). The regional plan that applies to the Project includes the SCAQMD’s Air Quality Management Plan (AQMP).

The SCAQMD CEQA Handbook states that “New or amended GP Elements (including land use zoning and density amendments), Specific Plans, and significant projects must be analyzed for consistency with the AQMP” (SCAQMD 1993). Strict consistency with all aspects of the plan is usually not required. A project should be considered consistent with the AQMP if it furthers one or more policies and does not obstruct other policies. The SCAQMD CEQA Handbook identifies two key indicators of consistency:

1) Whether the project will result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations or delay timely attainment of air quality standards or the interim emission reductions specified in the AQMP.

2) Whether the project will exceed the assumptions in the AQMP or increments based on the year of project buildout and phase.

With respect to the first criterion, based on the air quality modeling analysis conducted for the proposed Project, presented under Thresholds 2.3b and 2.3c below, construction and operation of the Project would not exceed the SCAQMD’s CEQA thresholds of significance and consequently would not result in an increase in the frequency or severity of existing air quality violations nor cause or contribute to new violations, or delay timely attainment of air quality standards or the interim emissions reductions in the AQMP. In addition, the Project would allow for greater water replenishment of local aquifers, which would reduce the need for more energy- and emissions-intensive water imports from more distant locations. Therefore, the Project would be consistent with the first criterion.

With respect to the second criterion, the Project was assessed as to whether it would exceed the assumptions in the AQMP. The SCAQMD's current air quality planning document for the SoCAB where the Project site is located is the 2022 Air Quality Management Plan (2022 AQMP) (SCAQMD 2022). The 2022 AQMP is a regional and multi-agency effort among the SCAQMD, CARB, Southern California Association of Governments (SCAG), and the United States Environmental Protection Agency (USEPA). The 2022 AQMP includes an analysis of emissions, meteorology, atmospheric chemistry, regional growth projections, and the impact of existing control measures. The purpose of the 2022 AQMP is to set forth a comprehensive program that would promote reductions in criteria pollutants, greenhouse gases, and toxic risk and efficiencies in energy use, transportation, and goods movement. The 2022 AQMP incorporates the latest scientific and technical information and planning assumptions, including SCAG's 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS); updated emission inventory methods for various source categories; and SCAG's latest growth forecasts. The 2022 AQMP includes strategies and measures necessary to meet the National Ambient Air Quality Standards. The AQMP is based on projections of energy usage and vehicle trips from land uses within the SoCAB.

The primary land use planning documents that govern the Project sites are the General Plans and zoning codes of Pasadena, South Pasadena, and Los Angeles. Pasadena, South Pasadena, and Los Angeles all have a General Plan land use designation and zoning designation of OS/Open Space for each respective city's portions of the two sites. As discussed in Section 2.11, Land Use and Planning, of this IS/MND, the Project would be consistent with the applicable land use plans, policies, and regulations. Implementation of the Project would not require a change in land use designations or zoning and consequently be consistent with the assumptions in the 2022 AQMP. Project implementation would not result in population growth nor increases in the number of emission sources in the surrounding cities. The Project would improve water quality discharged from the San Rafael Creek and the Arroyo Seco Channel which would benefit local water supplies through infiltration to the local groundwater basin and increased used of captured stormwater (i.e., non-potable water) for irrigation. Use of local water supplies would reduce the need for imported water which is more energy and air pollution intensive as compared to use of local water supplies. As such, the Project is not anticipated to exceed the AQMP assumptions for the site and is found to be consistent with the 2022 AQMP for the second criterion. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐

WHY? The SCAQMD has developed construction and operations thresholds to determine whether projects would potentially result in contributing toward a violation of ambient air quality standards. The SCAQMD recommends that projects be evaluated in terms of the quantitative thresholds established to assess both the regional and localized impacts of project-related air pollutant emissions. The City uses the current SCAQMD thresholds to determine whether a proposed project would have a significant impact. The SCAQMD regional thresholds are identified in Table 9, South Coast Air Quality Management District Air Quality Significance Thresholds.

TABLE 9
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT AIR QUALITY REGIONAL SIGNIFICANCE THRESHOLDS

Mass Daily Thresholds (lbs/day)		
Pollutant	**Construction**	**Operation**
VOC	75	55
NO_x	100	55
CO	550	550
PM10	150	150
PM2.5	55	55
SO_x	150	150
Lead	3	3

lbs/day: pounds per day; VOC: volatile organic compound; NOx: nitrogen oxides; CO: carbon monoxide; PM10: respirable particulate matter 10 microns or less in diameter; PM2.5: fine particulate matter 2.5 microns or less in diameter; SOx: sulfur oxides.

Source: SCAQMD 2023.

Air pollutant emissions for the Project were estimated using the California Emissions Estimator Model (CalEEMod) version 2022.1.1.14 computer program (CAPCOA 2022). CalEEMod is designed to model construction and operational emissions for land development projects and allows for the input of project- and county-specific information. For air quality modeling purposes, construction of the Project was based on the Project's construction assumptions as described in Section 1.0 and default assumptions derived from CalEEMod. Operational emissions are assessed qualitatively below because the Project is not anticipated to result in increased use of the Arroyo Seco. Additional input details are included in Appendix A of this IS/MND.

Construction Emissions

Air pollutant emissions would occur from the following: construction equipment exhaust; fugitive dust from site grading; exhaust and particulate emissions from trucks hauling demolition and construction debris, soil, and building materials to and from the Project sites; automobiles and light trucks driven to and from the Project sites by construction workers; and volatile organic compounds (VOCs) from painting and asphalt paving operations. The Project would comply with applicable SCAQMD rules and regulations, including Rule 402 for nuisance and Rule 403 for fugitive dust control. Rule 403 measures include regular watering of active grading areas and unpaved roads, limiting vehicle speeds on unpaved surfaces, stabilizing stockpiled earth, and curtailing grading operations during high wind conditions (SCAQMD 2005). Watering of active grading areas is included in the CalEEMod emissions analysis and results in reduced PM10 and PM2.5 emissions. It should be noted that some Project requirements and features (such as watering grading areas), although required Project elements, are shown in the CalEEMod format as mitigation measures. The emission reductions associated with compliance with this rule have been included in the emissions calculations.

<u>Maximum Daily Regional Emissions</u>

Table 10, Estimated Maximum Daily Regional Construction Emissions, presents the estimated maximum daily emissions during construction of the Project and compares the estimated emissions with the SCAQMD's daily regional emission thresholds. Installation of the water harvester at the San Pascual site, including related construction equipment operation and vehicle trips, was assumed in this modeling as a worst-case scenario (i.e., more activity in one location). As shown, construction mass daily emissions would be far below the SCAQMD thresholds for all criteria air pollutants. Therefore, there would be less than significant impacts related to regional emissions of criteria pollutant during construction, and no mitigation is required.

TABLE 10
ESTIMATED MAXIMUM DAILY REGIONAL CONSTRUCTION EMISSIONS

Year	Emissions (lbs/day)					
	VOC	**NO_x**	**CO**	**SO_x**	**PM10**	**PM2.5**
2024	2	16	17	<1	1	1
2025	1	9	11	<1	<1	<1
Maximum	2	16	17	**<1**	**1**	**1**
SCAQMD Thresholds (Table 7)	***75***	***100***	***550***	***150***	***150***	***55***
Exceeds SCAQMD Thresholds?	**No**	**No**	**No**	**No**	**No**	**No**

lbs/day: pounds per day; VOC: volatile organic compound; NO_x: nitrogen oxides; CO: carbon monoxide; SO_x: sulfur oxides; PM10: respirable particulate matter 10 microns or less in diameter; PM2.5: fine particulate matter 2.5 microns or less in diameter; SCAQMD: South Coast Air Quality Management District.

Source: SCAQMD 2023 (thresholds); see Appendix A for CalEEMod model outputs.

Localized Significance Thresholds

In addition to the mass daily emissions thresholds established by the SCAQMD, short-term local impacts to nearby sensitive receptors from on-site emissions of NO_2, CO, PM10, and PM2.5 are examined based on SCAQMD's localized significance threshold (LST) methodology. To assess local air quality impacts for development projects without complex dispersion modeling, the SCAQMD developed screening (lookup) tables to assist lead agencies in evaluating impacts.

The LST method is recommended to be limited to projects that are five acres or less. For the purposes of an LST analysis, the SCAQMD considers receptors where it is possible that an individual could remain for 1 hour for NO_2 and CO exposure and 24 hours for PM10 and PM2.5 exposure. The emissions limits in the lookup tables are based on the SCAQMD's Ambient Air Quality Standards (SCAQMD 2016).

Table 11, Construction-Phase Localized Significance Threshold Emissions, on the following page shows the maximum daily on-site emissions for construction activities compared with the SCAQMD LST screening thresholds. The screening thresholds shown are from the lookup tables for a site that is one acre, based on the assumption that the most intensive phase of construction that involves soil disturbance would not exceed one acre per day, and at a distance of 25 meters (82 feet) or closer to a receptor as this is the nearest distance for which most of the equipment would be operated concurrently. Receptors located further away than this would be exposed to less air pollutants. As shown, localized emissions for all criteria pollutants from construction of the Project would be below their respective screening thresholds. Therefore, there would be less than significant impacts related to local emissions of criteria pollutant during construction, and no mitigation is required.

TABLE 11
CONSTRUCTION-PHASE LOCALIZED SIGNIFICANCE THRESHOLD EMISSIONS

Emissions and Thresholds	Emissions (lbs/day)			
	NOx	CO	PM10	PM2.5
Project maximum daily on-site emissions	12	11	1	1
Localized Significance Screening Threshold*	**69**	**535**	**4**	**3**
Exceed Screening Threshold?	**No**	**No**	**No**	**No**

lbs/day: pounds per day; NOx: nitrogen oxides; CO: carbon monoxide; PM10: respirable particulate matter 10 microns or less in diameter; PM2.5: fine particulate matter 2.5 microns or less in diameter.

Note: Data is for SCAQMD Source Receptor Area 8, West San Gabriel Valley

* NOx, CO, PM10 and PM2.5 thresholds are based on a distance of 25 meters (82 ft) of the Project sites.

Source: SCAQMD 2009 (thresholds); see Appendix A for CalEEMod model outputs.

Operational Emissions

The ongoing operation of the Project would result in a long-term increase in air quality emissions. This increase would be due to emissions (1) from Project-generated vehicle trips associated with inspection and maintenance and (2) from the electric demand for some of the Project infrastructure. The Project would involve the infrequent occurrence of, on average, one round trip to both sites per month related to inspection and maintenance activities. It is expected that maintenance personnel would travel to and from the sites in one to two vehicles – such as a pickup truck, or pickup truck and a vacuum truck, for instance. Occasional additional visits for more intensive maintenance activity or to respond to equipment issues may occur.

Emissions would also occur from electricity use needed to operate a small flow pump that operates year-round, bigger pumps that operate when it rains and once every three weeks to ensure proper operation, and a water harvester. The air pollutant emissions associated with these long-term sources on most days would be near zero and would be too low a concentration to be meaningfully quantified. These very low emissions would not result in an exceedance of the SCAQMD operations phase significance thresholds. Therefore, operation of the Project would result in less than significant impacts, and no mitigation is required.

Cumulative Impacts

<u>Construction Emissions</u>

Construction activities associated with the proposed Project would result in less than significant construction-related regional and localized air quality impacts, as quantified above in Tables 5 and 6, respectively. SCAQMD's policy with respect to cumulative impacts associated with the above-referenced pollutants and their precursors is that impacts that would be directly less than significant would also be cumulatively less than significant. As discussed above, short-term construction emissions associated with the Project would be well below SCAQMD thresholds. Therefore, consistent with SCAQMD policy, the cumulative construction impact of criteria pollutants would be less than significant, and no mitigation is required. Therefore, Project construction would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard. Impacts would be less than significant, and no mitigation is required.

<u>Operational Emissions</u>

Operational emissions would be near zero most days, as discussed above and were analyzed qualitatively because of the very low anticipated emissions would not exceed any of the SCAQMD operations phase significance thresholds. Therefore, the Project would not contribute to a cumulatively considerable increase of a pollutant for which the SoCAB is in nonattainment. Emissions of nonattainment pollutants or their precursors would not be cumulatively considerable. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐

WHY? A significant impact may occur when a project would generate pollutant concentrations to a degree that would significantly affect sensitive receptors, which include populations that are more susceptible to the effects of air pollution than the population at large. Exposure of sensitive receptors is addressed for the following situations: criteria pollutants; CO hotspots; and toxic air contaminants (TACs), specifically diesel particulate matter (DPM) from on-site construction. CARB identified DPM as a TAC in 1998. Operational, long-term TACs may be generated by some industrial land uses; commercial land uses (e.g., gas stations and dry cleaners); and diesel trucks on freeways. Operation of the proposed Project would not result in substantial levels of TAC emissions as emissions would be limited to those from one vehicle trip and electricity use. Regarding criteria pollutants, exposure of persons to NO_x, CO, PM10, and PM2.5 emissions is discussed in response to Threshold 2.3(b), above. As discussed, criteria pollutant emissions would be minimal. There would be less than significant impacts, and no mitigation is required.

In an urban setting, vehicle exhaust is the primary source of CO. Consequently, the highest CO concentrations generally are found close to congested intersections. Under typical meteorological conditions, CO concentrations tend to decrease as the distance from the emissions source (e.g., congested intersection) increases. The air basin is currently in a state of attainment for CO. CO concentrations associated with Project-related trips would be limited to on average, one round trip to both BMP sites and the water harvester site per month. This extremely low level of long-term vehicle activity is of insufficient magnitude to contribute toward a CO hotspot. As such, Project-related traffic would result in less than significant CO impacts, and no mitigation is required.

Construction activities would result in short-term, Project-generated emissions of DPM from the exhaust of off-road, heavy-duty diesel equipment used for site preparation (e.g., site preparation, grading); infrastructure construction; and other miscellaneous activities. The dose to which receptors are exposed is the primary factor used to determine health risk. Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. Thus, the risks estimated for a maximally exposed individual are higher if a fixed exposure occurs over a longer time period. According to the Office of Environmental Health Hazard Assessment, health risk assessments—which determine the exposure of sensitive receptors to TAC emissions—should be based on a 40-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the Project.

There would be relatively few pieces of off-road, heavy-duty diesel equipment in use and the total construction period would be short when compared to a 40-year exposure period. Combined with the highly dispersive properties of DPM and additional reductions in particulate emissions from newer construction equipment, as required by USEPA and CARB regulations, construction emissions of TACs would not expose sensitive receptors to substantial emissions of TACs. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
d) Result in other emissions (such as those leading to odors) adversely affecting substantial number of people?	☐	☐	☒	☐

Why? The SCAQMD's *CEQA Air Quality Handbook* lists land uses that are typically associated with odor complaints. They include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding (SCAQMD 1993). The Project does not include any uses identified by the SCAQMD as being associated with odors and, therefore, would not produce emissions which would lead to odors. The proposed water infrastructure would not involve any sources of odorous emissions. The Project uses are also regulated from nuisance odors or other objectionable emissions by SCAQMD Rule 402. Rule 402 prohibits any discharge from any source of air contaminants or other material which, would cause injury, detriment, nuisance, or annoyance to the public. The Project would be a less than significant impact, and no mitigation is required.

Mitigation Measures

There would be no significant impacts related to air quality, and no mitigation is required.

2.4 BIOLOGICAL RESOURCES

Information in this section is derived from the *Biological Resources Assessment for the Arroyo Seco Water Reuse Project in the Cities of Pasadena, South Pasadena, and Los Angeles, California* (BRA) dated November 16, 2023, and prepared by Psomas for the Project (Psomas 2023a). The BRA is based on literature review, database searches, and field observations, including performance of a tree survey, jurisdictional delineation, and special status plant surveys by Psomas. The BRA is provided in its entirety in Appendix B of this IS/MND.

The survey area assessed for impacts to biological resources encompasses the two discrete Project sites, construction staging areas, and adjacent areas. The survey area referenced herein includes: (1) the San Rafael area at the northern end of the survey area, which consists of a concrete-lined drain that conveys water from adjacent residential areas located northwest of the survey area and drain into the Arroyo Seco; (2) the Arroyo Seco Channel, which consists of the concrete-lined channel extending between the two Project sites along with an adjacent dirt trail than runs along the eastern bank adjacent to the San Pascual Stables; and (3) the San Pascual area, a densely vegetated area that accepts flows diverted from the Arroyo Seco Channel through existing infrastructure and is located immediately northwest of Arroyo Park. The Golf Course maintenance yard was not included in the survey area because it is in a heavily disturbed condition and no special status biological resources are present within the fenced area.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modification, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☒	☐

WHY? Plants or wildlife may be considered “special status” due to declining populations, vulnerability to habitat change, or restricted distributions. Certain special status species have been listed as Threatened or Endangered under the State and/or Federal Endangered Species Acts.

<u>Special Status Plants</u>

According to the Project-specific BRA, a total of 50 special status plant species have been reported in the vicinity of the Project survey area. Of the 50 species reported from the literature review, 10 species are federally and/or State-listed Endangered, Threatened, or are candidates for listing: Braunton’s milk-vetch (*Astragalus brauntonii*), Santa Susana tarplant (*Deinandra minthornii*), Agoura Hills dudleya (*Dudleya cymose ssp. Agourensis*), marcescent dudleya (*Dudleya cymose ssp. Marcescens*), Santa Monica dudleya (*Dudleya cymose ssp. Ovatifolia*), conejo dudleya (*Dudleya parva*), Verity's dudleya (*Dudleya verity*), conejo buckwheat (*Eriogonum crocatum*), California Orcutt grass (*Orcuttia californica*), and Lyon’s pentachaeta (*Pentachaeta lyonia*). None of these species has potential to occur within the survey area either due to lack of suitable habitat or because the survey area is outside the known range. No impacts on federally or State listed plant species are expected to occur.

In addition to species formally listed by the resource agencies, 20 species reported in the vicinity of the survey area have a California Rare Plant Rank (CRPR). One list 4.3 species, club-haired mariposa lily (*Calochortus clavatus var. clavatus*), and one list 4.2 species, Plummer’s mariposa-lily (*Calochortus plummerae*), have limited potential to occur due to the presence of marginally suitable habitat. One list 4.2 species, southern California black walnut, has potential and is known to occur near the survey area. The remainder of these 20 species do not have potential to occur in the survey area due to a lack of potentially suitable soils or habitat. No impacts on CRPR 1B or 2B plant species are expected to occur. Impacts on species with a CRPR of 3 or 4 are not typically considered significant impacts pursuant to CEQA.

Focused special status plant survey results identified only one species, California black walnut, occurring within the Project vicinity. This individual is located adjacent to the survey area boundary near the San Rafael site. The California black walnut is not expected to be impacted as it is located immediately outside the southwest boundary of the San Rafael site and staging area. Although Project construction and operational activities are expected to have no impact on special status plant species, MM BIO-1 requires biological monitoring to ensure avoidance of the southern California black walnut near the San Rafael site and other special status biological resources on and near the Project sites. With implementation of MM BIO-1, potential impacts to special status plants would be reduced to a less than significant impact.

<u>Special Status Wildlife</u>

According to the Project-specific BRA, a total of 24 special status wildlife species have been reported in the vicinity of the survey area. Of the species reported from the literature review, six species are federally and/or State-listed Endangered or Threatened or are candidates for listing including: southwestern willow flycatcher (*Empidonax traillii extimus*), coastal California gnatcatcher (*Polioptila californica californica*), southern mountain yellow-legged frog (*Rana muscosa*), bank swallow (*Riparia riparia*), least Bell's vireo (*Vireo bellii pusillus*), and Crotch bumble bee (*Bombus crotchii*). Marginally suitable habitat for bank swallow is present within the survey area. The remaining species are not expected to occur in the survey area due to lack of suitable habitat.

In addition to species formally listed by the resource agencies, 13 special status species (i.e., California Species of Special Concern) have been reported near the survey area. Six of these species – big free-tailed bat (*Nyctinomops macrotis*), western yellow bat (*Lasiurus xanthinus*), western mastiff bat (*Eumops perotis californicus*), pallid bat (*Antrozous pallidus*), Southern California legless lizard (*Anniella stebbinsi*), and coast range newt (*Taricha tarosa*) – have potential to occur in the survey area due to the presence of potentially suitable or marginally suitable habitat. The remaining seven species are not expected to occur in the survey area due to lack of suitable habitat.

However, no impacts on federally- or State-listed species are expected to occur. Although several other special status wildlife species (i.e., not federally- or State-listed) may occur within the Project sites, these species are only expected to occur temporarily in limited numbers and not breeding or roosting within Project work areas. Because of this, even if one or more of these species were present on the site at the start of construction, an adverse effect to individuals that may be on site would not result in a significant impact under CEQA. Bats are discussed further below under Threshold 2.4(d). Therefore, Project construction and operational activities would result in no impacts on special status wildlife species, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐

WHY?

The California Department of Fish and Wildlife (CDFW) regulates the removal of native trees and/or riparian habitat associated with stream channels via the *California Fish and Game Code*. Therefore, effects to both individual trees that may be under CDFW jurisdiction and mapped riparian habitat (limited to Coast live oak-western sycamore woodland) are discussed below.

Trees

The CDFW is charged with issuing Streambed Alteration Agreements that would allow for the removal of native tree species that occur within the bed, channel, or bank of any river, stream, or lake. A total of 40 trees would be removed or encroached upon that fall under the CDFW's jurisdiction within the riparian habitat identified as part of the BRA (13 of these trees are toyon and blue elderberry that CDFW often considers as large shrubs and may not require compensatory mitigation). A multitude of these trees are also subject to regulation by the respective city tree ordinances described further below in Threshold 2.4(e). The Project would acquire appropriate jurisdictional approval from the cities of Pasadena, South Pasadena, and Los Angeles, as applicable, prior to tree removal or trimming. As discussed in Section 1.0 of this IS/MND, it is anticipated that 3 of the removed trees would be solely under CDFW jurisdiction (i.e., trees that do not overlap removals regulated by the cities. The precise number of replacement trees for affected trees under CDFW's jurisdiction would be dependent on negotiation with CDFW during the Clean Water Act permitting process, subsequent to the CEQA process. Additionally, MM BIO-2 defines protective measures that shall be implemented for all trees to be preserved on-site during construction. With implementation of MM BIO-2 and compliance with local and federal permitting requirements, potential impacts to trees under CDFW jurisdiction would be reduced to a less than significant level.

Riparian Habitat

The CDFW Vegetation Classification and Mapping Program provides a list of vegetation Alliances, Associations, and Special Stands that are considered "Sensitive Natural Communities" based on their rarity and threat. Information on rarity is based on the range and distribution of a given type of vegetation, and the proportion of occurrences that are of good ecological integrity. Threats and trends are considered in categories like residential and commercial development; agriculture, energy production, and mining; and invasive and other problematic plant species. One vegetation type present in the survey area, coast live oak–western sycamore woodland, is considered a special status vegetation type by the CDFW.

Activities within the construction footprint of the sites would be considered permanent impacts. For the San Rafael site, four separate, irregularly-shaped, areas at the Project footprint boundary have been identified for staging and collectively encompass 0.30 acre. For the San Pascual site, the paved parking lot has been identified as a staging and laydown area, which encompasses 0.25 acre. Impacts related to the vegetation communities, shown below, consider the extent of adverse effects within the Project's disturbance footprint and staging areas. Activities within these areas would be considered temporary impacts.

The Project would temporarily and permanently impact a variety of vegetation types. However, most of these impacts, at both the San Rafael and San Pascual sites, are either minimal in extent (under one acre of an individual vegetation type) or would affect degraded and/or non-native/ornamental vegetation or unvegetated areas. Acreage of impacts from both temporary and permanent are listed in Table 12, Summary of Impacts to Vegetation Types and Other Areas, below.

TABLE 12
SUMMARY OF IMPACTS TO VEGETATION TYPES AND OTHER AREAS

Vegetation Type	San Rafael Site Impacts (acres)		San Pascual Site Impacts (acres)		Total Impacts (acres)	
	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent
Disturbed coast live oak woodland	0.00	0.066	0.00	0.00	0.00	0.066
Coast live oak-western sycamore woodland	***0.00***	***0.00***	***0.00***	***1.234***	***0.00***	***1.234***
Non-native ornamental woodland	0.00	0.00	0.00	0.705	0.00	0.705
Disturbed blue elderberry - laurel sumac scrub	0.143	1.288	0.00	0.00	0.143	1.288
Bare ground	0.098	0.056	0.00	0.00	0.098	0.056
Developed	0.011	0.009	0.25	0.133	0.261	0.142
Disturbed	0.00	0.00	0.00	0.137	0.00	0.137
TOTALS	**0.252**	**1.419**	**0.25**	**2.209**	**0.502**	**3.628**

Note: ***Bold italics*** indicate a special status vegetation type and a riparian habitat
Source: Psomas 2023a. Appendix B.

At shown in Table 12, there would be no special status vegetation types impacted at the San Rafael site. At the San Pascual site, 1.23 acres of coast live oak-western sycamore woodland (a CDFW special status vegetation type and a riparian habitat) would be permanently impacted (i.e., not temporarily during the construction period only). However, the Project would also result in the removal of 1.52 acres of non-native vegetation species (124 percent of the quantity of native vegetation removed) and installation of native replacement trees as well as native shrubs and groundcovers, including plants representative of this vegetation type, across the San Pascual site.

Impact Analysis

The San Pascual site is lacking in understory vegetation among the trees and large shrubs. As such, the area mapped as coast live oak-western sycamore woodland on the site, as well as non-native ornamental woodland, is comprised largely of individual trees and large shrubs. As discussed previously, the Project would involve removal of 136 existing trees on the San Pascual site, including 36 trees considered protected under South Pasadena's or Los Angeles' respective tree ordinances. Most of the existing trees being removed at San Pascual that are not protected under a tree ordinance (100 trees) are Mexican fan palms (83 trees), which represent the primary species mapped in the non-native ornamental woodland present in the central portion of this site. All trees being removed and not covered under a tree ordinance are both non-native and invasive plant species. Table 13, Comparison of Existing Protected Trees and Proposed Trees at the San Pascual Site, summarizes the species and number of protected trees and large shrubs that would be removed and the species proposed to be planted at this site as part of the Project.

TABLE 13
COMPARISON OF EXISTING PROTECTED TREES AND PROPOSED TREES AT THE SAN PASCUAL SITE

Tree Species	Quantity Removed	Quantity Proposed to be Planted
arroyo willow *Salix lasiolepis*	2	62
black willow *Salix gooddingii*	8	N/A
blue elderberry *Sambucus nigra* ssp. *caerulea*	13	26
coast live oak *Quercus agrifolia*	8	24
western sycamore *Platanus racemosa*	5	17
Totals	**36**	**129**

N/A = not applicable

As shown, at the San Pascual site the Project would plant approximately 3.5 times the number of protected trees with the same species, except black willow, that are all associated with coast live oak-western sycamore woodland. Additionally, the proposed plant palette includes four western redbud (*cercis occidentalis*), a native tree species, in the northernmost portion of the San Pascual site. Further, the landscape concept includes extensive planting of native shrub and groundcover species as an understory to the remaining and newly installed trees. The shrub and groundcover species include those appropriate for a coast live oak-western sycamore woodland as well as riparian-related species. Understory vegetation, in combination with trees and large shrubs, is an important component of habitat and its presence creates higher habitat quality than a similar acreage with no or minimal understory coverage. This is because a habitat area with multiple layers (i.e., heights) of vegetation provides a greater number and diversity of food sources and increased cover, perching, foraging, and nesting opportunities. This is in part due to the provision of a higher number of ecological niches resulting in a greater number and diversity of animal species that would utilize the site. Additionally, because the proposed plant palette is comprised of solely native species, the resulting habitat would also better support native wildlife species that have specific, specialized habitat requirements. Therefore, coast live oak-western sycamore woodland with robust understory native vegetation species-the proposed condition, represents a higher quality habitat than the same trees without the understory vegetation, as in the existing condition. Accordingly, the Project is expected to result in a net benefit to coast live oak-western sycamore woodland vegetation and other riparian habitat areas and improve overall habitat functions and values for native species of the region. The number and type of trees proposed on the conceptual landscape plan may be refined as part of permitting processes with the affected agencies (i.e., Pasadena and CDFW). However, all required tree replacements to fully meet each agency's requirements will be planted and would be located within the Project site.

Although there are no existing special status vegetation types on the San Rafael site, same as discussed for the San Pasqual site, Implementation of the Project would result in improved habitat functions and values for native species in the region than a similar acreage in the existing condition, which is comprised solely on non-native, degraded vegetation communities. Table 14, Comparison of Existing Protected Trees and Proposed Trees at the San Rafael Site, summarizes the species and number of protected trees and large shrubs that would be removed and the species proposed to be planted at this site as part of the Project.

TABLE 14
COMPARISON OF EXISTING PROTECTED TREES
AND PROPOSED TREES AT THE SAN RAFAEL SITE

Tree Species	Quantity Removed	Quantity Proposed to be Planted
blue elderberry *Sambucus nigra* ssp. *caerulea*	6	6
coast live oak *Quercus agrifolia*	N/A	17
western sycamore *Platanus racemosa*	N/A	6
Totals	**6**	**29**
N/A = not applicable		

As shown, as with the San Pascual site, at the San Rafael site the Project proposes to plant almost five times the number of protected trees with the same species and two complementary species–coast live oak and western sycamore. As discussed for the San Pascual site, the landscape concept for the San Rafael site includes extensive planting of native shrub and groundcover species as an understory to the remaining and newly installed trees, increasing the quality of the habitat substantively compared to the existing condition. As discussed, the number and type of trees proposed on the conceptual landscape plan may be refined as part of permitting processes with the affected agencies (i.e., Pasadena and CDFW). However, all required tree replacements to fully meet each agency's requirements will be planted and would be located within the Project site.

As noted above, Project construction would result in temporary impacts related to staging areas. Specifically, At the San Rafael site, an approximately 0.25 acre across four separate areas adjacent to the Project footprint would be used for staging. These areas were carefully located to avoid trees and are comprised of disturbed blue-elderberry-laurel sumac scrub, bare ground, or developed areas. At the San Pascual site, an approximate 0.50-acre paved parking lot would be used for staging. No special status vegetation types would be affected by temporary impacts.

Therefore, both temporary and permanent Project impacts on trees, riparian habitat, and/ or other special status vegetation communities would be considered less than significant, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) Have a substantial adverse effect on State or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐

WHY? Jurisdictional resources were delineated as part of the BRA throughout the survey area. Within the survey area, an interconnected drainage system flows downstream from San Rafael Creek and from the Arroyo Seco Channel and exits in part via an existing diversion into the San Pascual site and in part continuing downstream through the Arroyo Seco Channel.

<u>Impacts to ACOE “Waters of the U.S.”</u>

Impacts to U.S. Army Corps of Engineers (USACE)[4] Waters of the United States (WOTUS)[5] would result from creating a diversion structure within San Rafael Creek. The proposed Project modifications include modifying the side wall and channel bottom of the San Rafael Creek to divert water into proposed water treatment wetlands in areas that are currently uplands. This would be a permanent impact to WOTUS at the site, though it would not affect flows to downstream waters other than a beneficial impact through improving the quality of the water flowing into the Arroyo Seco Channel from the San Rafael Creek drainage area. There would be an increased diversion of stormwater runoff from the San Rafael Creek, at the San Rafael site, and the Arroyo Seco Channel, at the San Pascual site compared to the existing condition as both BMPs sites would infiltrate a portion of the diverted water. However, there is no habitat being supported by runoff downstream of the sites that would be adversely affected by the 320 af average annual water capture for water supply resulting from Project implementation. Runoff from this watershed drains to over 50 linear miles of the Los Angeles River, which is largely channelized, and then to the Pacific Ocean.

Permanent impacts to WOTUS would also occur in the San Pascual site from grading activities and vegetation removal to construct the proposed facilities. A summary of Project impacts related to WOTUS is provided in Table 15, Summary of Impacts to Waters of the U.S. (USACE Jurisdiction).

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4 Section 404 of the federal Clean Water Act (CWA) regulate activities affecting resources under the jurisdiction of the USACE.
5 WOTUS under the jurisdiction of the ACOE include navigable coastal and inland waters, lakes, rivers, streams, and their tributaries; interstate waters and their tributaries; wetlands adjacent to such waters; intermittent streams; and other waters that could affect interstate commerce,

TABLE 15
SUMMARY OF IMPACTS TO WATERS OF THE U.S. (USACE JURISDICTION)

Agency	Impact Type	Impacts (acres) San Rafael Site	Impacts (acres) Arroyo Seco Channel	Impacts (acres) San Pascual Site	Totals
Wetlands					
USACE	Existing	0.000	0.000	0.064	**0.064**
	Permanent	0.000	0.000	0.064	**0.064**
	Temporary	0.000	0.000	0.000	**0.000**
Non-wetland waters					
USACE	Existing	0.098	2.604	0.219	**2.921**
	Permanent	0.001	0.000	0.219	**0.220**
	Temporary	0.000	0.000	0.000	**0.000**
USACE: U.S. Army Corps of Engineers Source: Psomas 2023a, Appendix B.					

Impacts to RWQCB “Waters of the State”

Impacts to Los Angeles RWQCB “waters of the State”[6] largely mirror those of WOTUS. The construction of a diversion structure is considered a permanent impact to the unvegetated, concrete-lined, San Rafael Creek. The Project also proposes a concrete cap or bridge over San Rafael Creek. While the USACE regulates only discharges to jurisdictional waterways, the RWQCB typically considers the installation of structures that cover channels (such as this concrete cap/bridge) to be a permanent, though indirect, impact because it may have an impact on water quality. Impacts to jurisdictional “waters of the State” slightly exceed those of WOTUS at the San Pascual site because the basin includes an existing side channel that drains adjacent upland areas into the San Pascual site. This side channel is not considered WOTUS but still falls under the jurisdiction of the Los Angeles RWQCB as an isolated feature. A summary of Project impacts related to “waters of the State” under the jurisdiction of the Los Angeles RWQCB is provided in Table 16, Summary of Impacts to Waters of the State (Los Angeles RWQCB Jurisdiction).

TABLE 16
SUMMARY OF IMPACTS TO WATERS OF THE STATE
(LOS ANGELES RWQCB JURISDICTION)

Agency	Impact Type	Impacts (acres) San Rafael Creek	Impacts (acres) Arroyo Seco Channel	Impacts (acres) San Pascual Basin	Totals
Wetlands					
LARWQCB	Existing	0.000	0.000	0.064	**0.064**
	Permanent	0.000	0.000	0.064	**0.064**
	Temporary	0.000	0.000	0.000	**0.000**
Non-wetland Waters					
LARWQCB	Existing	0.098	2.604	0.221	**2.923**
	Permanent	0.008	0.000	0.221	**0.229**
	Temporary	0.000	0.000	0.000	**0.000**
LARWQCB: Los Angeles Regional Water Quality Control Board Source: Psomas 2023a, Appendix B.					

6 Section 401 of the Clean Water Act provides the RWQCB with the authority to regulate, through a Water Quality Certification, any proposed federally permitted activity that may affect water quality. The RWQCB also has jurisdiction over isolated wetlands and waters of the State under the Porter-Cologne Water Quality Control Act.

Impacts to CDFW Jurisdictional Waters

Impacts to CDFW[7] jurisdictional waters would result from modifications to San Rafael Creek to create the diversion structure to allow water to reach the proposed treatment wetlands. The proposed construction of the concrete cap/bridge over San Rafael Creek would likely not be considered as an impact by the CDFW because there is no aquatic habitat in the concrete channel. A summary of Project impacts to CDFW jurisdictional areas is provided in Table 17, Summary of Impacts to CDFW Jurisdictional Waters.

TABLE 17
SUMMARY OF IMPACTS TO CDFW JURISDICTIONAL WATERS

Agency	Impact Type	Impacts per Project Area (acres)			Totals
		San Rafael Creek	Arroyo Seco	San Pascual Basin	
CDFW	Existing	0.098	3.018	1.798	**4.914**
	Permanent	0.001	0.000	1.617	**1.618**
	Temporary	0.000	0.000	0.000	**0.000**

CDFW: California Department of Fish and Wildlife
Source: Psomas 2023a, Appendix B.

As impacts to jurisdictional waters would result from the Project, as described for each agency above, the Project would acquire jurisdictional permits pursuant to the Clean Water Act prior to any impacts on jurisdictional resources. Specifically, prior to any impacts on waters under the regulatory authority of the Regional Water Quality Control Board (RWQCB), the Army Corps of Engineers (ACOE), or the California Department of Fish and Wildlife (CDFW), the City of Pasadena (Pasadena) must prepare and process a RWQCB Report of Waste Discharge, ACOE 404 application, and a CDFW Section 1602 Notification of Lake or Streambed Alteration, as applicable. Pasadena must ensure implementation of and compliance with all measures required by the RWQCB, ACOE, and CDFW permits. Compensatory mitigation may include restoration (i.e., reestablishment or rehabilitation), establishment (i.e., creation), enhancement, and/or preservation of jurisdictional resources. Compensatory mitigation may occur through permittee-responsible mitigation, payment to an in-lieu fee program, or purchase of compensatory mitigation credits from an approved mitigation bank. As part of the required permitting process, mitigation ratios (i.e., the amount of mitigation acreage compared to the amount of impacted habitat) would be negotiated with the regulatory agencies with a minimum 1:1 replacement of impacted jurisdictional resources with jurisdictional resources of equivalent or higher quality habitat value.

As discussed in Section 1.0, a temporary bridge would span the Arroyo Seco Channel to have access to the San Rafael site that would accommodate the potential weight of all anticipated construction vehicles. The abutments on either side of the temporary bridge would not touch the limits of the Channel itself. Therefore, there would be no impacts to jurisdictional features related to the temporary bridge at the San Rafael site.

Through compliance with required Clean Water Act permitting requirements, potential impacts to protected wetlands would be reduced to a less than significant level.

7 Section 1602 of the *California Fish and Game Code* regulate activities affecting resources under the jurisdiction of the CDFW. The CDFW has jurisdictional authority over resources associated with rivers, streams, and lakes.

	Potentially Significant Impact	**Less than Significant with Mitigation**	**Less than Significant Impact**	**No Impact**
Would the project:				
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☒	☐	☐

WHY? Wildlife movement typically consists of (1) dispersal (e.g., juvenile animals from natal areas or individuals extending range distributions); (2) seasonal migration; and (3) movements related to home range activities (e.g., foraging for food or water, defending territories, or searching for mates, breeding areas, or cover). This movement is necessary to maintain healthy wildlife populations, especially where open space is limited in size or otherwise isolated from other open space areas.

Wildlife Movement

The Project site is located at the urban-wildland interface. Residential development, stables, community parks, parking lots, roadways, and flood control facilities surround the area. Within the Project vicinity, vehicular use is low and pedestrian and/or equestrian use is moderate to high in some areas and low in others. Vehicular use is typically restricted to maintenance vehicles along the channel and pedestrian use is mainly limited to the walkways east and north within the survey area.

Wildlife movement through the Project vicinity consist largely of species common in urban or suburban landscapes such as common birds, flying invertebrates, reptiles, and amphibians able to persist in small habitat patches and within developed lands as well as mammals such as coyote, common raccoon, striped skunk, and Virginia opossum, among others. Regional movement for these species may occur to a greater degree along green belts such as the Arroyo Seco but movement is also expected to occur throughout the suburban landscape. Implementation of the Project components would not create any additional constraints to wildlife movement and local wildlife are expected to move throughout the Project sites and surrounding areas in a similar manner to existing conditions. Therefore, impacts on wildlife movement would be considered less than significant, and no mitigation is required.

Migratory Bird Treaty Acy

The federal Migratory Bird Treaty Act (MBTA) protects migratory birds and their nests and eggs, both common and special status. Bird species protected under the provisions of the MBTA are identified by the List of Migratory Birds (50 *Code of Federal Regulations* [CFR] §10.13, as amended). Birds have the potential to nest in the vegetation in the survey area, and their nests may be impacted by the Project. In addition to the MBTA, Sections 3503 and 3503.5 of the *California Fish and Game Code* protect nesting migratory birds and raptors. Impacts to nesting birds, both on and adjacent to the Project site, would be considered a significant impact prior to mitigation. Therefore, if Project construction, on either site, is initiated during the typical breeding season for nesting birds (i.e., February 1 to September 15) and nesting raptors (i.e., as early as January 1 for some raptors to June 30), MM BIO-3 requires a pre-construction nesting bird/raptor survey to ensure compliance with the MBTA and describes the process for protecting any active nests identified while construction is ongoing. If construction activities are initiated during the non-breeding season, implementation of MM BIO-3 would not be required and there would be no potential impact to nesting birds and raptors. With implementation of MM BIO-4, potential impacts to nesting migratory birds and raptors during their breeding seasons due to Project construction would be reduced to a less than significant level.

Roosting Bats

Several bat species may forage throughout the Project sites and roost in mature trees or under bridges. However, large roosting colonies have not been documented on or near the Project sites and are not expected to occur. Impacts on individual roosting bats or small colonies (i.e., less than ten individuals) are a potential constraint on development. Indirect impacts on individual roosting bats or small colonies may occur with Project implementation and may result in bats avoiding the site temporarily. Therefore, the Project would implement MM BIO-4, which requires a two-step tree removal process to be implemented to prevent bat mortality. With implementation of MM BIO-4, potential impacts to roosting bats would be reduced to a less than significant level.

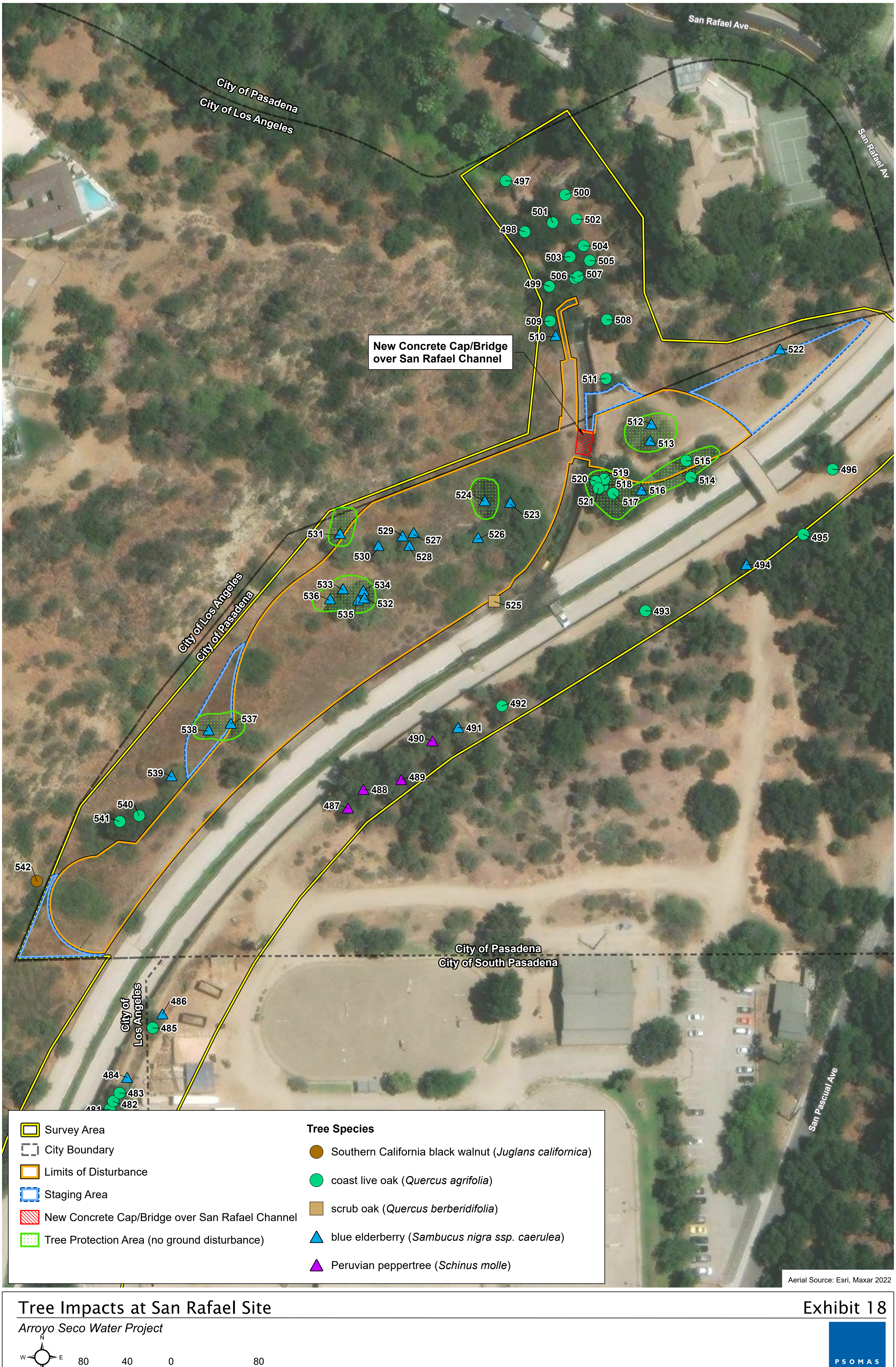
	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☒	☐	☐

WHY? The Project includes properties in three cities that regulate impacts to trees: Pasadena, South Pasadena, and Los Angeles, as discussed below. Many of these trees are also subject to regulation by the CDFW, as previously discussed in Threshold 2.4(b). Exhibit 18, Tree Impacts at San Rafael Site, and Exhibit 19, Tree Impacts at San Pascual Site, show the location, survey number, and species of all trees within the survey area. Trees within the disturbance footprint are shown, including those with tree protection areas that would be avoided and protected in place as part of the Project.

City of Pasadena

Trees that are regulated by Pasadena are described in Chapter 8.52, City Trees and Tree Protection Ordinance, of the Pasadena Municipal Code, hereinafter referred to as the Pasadena Tree Ordinance. Under the Pasadena Tree Ordinance, removal of or injury to any protected trees requires a permit from Pasadena. Protected trees are defined in Section 8.52.020(T) as “a native, specimen, landmark, landmark-eligible, mature (except for the trees in RS or RM-12 zones), or public tree”. Additionally, the Pasadena Tree Ordinance states that “Special consideration shall be afforded mature, public, landmark, landmark-eligible, native and specimen trees as set forth in this chapter”1#Native trees that are specified in the Pasadena Tree Ordinance include California buckeye (*Aesculus californica*), white alder (*Alnus rhombifolia*), Southern California black walnut (*Juglans californica*), native oaks (coast live oak [*Quercus agrifolia*], scrub oak [*Q. berberidifolia*], canyon oak [*Q. chrysolepis*], Engelmann oak [*Q. engelmannii*], and valley oak [*Q. lobata*]), western sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremonttii*), black cottonwood (*Populus trichocarpa*), arroyo willow (*Salix lasiolepis*), and California bay laurel (*Umbellularia californica*). Replacement requirements under the Pasadena Tree Ordinance are determined on a case-by-case basis by a matrix in which the quantity of replacement trees to be required is based on the size of trees to be removed and the size of trees that are subsequently planted.

A total of 6 trees, all native blue elderberry, would be removed at the San Rafael site and all fall under Pasadena’s jurisdiction, as summarized in Table 18, Trees Proposed for Removal Protected by the Pasadena Tree Ordinance. The data in each table summarizing protected trees is presented consistent with the data required to be documented under each city’s tree ordinance.



Tree Impacts at San Rafael Site **Exhibit 18**

Arroyo Seco Water Project

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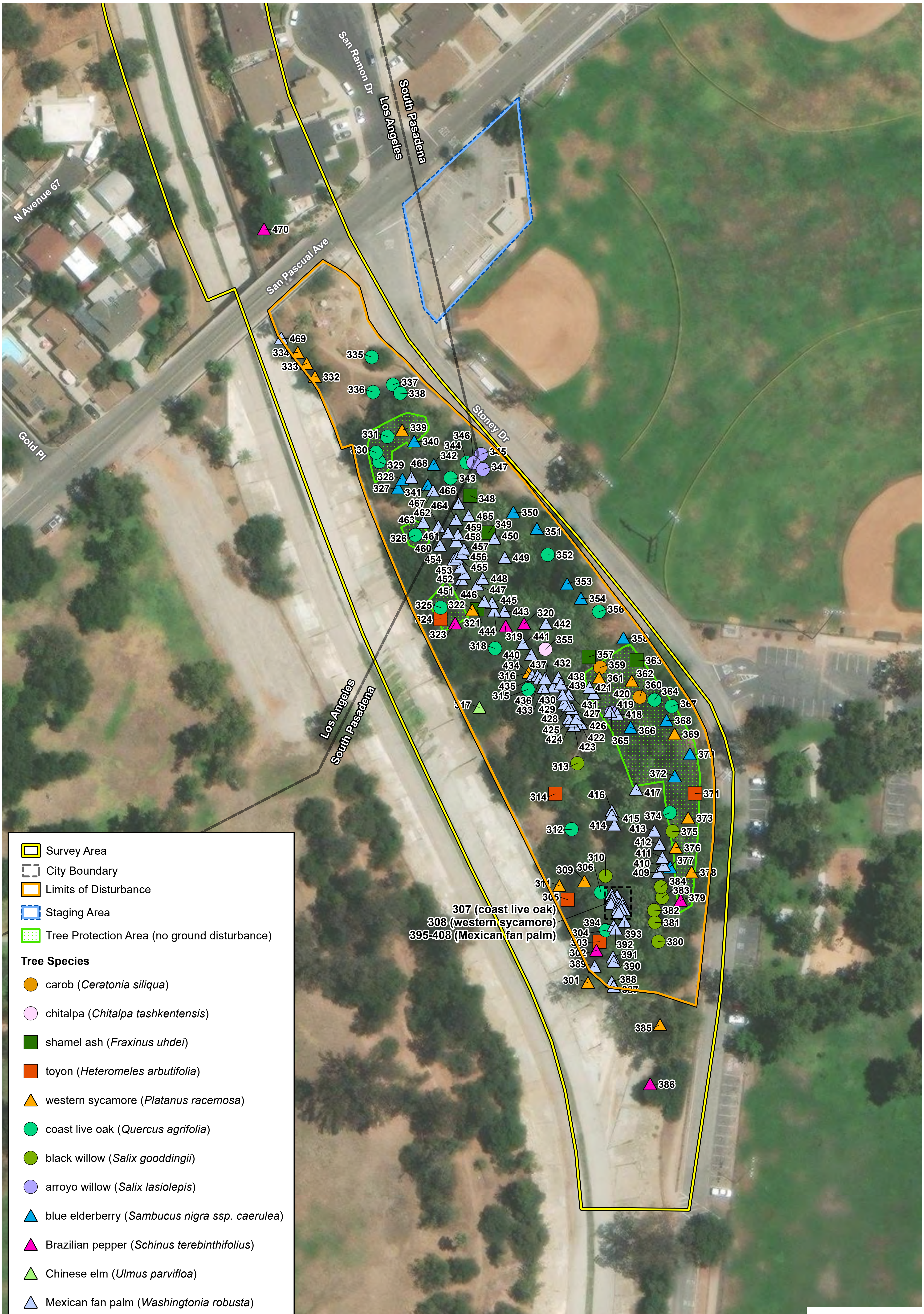

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Tree Impacts at San Pascual Site

Exhibit 19

Arroyo Seco Water Project

N W E S

80 40 0 80 Feet

PSOMAS

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TABLE 18
TREES PROPOSED FOR REMOVAL PROTECTED BY THE PASADENA TREE ORDINANCE

Tree No.	Tree Species	# Main Trunks	DBH (in)	Sum of Trunk DBH (in)	Height (ft)	Canopy Diameter (ft)	Health Rating	Aesthetic Rating
523	blue elderberry *Sambucus nigra* ssp. *caerulea*	3	12.4, 5.5, 5.1	23.0	40	30	3	3
526	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	9.6, 5.7	15.3	10	25	3	3
527	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	21.1	21.1	25	30	3	3
528	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	15.1	15.1	30	20	3	3
529	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	13.9, 6.2	20.1	30	25	3	3
530	blue elderberry *Sambucus nigra* ssp. *caerulea*	3	12.4, 12.2, 6.8	31.4	30	30	3	3

Aesthetics/Health Rating: 1=Very Poor, 2=Poor, 3=Fair, 4=Good, and 5=Excellent
DBH: diameter at breast height; in: inches; ft: feet
Note: Tree numbers identify individual surveyed trees and match data in Tree Report, which is an attachment to the BRA in Appendix B.
Source: Psomas 2023a (Appendix B)

The Project would implement MMs BIO-1 and BIO-2, which define the requirements and processes to protect special status natural resources (which includes the California black walnut situated near the San Rafael site) and trees, respectively, to be preserved on-site during construction process. With implementation of MMs BIO-1 and BIO-2 and compliance with Pasadena Tree Ordinance requirements, potential impacts to City of Pasadena trees would be reduced to a less than significant level.

<u>City of South Pasadena</u>

South Pasadena regulates impacts to “protected trees” that are defined in Section 34.1 of the South Pasadena Municipal Code, hereafter referred to as the South Pasadena Tree Ordinance. Protected trees include heritage trees (historically significant trees as determined by the City of South Pasadena); any tree species with a dbh of 12 inches or more; any oak tree species with a minimum dbh of 4 inches; all native tree species with minimum dbh of 4 inches; and shrubs that are at least 16 feet tall with a single trunk that has a dbh of 4 inches or more. For the Project, South Pasadena considered all native tree and shrub species meeting the applicable size requirements (i.e., branch diameter and/or height) within their jurisdiction on the San Pascual site to be considered protected under the South Pasadena Tree Ordinance. Replacement tree requirements are based on a matrix that is similar to the procedure used Pasadena. A total of 27 trees would be removed or encroached upon that fall under South Pasadena’s jurisdiction, as summarized in Table 19, Tree Proposed for Removal Protected by the South Pasadena Tree Ordinance.

TABLE 19
TREES PROPOSED FOR REMOVAL PROTECTED BY THE SOUTH PASADENA TREE ORDINANCE

Tree No.	Tree Species	Quantity	DBH Range (in)	Height Range (ft)	Canopy Diameter Range (ft)
308, 309, 316, 322, 361	western sycamore *Platanus racemosa*	5	5.0–63.7	20–60	8–40
304, 306, 307, 312, 315, 356, 374	coast live oak *Quercus agrifolia*	7	8.0–33.1	30–60	8–40
310, 313, 375, 380 through 384	black willow *Salix gooddingii*	8	4.0–15.0	20–35	10–20
347, 365	arroyo willow *Salix lasiolepis*	2	16.5	25	15
350, 353, 354, 366, 377	blue elderberry *Sambucus nigra* ssp. *caerulea*	5	6.5–26.0	10–25	10–25
DBH: diameter at breast height; in: inches; ft: feet					
Source: Psomas 2023a (Appendix B)					

To reduce impacts to trees to be protected in place during construction, the Project would implement MM BIO-2 that defines the process to protect trees to be preserved on-site during the construction process. With implementation of MM BIO-2 and compliance with South Pasadena Tree Ordinance requirements, potential impacts to South Pasadena trees would be reduced to a less than significant level.

City of Los Angeles

Los Angeles regulates trees that are designated as “protected trees” as defined by Section 17.02 of the Los Angeles Municipal Code, hereafter referred to as the Los Angeles Tree Ordinance. This category includes all native oak trees, Southern California black walnuts, western sycamores, California bay laurels, toyon (*Heteromeles arbutifolia*), and blue elderberry (*Sambucus nigra* ssp. *caerulea*) that have a minimum trunk dbh of 4 inches. Additionally, Los Angeles requires that all non-protected trees with a minimum dbh of 8 inches are documented. A total of 9 trees would be removed or encroached upon that fall under Los Angeles’ jurisdiction, as summarized in Table 20, Tree Proposed for Removal Protected by the Los Angeles Tree Ordinance.

TABLE 20
TREES PROPOSED FOR REMOVAL PROTECTED BY THE LOS ANGELES TREE ORDINANCE

Tree No.	Tree Species	# Main Trunks	DBH (in)	Sum of Trunk DBH (in)	Height (ft)	Canopy Diameter (ft)	Health Rating	Aesthetic Rating
326	coast live oak *Quercus agrifolia*	1	20.3	20.3	30	30	5	4
327	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	3.0, 1.5	4.5	15	12	4	3
328	blue elderberry *Sambucus nigra* ssp. *caerulea*	3	5.4, 5.3, 2.3	13.0	15	10	3	3
335	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	8.2	8.2	18	12	4	4
340	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	13.2	13.2	12	15	3	3
341	blue elderberry *Sambucus nigra* ssp. *caerulea*	5	4.5, 4.2, 3.0, 2.0, 2.0	15.7	15	10	3	2
342	blue elderberry *Sambucus nigra* ssp. *caerulea*	9	4.2, 4.2, 3.0, 1.5, 1.5, 1.0, 1.0, 1.0, 1.0	18.4	15	10	3	2
343	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	15.0	15.0	35	18	4	4
344	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	4.1, 3.6	7.7	18	10	4	3

Aesthetics/Health Rating: 1=Very Poor, 2=Poor, 3=Fair, 4=Good, and 5=Excellent

DBH: diameter at breast height; in: inches; ft: feet

Source: Psomas 2023a. Appendix B.

Construction at the San Pascual site would require removal of one Shamel ash (*Fraxinus uhdei*) and five Mexican fan palms (*Washingtonia robusta*) that occur within the City of Los Angeles limits. However, these tree species are not considered protected by the Los Angeles Tree Ordinance. The Project would implement MM BIO-2, which defines the process to protect trees to be preserved on-site during construction. With implementation of MM BIO-2 and compliance with Los Angeles Tree Ordinance requirements, potential impacts to Los Angeles trees would be reduced to a less than significant level.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

WHY? The Project does not conflict with any Significant Ecological Areas, Wildflower Reserve Areas, or Sensitive Environmental Resource Areas, as none exists within the Project site. There are no adopted Habitat Conservation Plan or Natural Community Conservation Plan within the Project area. Therefore, the Project would not conflict with any local, regional, or State plans protecting biological resources. There would be no impact, and no mitigation is required.

MITIGATION MEASURES

MM BIO-1 **Biological Monitoring.** Prior to initiation of Project construction activities, a qualified Biologist shall ensure the limits of construction are clearly marked in the field in the vicinity of natural resources, such as the California black walnut situated near the San Rafael site and jurisdictional drainages, to avoid impacts to special status natural resources being protected in place during construction. Field marking shall include 4-foot high, orange, construction safety fencing (snow fencing) staked at sufficient intervals to prevent failure. Safety fencing shall be maintained throughout the construction phase by the Contractor and replaced or moved as needed. The biologist shall monitor work activities on the first day of construction, during all vegetation removal, and on an as-needed basis thereafter.

MM BIO-2 **Trees.** All trees to be preserved on-site during the construction process shall have the following measures implemented:

- Prior to initiation of construction activities, protective fencing shall be placed around the critical root zone (five feet outside the outer canopy) of all trees that are in the Project construction area and are intended to remain in place. No ground disturbance or storage of construction materials should occur within the critical root zone during construction.

- A Certified Arborist shall be retained to monitor construction activities of any ground disturbance planned within or adjacent to the critical root zone for any tree to be preserved during construction.

MM BIO-3 **Nesting Birds/Raptors.** The Project shall be conducted in compliance with the conditions set forth in the Migratory Bird Treaty Act (MBTA) and *California Fish and Game Code* with methods approved by the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) to protect active bird/raptor nests. To avoid impacts on active nests for common and special status birds and raptors, no vegetation removal or ground-disturbing activities shall occur during avian breeding season which generally runs from February 1 through September 15 (as early as January 1 for some raptors). The applicant shall schedule vegetation clearing during the non-breeding season (i.e., September 16 to December 31) to the extent feasible. If Project timing requires that vegetation clearing occur between February 1 and September 15, the applicant or its designee shall retain a qualified Biologist to conduct a pre-construction survey for nesting birds and raptors. The pre-construction survey shall be conducted by a qualified Biologist within three days prior to vegetation clearing. The pre-construction nesting bird survey area shall include the Project impact area (i.e., disturbance footprint) plus a 250-foot buffer to search for nesting birds and a 500-foot buffer to search for nesting raptors. If no active nests are found, no further mitigation would be required.

If an active nest is located in the pre-construction nesting bird survey area, the Biologist shall delineate an appropriate buffer to protect the nest based on the sensitivity of the species. A minimum 300-foot no disturbance buffer shall be used around each active bird nest. A protective buffer of 500 feet shall be used to protect nesting raptors and 0.5 mile for special status species (e.g., California Endangered Species Act [CESA]-listed), if feasible. If appropriate, a smaller buffer may be considered around active nests that are not considered special status species (e.g., CESA-listed). Adjustments to the buffer size may be based on site topography, existing disturbance, sensitivity of the individuals (established by observing the individuals at the nest), and the type of construction activity. Personnel working on the Project, including all contractors working on site, shall be instructed on the presence of nesting birds, area sensitivity, and adherence to no-disturbance buffers. No construction activities shall be allowed in the designated buffer until the Biologist determines that nesting activity has ended. Construction may proceed within the buffer once the Biologist determines that nesting activity has ceased (i.e., fledglings have left the nest or the nest has failed). The designated buffer will be clearly marked in the field and will be mapped as Environmentally Sensitive Areas (ESAs) on construction plans.

Prior to the initiation of construction activities, an email summary of the results shall be submitted to the City of Pasadena with a map of any active nests found and their designated buffers. Construction shall be allowed to proceed if appropriate buffer distances are employed for all active nests. The Biologist shall then prepare a formal Letter Report describing methods used, results of the survey, recommended buffers, and/or justification for buffer reductions. The Letter Report shall be submitted to the City of Pasadena within one week of completion of the survey. If an active nest is observed during the survey, the Letter Report shall include a map showing the designated protective buffer.

MM BIO-4 **Bats.** A two-step tree removal process shall be implemented to prevent bat mortality. Prior to tree removal, a qualified biologist shall conduct a pre-construction bat habitat assessment. If the tree potentially supports roosting bats, at the direction of the biologist, some level of disturbance (such as trimming of lower branches of trees) shall be applied three days prior to removal to allow bats to escape. The trees shall be removed on day three (i.e., there shall be no less or more than two nights between initial disturbance and the tree removal). On each of the three days of the tree removal process, the tree to be removed will be visually inspected by a qualified biologist to confirm no bats are roosting immediately prior to removal.

2.5 CULTURAL RESOURCES

Information in this section is based upon the records searches and literature reviews of information available from the South-Central Coastal Information Center (SCCIC) and the Native American Heritage Commission (NAHC). The results of the cultural resources assessment are presented below, and supporting documentation is provided in Appendix C of this IS/MND.

Existing Conditions

A literature review of documents on file at the SCCIC at California State University, Fullerton was completed on January 18, 2022. The results of the records search identified 22 previously studies that have been conducted within a half-mile of the Project sites, which includes 7 previous studies (LA-06334, LA-06385, LA-08252, LA-08928, LA-10541, LA-11231, LA-11529) covering the Project sites, which are described in more detail in Table 21, Cultural Resource Studies Including the Project Sites. In general, prior studies within a half-mile of the Project site consist of archaeological field studies and literature reviews, management/planning, architectural and historical evaluation, cultural resources mitigation monitoring and other research conducted between 1986 and 2009.

TABLE 21
CULTURAL RESOURCE STUDIES INCLUDING THE PROJECT SITES

Report No	Affiliation	Year	Author	Title
LA-06334	Greenwood and Associates	2002	Kinkella, Andrew	Below the Basketball Court: Burial Recovery at Arroyo Seco Park
LA-06385	Historic Resources Group	2001	McAvoy, Christy J.	Section 106 Review for 5568 Via Marison Avenue Arroyo Seco Park Historic District Los Angeles, California
LA-08252	Caltrans	1986	Snyder, John W., Mikesell, Stephen, and Pierzinski	Request for Determination of Eligibility for Inclusion in the National Register of Historic Places/Historic Bridges in California: Concrete Arch, Suspension, Steel Girder and Steel Arch
LA-08928	McKenna et al.	2007	McKenna, Jeanette A.	A Phase I (CEQA) and Class Iii (NEPA) Cultural Resources Investigation for the Lower Arroyo Seco Trail and Trailhead Improvements Project Area in the City of Pasadena, Los Angeles County, California
LA-10541	Dolan, Christy and Monica Strauss	2005	EDAW, Inc.	Finding of Effect for the Proposed Arroyo Seco Bike Path, Los Angeles County, California
LA-11231	Meiser, M.K.	2009	EDAW, Inc.	Historic American Engineering Record Arroyo Seco Flood Control Channel, Los Angeles County, California
LA-11529	Castanon, David	2008	Department of the Army	Arroyo Seco Channel Project in the cities of Los Angeles and Pasadena, Los Angeles County, California
Source: SCCIC 2022				

The SCCIC records searches also identified one previously recorded archaeological resource (as opposed to study) within a half-mile of the Project sites (see Table 22, Previously Recorded Cultural Resources Within a Half-Mile of the Project Sites, below). The archaeological resource is a precontact site (prior to the arrival of Europeans) and documented as a lithic scatter (remnants of tool stone production) site with an ancestral Gabrielino/Tongva cemetery. No archeological resources were identified within the Project sites.

Additionally, three non-archaeological resources (P-19-186859, P-19-189325, P-19-190590) were identified within the Project sites. The non-archaeological resources include one historic-era built environment site and two historic-era districts. The historic-era built environment resource is the Arroyo Seco Flood Control Channel. The historic-era districts consist of the Arroyo Seco Park District and the Pasadena Arroyo Parks and Recreation District. The three non-archaeological cultural resources identified within the Project sites are briefly discussed further below in the impacts analysis.

TABLE 22
PREVIOUSLY RECORDED CULTURAL RESOURCES
WITHIN A HALF-MILE OF THE PROJECT SITES

Primary Number	Trinomial	Resource Description	Recording of Events	Proximity to Project Site
P-19-003057	CA-LAN-003057	Prehistoric: Arroyo Seco/San Pascual Site	John M. Foster, Greenwood & Associates (2002)	Outside
P-19-186859	-	Historic: Arroyo Seco Flood Control Channel	EDAW (2003)	Within
P-19-189325	-	Historic: Arroyo Seco Park District	McEvoy (2000)	Within
P-19-190509	-	Historic: Pasadena Arroyo Parks and Recreation District	Pasadena Heritage (2007)	Within
Source: SCCIC 2022				

A Sacred Lands File (SLF) search was requested from the Native American Heritage Commission (NAHC) on November 23, 2021. On January 12, 2022, the NAHC replied that the results of the SLF check conducted through the NAHC are positive for sacred land within the vicinity of the Project sites, and to contact the Gabrieleno Band of Mission Indians – Kizh Nation. Additionally, the NAHC provided a list of nine Native American tribes or individuals to contact for further information.

Impacts Analysis

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?	☐	☐	☐	☒

WHY? Section 15064.5 of the CEQA Guidelines generally defines a historic resource as a resource that is (1) listed in or determined to be eligible for listing in the California Register of Historical Resources (California Register); (2) included in a local register of historical resources (pursuant to Section 5020.1(k) of the Public Resources Code); or (3) identified as significant in an historical resources survey (meeting the criteria in Section 5024.1(g) of the Public Resources Code). Additionally, any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be an historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the California Register. The California Register automatically includes all properties listed in the NRHP and those formally determined to be eligible for listing in the National Register.

As stated above, the records search identified three non-archaeological resources (P-19-186859, P-19-189325, P-19-190590) within the Project sites. These are built environment resources and are each discussed below.

P-19-186859

Cultural resource P-19-186859 is the Arroyo Seco Flood Control Channel. The Channel is a 10-mile-long masonry-lined open channel with two soft-bottom natural segments. This Channel extends from the base of the Devil's Gate Dam to its confluence at the Los Angeles River. The channelization of the Arroyo Seco was completed in 1947. This Channel was recommended eligible for the NRHP by M. Strauss in 2003 under Criterion A. The Project would not directly or indirectly impact the Arroyo Seco Flood Control Channel.

P-19-189325

Cultural resource P-19-189325 is the Arroyo Seco Park District. The Arroyo Seco Park District consists of a series of contiguous parks extending along the Arroyo Seco from San Pascual Avenue on the north to Pasadena Avenue on the south. These parks include the existing Heritage Square Park, Lummis Park, Sycamore Grove Park, the northern portion of the Ernest E. Debs Regional Park, and Arroyo Seco Park (the site of the Project). Parts of the Arroyo Seco Park District are traversed by the Pasadena Freeway, previously determined eligible for the National Register of Historic Places (NRHP) in 1983. Several buildings and structures are located within the Arroyo Seco Park District. The arroyo waterway is confined to a concrete flood control drainage channel through its length. The drainage Channel and many of the buildings and structures reflect the type of construction common to public works and federal relief projects in the 1930s.

The San Rafael site falls within the boundaries of the Arroyo Seco Park District, specifically, within the Arroyo Seco Park. The District Record (HRG 2000) states the following about the Arroyo Seco Park, and does not identify character-defining features for Arroyo Seco Park:

> Completion of the Pasadena Freeway and subsequent development along the Arroyo Seco has diminished the distinctive character of Arroyo Seco Park's original plan as first envisioned in 1931. Although the area of the park remains intact, the park's boundaries are no longer consistent with its original design and several large sections have assumed other names. Nevertheless, Arroyo Seco Park remains a testament to Los Angeles' efforts to develop a municipal park and parkway system along the Arroyo Seco in the 1920s and l930s. The WPAs involvement is an added level of significance, as these efforts were largely made possible by the New Deal Federal relief programs of the 1930s.

The contributing elements identified for the District Record include the Bowling Clubhouse (1938), Comfort Station (1932), Watch'an's House (1932), Service Buildings, Sheds, and Yard (1932), 5 Tennis Courts (1932), Paved Walks and Drives, and Mature Trees (i.e., Firehorn, California pepper, California native sycamores, and eucalyptus). As discussed further in Section 2.4, Biological Resources, there are no trees of these species proposed to be removed on the San Rafael site (see Table 14). Although the Project would remove some mature trees (a total of six blue elderberry), the removals would occur in an area that currently lacks a formal landscape design. As discussed in detail in Section 2.4, Biological Resources, implementation of the Project would result in a net increase of trees and native vegetation present at this site. Additionally, the Project would reflect a formal landscape design that is intended to present a naturalized but aesthetically pleasing visual condition. The existing equestrian/pedestrian perimeter trails would remain and be enhanced, and all upgrades to the existing circulation system and other features on the San Rafael site would be made in conformance with the Arroyo Seco Design Guidelines. The trails would continue to serve as important paths of circulation throughout the Park and help to maintain its historic use. Therefore, the Project would not directly or indirectly impact the Arroyo Seco Park District or any contributing resources.

P-19-190590

Cultural resource P-19-190590 is the Pasadena Arroyo Parks and Recreation District (District). The District currently includes 81 structures and is included on the NRHP. A total of 24 of the 81 structures are considered contributing structures to the Pasadena Arroyo Parks and Recreation District. The Arroyo Seco

Flood Control Channel is not considered a contributing resource since it is not associated in the context of parks and recreation at the local level. Major character-defining features of the District include numerous buildings and structures, none of which occurs within the San Rafael site, and the trail circulation system that connects the entire District. The closest contributing structure to the Project site is the San Rafael Bridge, located approximately 70 feet north (upstream) of the San Rafael site at the nearest points. However, this structure has no potential to be impacted by the Project and would not be used for construction vehicle access or staging. The only character-defining feature within Project site are portions of the Arroyo Seco Trail. However, any improvements made to the trail as part of the Project would not alter the historic function or circulation of the trails and would be completed in conformance with the Arroyo Seco Design Guidelines. Therefore, the Project would not directly or indirectly impact the Pasadena Arroyo Parks and Recreation District or any contributing resources.

No other historic resources were identified on or within one-half mile of the Project sites. No on-site structures meet the 50-year construction age criterion for historic evaluation, that have not already been assessed. Therefore, no impact would occur, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☐	☒	☐	☐

WHY? As discussed above, there are no known archaeological sites on the Project sites. The SCCIC record search and literature review did identify one cultural resource within the one-half-mile search radius of the Project sites. Cultural Resource P-19-003057 is a multicomponent (precontact and historic-era) archaeological site known as the Arroyo Seco/San Pascual Site. This archaeological site was documented in 2002 and consists of precontact lithic scatters (debris left from the manufacturing of stone tools). Ethnographic data (McKenna et al. 2007:28), from the local Native American community has identified this part of Arroyo Seco as “MKat”, meaning rocky, and suggest the area was used by the Indigenous Californians to quarry stone to produce tools. Human burials dating to the precontact era were also documented at this site. The historic component is related to Rancho San Pascual and the Mission San Gabriel. However, implementation of the Project would have no impact on this site. Nevertheless, excavation in native (i.e., previously undisturbed) soils always has the potential to encounter unknown, intact, archaeological resources, which would be considered a significant impact. Therefore, MM CUL-1, which requires monitoring of earthmoving activities in native (i.e., undisturbed) soils and describes the treatment of intact archaeological resources that may be inadvertently discovered during construction. With implementation of MM CUL-1, there would be less than significant impacts to unknown archaeological resources.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☒	☐

WHY? There are no known human remains on the sites. The Project sites are not part of a formal cemetery and are not known to have been used for burial of historic or prehistoric human remains. Thus, the Project would not impact known human remains or cemeteries; however, unknown human remains could potentially be buried within the Project sites below the surface. If human remains are encountered during Project construction, those remains would require proper treatment, in accordance with applicable laws. Sections 7050.5 through 7055 of the *California Health and Safety Code* describe the general provisions for human remains. Specifically, Section 7050.5 of the *California Health and Safety Code* describes the protocols to be followed if human remains are accidentally discovered during excavation of a site. In addition, the requirements and procedures set forth in Section 5097.98 of the *California Public Resources Code* would be implemented. If human remains are found during excavation, construction activities must stop in the vicinity of the find and in any area that is reasonably suspected to overlie adjacent remains until the County Coroner has been notified; the remains have been investigated; and appropriate recommendations have been made for the treatment and disposition of the remains. Following compliance with State regulations, which detail the appropriate actions necessary in the event human remains are encountered, potential impacts would be less than significant, and no mitigation is required.

MITIGATION MEASURES

MM CUL-1 Prior to the initiation of any earthmoving activity in which native soil is disturbed, the City shall be responsible for retaining a qualified Archaeologist to observe grading activities and to salvage and catalogue archaeological resources, as necessary. The Archaeologist shall be present at the pre-grade conference, shall establish procedures for archaeological resource surveillance, and shall establish, in cooperation with the City or its designee, procedures for temporarily halting or redirecting work to permit the sampling, identification, and evaluation of any discovered artifacts as appropriate. If archaeological resources are found to be significant pursuant to Section 15064.5 of the State CEQA Guidelines, the Archaeologist shall determine appropriate actions, in cooperation with the City or its designee, for exploration and/or recovery. The Archaeologist shall also prepare a report of findings. The report shall include the period of inspection, an analysis of any artifacts found, and the present repository of the artifacts. The Archaeologist shall prepare excavated material to the point of identification and curation. The City or its designee shall pay curatorial fees associated with the cost of curation.

2.6 ENERGY

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐

WHY? The Project would result in energy consumption from the construction phase related to construction equipment use and vehicle trips, including worker trips, equipment delivery, and export of demolition debris and excavated soil.

Project construction would require the use of construction equipment for grading and building activities. All off-road construction equipment is assumed to use diesel fuel. Construction also includes the vehicles of construction workers and vendors traveling to and from the Project site. Off-road construction equipment use was calculated from the equipment data (mix, hours per day, horsepower, load factor, and days per phase) provided in the CalEEMod construction output files which informed the air quality and greenhouse gas emissions analyses and is included in Appendix A, Air Quality and Greenhouse Gas Emissions Data. The total horsepower hours for the Project was then multiplied by fuel usage estimates per hours of construction activities included in the OFFROAD2017 Model (see Appendix D, Energy Data).

Fuel consumption from construction worker, vendor, and delivery/haul trucks was calculated using the trip rates and distances provided in the CalEEMod construction output files. Total vehicle miles traveled (VMT) was then calculated for each type of construction-related trip and divided by the corresponding miles per gallon factor using CARB's EMissions FACtor (EMFAC) 2021 model. EMFAC provides the total annual VMT and fuel consumed for each vehicle type. Construction vendor and delivery/haul trucks were assumed to be heavy-duty diesel trucks. Table 23, Energy Use During Construction, provides an estimate of diesel and gasoline fuel consumption during Project construction.

TABLE 23
ENERGY USE DURING CONSTRUCTION

Source	Gasoline (gallons)	Diesel Fuel (gallons)
Off-road construction equipment	0	12,950
Worker commute trips	1,852	2
On-road haul trips	1	1,132
Totals[1]	**1,853**	**14,085**

[1]Totals may be affected by rounding.
Sources: Based on data from CalEEMod, OFFROAD2007 and EMFAC2021. See Appendix A for CalEEMod data and Appendix D for energy calculations.

Fuel energy consumed during construction would be temporary, finite, and this amount of fuel consumption would not represent a substantial demand on energy resources. Furthermore, there are no unusual Project characteristics that would necessitate the use of construction equipment that would be less energy efficient than at comparable construction sites in other parts of California. Therefore, the Project's construction would not result in inefficient, wasteful, or unnecessary fuel consumption.

Operation of the Project would use nominal amounts of energy from infrequent, inspection- and maintenance-related vehicle trips. In addition, electricity would be used for a small flow pump that would be used year-round, other pumps that would be used during rainy days and once every three weeks to ensure proper operation, and the water harvester and related infrastructure. Vehicle trips and electricity use is not considered to require a wasteful or inefficient use of energy because it would develop additional water infiltration and treatment for the local area, as well as provide treated stormwater to irrigate Arroyo Seco Golf Course. Therefore, the Project's operation would not result in inefficient, wasteful, or unnecessary energy or fuel consumption. There would be less than significant impacts, and no mitigation is required.

	Potentially Significant Impact	**Less than Significant with Mitigation**	**Less than Significant Impact**	**No Impact**
Would the project:				
b) Conflict with or obstruct a State or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

WHY? As Pasadena is the CEQA lead agency, the following analysis considers the City of Pasadena's policy documents. The Project is consistent with Pasadena's Comprehensive Water Conservation Plan as well as Pasadena Water and Power's (PWPs) Water Integrated Resources Plan (WIRP), both of which call for measures to increase water conservation and increasing local water supplies. In addition, the Project is consistent with Pasadena's Climate Action Plan (CAP) emission reduction strategy and its Green City Action Plan, both of which include water conservation by improving storm water infiltration and urban greening. Consistency with specific measures identified in the CAP are presented in Section 2.8, Greenhouse Gas Emissions, of this document.

The Project would develop a natural water treatment and infiltration option which would capture and treat 100 percent of dry-weather flows. The use of a nature-based water treatment and infiltration option would result in conservation of energy resources compared to a fully engineered or structural water treatment option. As discussed above, the Project would not involve excessive long-term energy use. As such, the Project would not obstruct implementation of the City's policies related to increased energy use and, consequently, would neither obstruct nor conflict with City or State policies related to energy use. There would be no impact, and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to energy, and no mitigation is required.

2.7 GEOLOGY AND SOILS

Information in this section is derived from the *Geotechnical Evaluation, San Rafael Treatment Wetland, Arroyo Seco Water Reuse and National Stream Restoration Project, Pasadena, California* (San Rafael Geotechnical Evaluation) and *Geotechnical Evaluation, San Pascual Treatment Wetland, Arroyo Seco Water Reuse and National Stream Restoration Project, Pasadena, California* (San Pascual Geotechnical Evaluation), both dated June 2022 and prepared by Ninyo & Moore (Ninyo & Moore 2022a, 2022b, respectively). The Geotechnical Evaluations are provided in their entirety in Appendices E-1 and E-2).

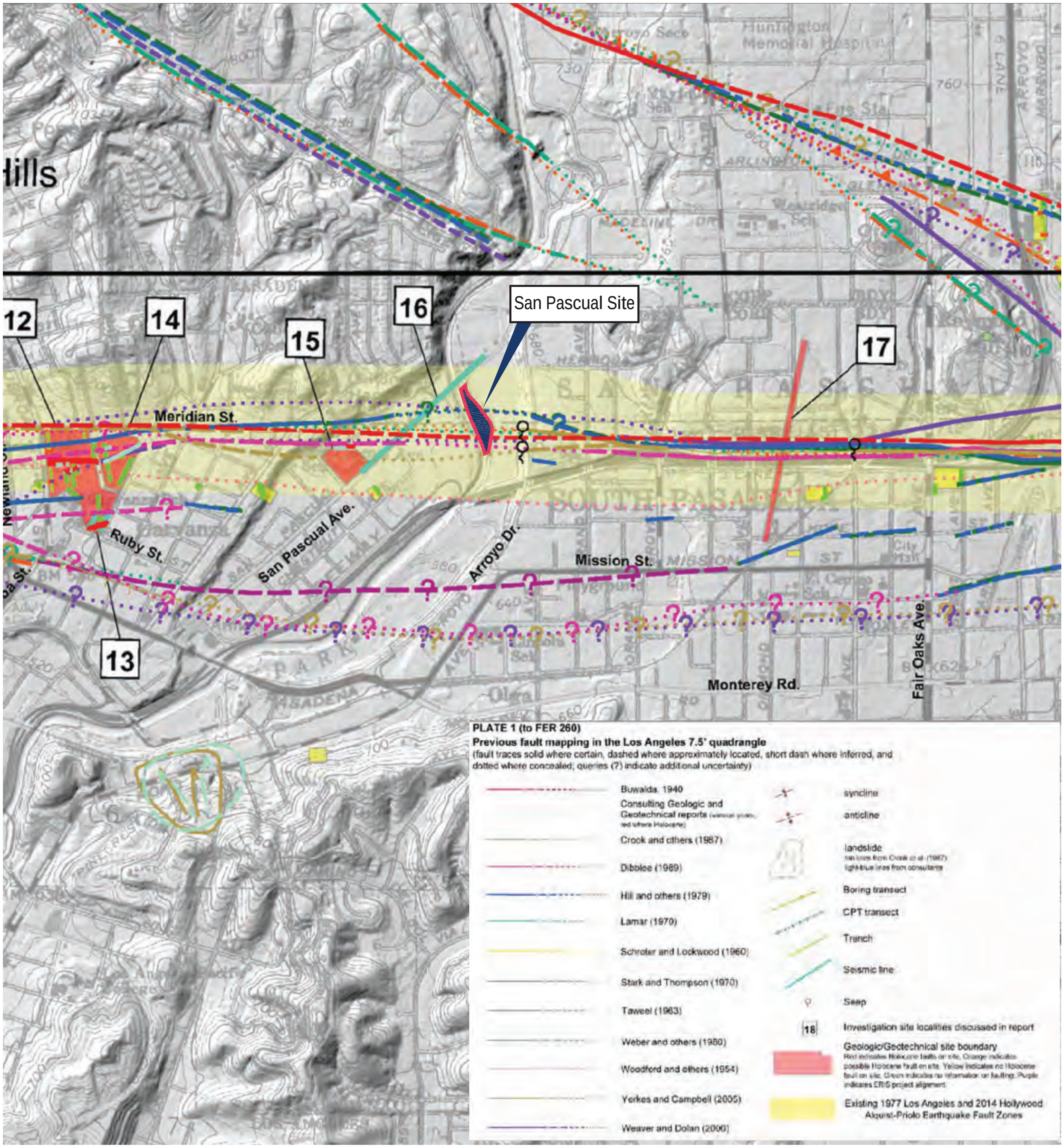
	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐

WHY? The numerous faults in Southern California include active, potentially active, and inactive faults. The criteria for these major groups are based on criteria developed by the California Geological Survey (CGS) for the Alquist-Priolo Earthquake Fault Zone Program. An active fault is defined as one that has had surface displacement within Holocene time (about the last 11,700 years). A potentially active fault has demonstrated surface displacement during Quaternary time (approximately the last 1.6 million years) but has had no known Holocene movement. Faults that have not moved in the last 1.6 million years are considered inactive. Surface fault rupture is the offset or rupturing of the ground surface by relative displacement across a fault during an earthquake.

The San Rafael site is not within an Alquist-Priolo Zone, nor do traces of any known active or potentially active faults traverse through or project toward the site. The nearest mapped active fault to the San Rafael site is the Raymond fault located approximately 0.4 mile to the south. Therefore, the potential for surface rupture is relatively low at this location. However, lurching or cracking of the ground surface due to nearby seismic events is possible (Ninyo & Moore 2022a).

The San Pascual site is located within an Alquist-Priolo Zone associated with the Raymond fault and is possibly underlain by one or more active splays of this fault. According to the California Geological Study (CGS) Fault Evaluation Report (FER) prepared for the Raymond fault, the fault is buried by the younger alluvial deposits where it crosses Arroyo Seco. Previous studies discussed in the FER have mapped potential (inferred) locations of the fault beneath Arroyo Seco. Many of these inferred locations cross beneath the southern end and/or middle section of the San Pascual site. Accordingly, the potential for surface rupture at the site during an earthquake along this section of the Raymond fault is considered high. Lurching or cracking of the ground surface due to seismic events on other nearby faults, or deeper earthquakes along the Raymond fault, is also possible at the San Pascual site (Ninyo & Moore 2022b). The Golf Course maintenance yard is not within an Alquist-Priolo Zone. Exhibit 20, Raymond Fault at San Pascual, shows the location of the San Pascual site, as well as upstream and downstream areas that encompass the San Rafael and Golf Course maintenance yard, relative to the Raymond Fault Alquist-Priolo Zone.

The potential for surface rupture, lurching, or cracking is an existing seismic hazard that affects the BMP sites, and the Project would not exacerbate this condition. The Project would not involve construction of habitable structures or structures whose height, mass, or materials would pose a hazard in the event of an earthquake that results in ground displacement. The Geotechnical Evaluations concluded implementation of the Project was feasible given the geotechnical recommendations are incorporated into its design and construction (Ninyo & Moore 2022a, 2022b). Earthquake-resistant design and materials used in new construction must meet the current seismic engineering standards of the California Building Code (CBC) requirements in effect at the time of design and construction of the Project. Compliance with these standards would reduce the risk to people and structures to the maximum extent practicable under current engineering



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Source: Ninyo & Moore 2022b

Raymond Fault at San Pascual

Exhibit 20

Arroyo Seco Water Reuse Project

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W E
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(07/07/2023 SAK) R:\Projects\PAS\3PAS010750\Graphics\MND\Ex_Raymond Fault_San_Pascual.pdf practice. The Geotechnical Evaluations outline the site- and Project-specific requirements for each site to meet CBC standards. The proposed Project would not directly or indirectly cause substantial adverse effects due to surface rupture. There would be a less than significant impact and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: ii) Strong seismic ground shaking?	☐	☐	☒	☐

WHY? The Project site is located in the seismically active southern California region and could be subjected to moderate to strong ground shaking in the event of an earthquake on one of the many active faults. As discussed in Threshold 2.7(a)(i), the active Raymond Fault is located approximately 0.4 mile south of the San Rafael site and one or more active splays of the Raymond Fault possibly underlie the San Pascual site. Consistent with its location in a seismically active region and the proximity to active faults capable of producing an earthquake event of moment magnitude (M) of 6.0 or greater, the Geotechnical Evaluations for both sites site concluded the Project area has a high potential to experience strong ground shaking (Ninyo & Moore 2022a, 2022b).

Seismic ground shaking from major earthquakes in the region is not anticipated to be greater than at other sites in Southern California. The potential for strong ground shaking is an existing seismic hazard that affects the site, and the Project would not exacerbate this condition. Also, the Project would not involve construction of habitable structures or structures whose height, mass, or materials would pose a hazard in the event of an earthquake. The Geotechnical Evaluations concluded implementation of the Project was feasible given the geotechnical recommendations are incorporated into its design and construction (Ninyo & Moore 2022a, 2022b). Earthquake-resistant design and materials used in new construction must meet the current seismic engineering standards of the CBC requirements in effect at the time of design and construction of the Project. Compliance with these standards would reduce the risk to people and structures to the maximum extent practicable under current engineering practice. The Geotechnical Evaluation outlines the site- and Project-specific requirements for each site to meet CBC standards. The proposed Project would not directly or indirectly cause substantial adverse effects due to strong seismic ground shaking. There would be a less than significant impact and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐

WHY? Liquefaction is a phenomenon in which loose, saturated or near saturated, relatively cohesionless soil deposits at depths less than 50 feet lose shear strength during strong ground motions of sufficient duration. The Geotechnical Evaluation for the San Rafael site included review of the Seismic Hazard Zone Map prepared by the CGS, and determined the southern portion of the San Rafael site and all of the San

Pascual site and Arroyo Seco Golf Course are located in areas mapped as being potentially susceptible to liquefaction (refer to Appendices D-1 and D-2). However, it is noted that this Evaluation was performed for the San Rafael site concept situated fully on the east side of San Rafael Creek. Nonetheless, the geologic and seismic conditions documented in the Geotechnical Evaluation also apply to the portion of the San Rafael site now situated on the west side of the Creek. Geotechnical conditions do not typically change substantively within the immediate geographic area. The Seismic Hazard Zone Map indicates the portion of the San Rafael site west of the Creek, as well as the San Pascual site and Arroyo Seco Golf Course, is within an area mapped as susceptible to liquefaction.

However, based on Ninyo & Moore's understanding of the proposed improvements and because the Project does not meet the requirements of a "project" per the Seismic Hazards Mapping Act, an evaluation of the potential for liquefaction and liquefaction-related risks, including dynamic settlement and lateral spread were not included in the Geotechnical Evaluations. In addition, due to the existence of shallow formational (i.e., bedrock) material at both sites it was concluded that soil liquefaction is not a design consideration for the Project. Finally, the Geotechnical Evaluations concluded implementation of the Project was feasible given the geotechnical recommendations are incorporated into its design and construction (Ninyo & Moore 2022a, 2022b). Moreover, the Project would not exacerbate any existing liquefaction conditions. There would be less than significant impacts related to liquefaction, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: iv) Landslides?	☐	☐	☒	☐

WHY? The Seismic Hazard Map indicates the San Pascual site or and Arroyo Seco Golf Course are not located in an area identified as susceptible to earthquake-induced landslides (Ninyo & Moore 2022b). The Geotechnical Evaluation's review of geologic literature indicates that landslides are not present on the slopes adjacent to the San Rafael site (where located east of the Creek); however, the ascending slopes along the north side of the site and west of San Rafael Creek–including the portion of the San Rafael site west of the Creek–are mapped as being susceptible to earthquake-induced landslides. Bedding in the area dips to the northeast, which is considered favorable for stability of the slope along the north side of the site. The Project BMPs are situated on relatively flat and gently sloping ground areas underlain by fill and alluvial deposits, which are not considered susceptible to landslides. The Evaluation notes it is anticipated that excavations made to construct the Project would be shallow in nature (up to a depth of 15 feet) and not extend into the toe of the slope near the San Rafael site. However, the Geotechnical Evaluation states that detailed plans should be provided for review prior to construction, and that additional analyses could be warranted based on the proposed improvements, their locations to the adjacent slopes, and chosen construction methods. The Geotechnical Evaluations concluded implementation of the Project was feasible given the geotechnical recommendations are incorporated into its design and construction (Ninyo & Moore 2022a, 2022b). Compliance with applicable CBC standards, including incorporation of all geotechnical recommendations, would reduce the risk to people and structures to the maximum extent practicable under current engineering practice. Moreover, any potential for landslides on the site is an existing environmental condition, which the Project would not exacerbate. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐

WHY? The largest source of erosion and topsoil loss, particularly in a developed environment, is uncontrolled drainage during construction activities. Grading and other earthwork associated with Project construction may temporarily expose soils on the Project site to wind and/or water erosion. Since the Project area of earth disturbance is greater than one acre, compliance with the State Water Resources Control Board's (SWRCB's) National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with the Construction and Land Disturbance Activities[8] (Construction General Permit) would be required. Pursuant to the Construction General Permit, Pasadena would be required to prepare, or have prepared, a Storm Water Pollution Prevention Plan (SWPPP) that would include erosion-control Best Management Practices (BMPs). Once construction is complete, there would not be substantial soil erosion from the site and the Project would develop either hardscape or landscape areas with appropriate irrigation to ensure there is no loss of topsoil. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☒	☐

WHY? Secondary seismic hazards related to the underlying geologic unit include several types of ground failure that can occur due to severe ground shaking. These hazards include landslides, collapse, ground lurching, shallow ground rupture, and liquefaction. The probability for each type of ground failure depends on the severity of the earthquake, the site's distance from the fault, the local topography, and subsoil and groundwater conditions, among other factors. In addition, there can be soil engineering characteristics inherent in the underlying sediments on a site that can adversely affect structures if not appropriately managed during construction, including expansive soils. Liquefaction and landslide are addressed above under Thresholds 2.7(a)(iii) and 2.7(a)(iv). As discussed, the risks of these instabilities would be less than significant with incorporation of CBC standards, including incorporation of all geotechnical recommendations.

No seismic or soil engineering characteristics have been identified that would result in instability, nor would implementation of the Project cause the site to become unstable as the Geotechnical Evaluations concluded the Project was feasible given the geotechnical recommendations are incorporated into its design and construction (Ninyo & Moore 2022a, 2022b). The Geotechnical Evaluations outline the site- and Project-specific requirements to meet CBC standards. Therefore, the Project would not be located on a

8 Order No. 2009-0009-DWQ, NPDES No. CAS000002, adopted by the SWRCB on September 2, 2009 (effective for all project sites on July 1, 2010) and most recently amended by Order No. 2012-0006-DWQ on July 17, 2012.

geologic unit or soil that is unstable or would become unstable. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☒	☐

WHY? Expansive soils are soils that swell when they absorb water and shrink as they dry, such as pure clay soils and claystone. The hazard associated with expansive soils is that they can overstress and cause damage to the foundation of buildings set on top of them. The site is underlain by undocumented fill, younger alluvium, and older alluvium materials that consist of silty sand, and natural deposits consisting of silts, sands, gravel, cobbles, and possible boulders in the alluvium (Ninyo & Moore 2022a, 2022b). According to the Pasadena General Plan Safety Element Technical Background Report, most of Pasadena is underlain by sediments consisting of unconsolidated coarse sand and pebble, cobble, and boulder gravel, which are in the low to moderately low range for expansion potential (Pasadena 2002). This is consistent with the soil types encountered in the site-specific Geotechnical Evaluations that included soil sampling on both sites. As such, it can be assumed that the geologic materials at the San Pascual site, largely in South Pasadena, is similar to that described in Pasadena's General Plan Technical Background Report. Also, compliance with established building standards, including the CBC, would reduce the likelihood that substantial risks to life or property related to soil expansion would occur due to the proposed Project. There would be less than significant impacts and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒

WHY? The Project would not involve septic tanks or alternative wastewater disposal systems, and the Project would not generate wastewater. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐

WHY? Information on known fossil localities was obtained from the Natural History Museum of Los Angeles County (LACM). On November 24, 2021, the LACM responded that they do not have any fossil localities that lie directly within the proposed Project area, either at the surface or at depth (LACNHM 2021, Appendix C).

A paleontological records search was requested from the Natural History Museum of Los Angeles County, Vertebrate Paleontology Department and results were received on November 24, 2021. The results indicate that there are no fossil localities that lie directly within the proposed Project site; however, there are fossil localities nearby from the same sedimentary deposits that occur in the proposed Project site, either at the surface or at depth. The following provides the closest known localities in the collection of the LACM. Fossil fish were recovered from the Topanga Formation, including herrings (*Ganolytes*), perch-like fish (*Thyrsocles*), ray-finned fish (*Etringus*), mantis shrimp (*Squillidae*), and other unspecified fish. Unknown or unrecorded (Pleistocene) fossils in the region have produced specimens of mammoth (*Mammuthus*), Bison (*Bison*), sabertooth cat (*Smilodon*), deer (*Odocoileus*), turkey (*Meleagris*), mastodon (*Mammut*), and horse (*Equus*). Fossils from these deposits were collected between 8 and 14 feet below ground surface (bgs). Therefore, the Project would not impact known paleontological resources; however, surface sediments at and surrounding the Project site consist of unrecorded (Pleistocene) to unknown formations (Pleistocene; sand and silty).

Deep excavation that involves disturbance of native soils could result in the disturbance and/or destruction of paleontological resources that may be present in deeper Pleistocene alluvial deposits that underlie the Project site. Implementation of MM GEO-1 related to paleontological resources at the San Rafael and Pascual sites would reduce this impact to a less than significant level. Excavation associated with installation of the water harvester and AST would be on the order of one to three feet, and therefore would not have a potential to encounter unknown paleontological resources.

MITIGATION MEASURES

MM GEO-1 In the event that paleontological resources are inadvertently unearthed during excavation activities at the San Rafael and San Pascual sites, the contractor shall immediately cease all earth-disturbing activities within a 100-foot radius of the area of discovery and the contractor shall contact the City immediately. The contractor shall retain a qualified professional paleontologist to evaluate the significance of the find, and in consultation with the City, determine an appropriate course of action. If the paleontological resources are found to be significant, the paleontologist, in consultation with the City, shall determine appropriate actions for exploration and salvage. After the find has been appropriately avoided or mitigated, work in the area may resume.

2.8 GREENHOUSE GAS EMISSIONS

Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

WHY? The following discussions of the environmental setting and the evaluation of Project consistency with Pasadena's adopted Climate Action Plan (CAP) addresses the potential GHG related impacts associated with the Project. As the CEQA Lead Agency, Pasadena's CAP applies to the whole of the Project.

Climate change refers to any significant change in measures of climate (e.g., average temperature, precipitation, or wind patterns) over a period of time. Climate change may result from natural factors, natural processes, and human activities that change the composition of the atmosphere and alter the surface and features of the land. Significant changes in global climate patterns have recently been associated with global warming, which is an average increase in the temperature of the atmosphere near the Earth's surface; this is attributed to an accumulation of GHG emissions in the atmosphere. GHGs trap heat in the atmosphere which, in turn, increases the Earth's surface temperature. Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities. The emission of GHGs through fossil fuel combustion in conjunction with other human activities appears to be closely associated with global warming.

GHGs, as defined under California's AB 32, include carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. General discussions on climate change often include water vapor, atmospheric ozone, and aerosols in the GHG category. Water vapor and atmospheric ozone are not gases that are formed directly in the construction or operation of development projects, nor can they be controlled in these projects. Aerosols are not gases. While these elements have a role in climate change, they are not considered by either regulatory bodies, such as CARB, or climate change groups, such as the California Climate Action Registry, as gases to be reported or analyzed for control. Therefore, no further discussion of water vapor, atmospheric ozone, or aerosols is provided.

Pasadena Climate Action Plan

The City of Pasadena has prepared and adopted a CAP (Pasadena 2018). The Pasadena's CAP includes the following components: a summary of existing state and local initiatives addressing climate change; community-wide GHG inventory and emissions forecasts; GHG reduction goals, measures, and actions; means of implementing and monitoring the plan; and adaptation strategies and climate change preparedness. This document builds upon the City's existing sustainability efforts, such as the Green City Action Plan and provides a framework to further reduce GHG emissions throughout the City. It is accepted as very unlikely that any individual development project of the size and character of the proposed Project would have GHG emissions of a magnitude to directly impact global climate change; therefore, any impact would be considered on a cumulative basis.

The CAP Consistency Checklist (Checklist) is intended to be a tool for new development projects to demonstrate consistency with Pasadena's CAP, which is a qualified GHG emissions reduction plan in accordance with State CEQA Guidelines Section 15183.5. Projects that meet the requirements of the Consistency Checklist would be deemed to be consistent with the Pasadena's CAP. The following options are provided for new development projects to establish consistency with the CAP.

Option A requires that the new development project apply sustainable development actions, as deemed appropriate by the CAP, which would become conditions of the entitlement for approval of the project.

Option B requires that the Project demonstrate consistency with the applicable Pasadena's per service population GHG efficiency threshold.

Option C requires that the Project achieve Net Zero GHG Emissions, which requires quantifying the project's GHG emission levels and demonstrating that the project would not result in a net increase in GHG emissions.

A consistency analysis for Option A is detailed below. This analysis only considers the Project against Option A criteria, which is considered most applicable. It is acknowledged that the Project may be consistent with the CAP via Options B and/or C regardless of whether the Project achieves consistency via Option A.

The CAP Consistency Checklist (Checklist) is intended to be a tool for new development projects to demonstrate consistency with Pasadena's CAP, which is a qualified GHG emissions reduction plan in accordance with Section 15183.5 of the State CEQA Guidelines. However, this Checklist was developed for land development projects and not for infrastructure projects such as the Project. Most of the Checklist requirements are not applicable to the Project. The Checklist does provide the following GHG Reduction Strategies within the CAP's water conservation and urban greening strategies that are applicable to the Project. The Project's consistency with these strategies is shown in Table 24, Pasadena Climate Action Plan Consistency Analysis.

TABLE 24
PASADENA CLIMATE ACTION PLAN CONSISTENCY ANALYSIS

GHG Reduction Strategy	*Sustainable Development Action*	Project Consistent?
WC-1.1: Reduce potable water use throughout Pasadena	**Indoor Water Efficiency:** Will the project achieve at least a 35% reduction in indoor water use per the LEED V4 Indoor Water Use Reduction Calculator? Please attach the calculator output.	**Not applicable.** The Project would not affect indoor water efficiency.
WC-2.1: Increase access to and use of non-potable water	**Rainwater Capture and Reuse:** Does the project utilize a rainwater capture and reuse system to reduce the amount of potable water consumed on site? Please include these specifications on the project plans.	**Consistent.** Yes, the Project would be infiltrating some of the runoff captured, and it is located near the boundary of the Raymond Groundwater Basin. Therefore, infiltrated water will contribute to water supply for this regional resource. Additionally, the Project would allow treated stormwater to be used to irrigate the Arroyo Seco Golf Course .
	Indoor & Outdoor Recycled Water: Will the project be plumbed to utilize recycled water for either indoor or outdoor water use? Please include these specifications on the project plans.	**Consistent.** The Project would result in outdoor natural water treatment as well as infiltration of water to contribute to groundwater recharge. Additionally, reuse of water stored at the San Pascual site for irrigation helps reduce potable water use.
	Greywater: Will the project be plumbed to take advantage of greywater produced on site such as a laundry to landscape system or another on-site water reuse system? Please include these specifications on the project plans.	**Not applicable.** The Project would not affect indoor water efficiency.

TABLE 24
PASADENA CLIMATE ACTION PLAN CONSISTENCY ANALYSIS

GHG Reduction Strategy	*Sustainable Development Action*	Project Consistent?
WC-3.1: Improve storm water to slow, sink, and treat water run-off, recharge groundwater, and improve water quality	**Permeable Surfaces:** Is at least 30% of the hardscape (e.g., surface parking lots, walkways, patios, etc.) permeable to allow infiltration? Please include these specifications on the project plans.	**Consistent.** Yes, the Project will help remove floatables, sediment, and nutrient laden water from the San Rafael Creek and Arroyo Seco creating a more pleasing natural look to the built channel infrastructure in the region. The natural treatment provided in the wetland and natural stream along with the series of treatment filters will discharge treated, cleaner water to the Arroyo Seco.
	Stormwater Capture: Is the project designed to retain stormwater resulting from the 95th percentile, 24-hour rain event as defined by the Los Angeles County 95th percentile precipitation isohyetal map? Please provide the engineered stormwater retention plan with the project plans (http://dpw.lacounty.gov/ wrd/hydrologygis/)	**Consistent.** Yes, the system has detention capabilities that could contribute towards enhanced flood retention capabilities of the whole storm drain system. To contribute meaningfully to flood protection, stormwater BMPs must utilize a combination of volume capture and peak flow reduction. The volume detention contributes to flood management, and because this project site is in the upland areas of the greater watershed, it offers distributed volume control that is needed across the watershed to mitigate flooding from the largest rain events.
UG-1.1: Continue to preserve, enhance, and acquire additional green space throughout Pasadena to improve carbon sequestration, reduce the urban heat-island effect, and increase opportunities for active recreation	**Greenspace:** Does the project include at least 500 sq. ft. of public use greenspace (landscaped yards, parklets, rooftop garden, etc.)? At a minimum, 50% of the required greenspace must include softscape landscaping (e.g., trees, plants, grass, etc.).	**Consistent.** Yes, the use of two different BMP types allows for a diverse habitat for plants, animals, and insects. The proposed wetland areas would introduce more aquatic plant and animal species to this area of the Arroyo Seco that currently features more species that prefer dry conditions. The infiltration areas placed alongside the wetlands would act as a transition between the wet and dry.
UG-2.1: Continue to protect existing trees and plant new ones to improve and ensure viability of Pasadena's urban forest	**Trees:** Does the project result in a net gain of trees? Please include these specifications of the project plans.	**Consistent.** Yes, native trees that are part of the post-construction landscape plan would contribute to increased tree count and shade for the area. Special consideration would be made for the infiltration basin area to increase the total tree count at the site.

The CAP includes water conservation as part of Pasadena's GHG emissions reduction strategy. This strategy includes promotion of water conservation and efficiency in both indoor and outdoor uses by increasing access to and use of recycled water and improving storm water infiltration. The Project is consistent with this goal by providing storm water infiltration, water treatment, and irrigation using treated water. This includes Measure 4, "Improve the resilience of systems that provide resources and services critical to community function", by increasing the local water supply through infiltration to the groundwater table and stormwater reuse as well as energy conservation through the use of, in part, natural water treatment through infiltration at the San Rafael site.

Pasadena's CAP has also included discussions regarding PWP's WIRP. Specifically, "The WIRP, adopted in 2011, calls for a long-term water resource strategy through 2035 and contains information on Pasadena Water and Power's water demands, water supply, and conservation options. The plan identifies for a preferred water resource portfolio that includes aggressive water conservation and increasing local water supplies. These actions will reduce GHG emissions by reducing demand for imported water which utilize significant energy to pump water from Northern California and the Colorado River." The Project would be consistent with the WIRP goal of increasing local water supplies through water infiltration and treatment.

Other Regulations and Policies

Pasadena's Green City Action Plan was adopted in 2006 and provides a list of environmental initiatives intended to guide Pasadena towards sustainability and accelerate its environmental commitment. The framework for and goals contained in this plan follow the United Nations Urban Environmental Accords (UNUEA), which include 21 actions that address energy, waste reduction, urban design, urban nature, transportation, environmental health, and water.

SB X7-7, also known as the Water Conservation Act, and enacted in 2009, requires all water suppliers to increase water use efficiency and reduce per capita urban water use by 20 percent by 2020. The Project would help both Pasadena and South Pasadena, as water suppliers, to meet this requirement.

Because the Project is consistent with Pasadena's CAP and Green City Action Plan, the Project satisfies the demonstration of Sustainable Development Actions under Option A. As such, the Project would result in less than significant impacts related to GHG emissions or conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions, and no mitigation is required.

Mitigation Measures

There would be no significant impacts related to GHG emissions, and no mitigation is required.

2.9 HAZARDS AND HAZARDOUS MATERIALS

Information in this section is derived in part from the San Rafael Geotechnical Evaluation and the San Pascual Geotechnical Evaluation, which included soil sampling and laboratory testing for hazardous materials (Ninyo & Moore 2022a, Appendix E-1; 2022b, Appendix E-2, respectively).

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐

WHY? With Project implementation, the Arroyo Seco would continue operations as a recreational and open space area, which does not use or store hazardous substances other than occasional use of small volumes of materials used for landscape equipment, such as fuels, oils, and solvents. Pasadena and South Pasadena would be required to continue adherence to applicable zoning and fire regulations for the use and storage of any hazardous substances as part of maintenance of the segments of the Arroyo Seco in their respective jurisdictions. As such, upon compliance with applicable regulations, the routine use, disposal, and transport of small amounts of commonly used hazardous materials associated with Project operation would not result in a significant hazard to the public or to the environment. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐

WHY? Construction of the Project would involve the use of common hazardous substances such as petroleum-based fuels and hydraulic fluid. However, the level of risk associated with the accidental release of hazardous substances during construction is considered low due to the small volume of hazardous materials that would be used during construction. The construction contractor would be required to use standard construction controls and safety procedures during any transport, use, or disposal of hazardous materials. Operation of the Project would not involve transport, use, or disposal of unusually hazardous materials. Common materials to maintain water-related infrastructure such as lubricants and solvents would be used as needed. Standard construction practices would be observed such that any materials released are appropriately contained and remediated as required by local, State, and federal law. As such, the transport, use, and disposal of hazardous substances required for construction and operation of the Project and the risk of release of these substances into the environment would not represent a significant hazard. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter-mile of an existing or proposed school?	☐	☐	☒	☐

WHY? There is one school within approximately ¼-mile of the San Pascual site–San Pascual STEAM Magnet Elementary School, 815 San Pascual Ave, Los Angeles–located approximately ¼-mile to the east-northeast at the closest points. As discussed under Threshold 2.9(b) above, construction of the Project would involve the use of common hazardous substances such as petroleum-based fuels or hydraulic fluid used for construction equipment. However, this would not be considered a significant hazard for potential environmental release. The remote risk of release of a small volume of fuel or other materials commonly used in construction activity, which are not acutely hazardous, would not pose a potential health hazard to the occupants (e.g., students, staff) of the school to the east of the site. Operation of the Project would not have potential for emitting hazards emissions or handling hazardous materials such that would result in impacts on the existing school in proximity to the Project site. There would be a less than significant impact and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒

WHY? Based on review of the Cortese List data resources, the Project sites are not located on the State of California Hazardous Waste and Substances Sites List published by California Environmental Protection Agency (CalEPA) and compiled pursuant to Section 65962.5 of the *California Government Code* (referred to as the Cortese List) (CalEPA 2023). The BMP sites and Golf Course maintenance yard are not known or anticipated to have been contaminated with hazardous materials, and no hazardous material storage facilities are known to exist on-site. For these reasons, the Project is not located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
e) For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area?	☐	☐	☐	☒

WHY? The Project sites are not within an airport land use plan or within two miles of a public airport or public use airport. The nearest public use airport to the Project sites is the San Gabriel Valley Airport located approximately eight miles southeast of the Project sites. Therefore, the Project would not result in a safety hazard for people residing or working in the Project area, nor for people visiting the Project. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒

WHY? Construction and operation of the Project would not place any permanent or temporary physical barriers on any existing public streets. As such, the Project would not obstruct any emergency evacuation or response activities. Construction staging would not interfere with circulation along San Pascual Avenue, Stoney Drive, or any other nearby roadways. For these reasons, the Project would not interfere with any emergency response or emergency evacuation plans. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
h) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	☐	☐	☐	☒

WHY? The Project site is not within a Very High Fire Hazard Severity Zone (VHFHSZ) designated area (CAL FIRE 2023). There would be no impact, and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to hazards and hazardous materials, and no mitigation is required.

2.10 HYDROLOGY AND WATER QUALITY

Information in this section is derived in part from the *Hydrology and Hydraulics Report, San Rafael Treatment Basin Stormwater Capture Project* (San Rafael Hydrology Study), dated January 2023; and the *San Pascual Stormwater Capture Facility; Stormwater Capture Study Technical Memorandum* (San Pascual Hydrology Study), dated September 2022, and both prepared by Craftwater Engineering, Inc. (Craftwater Engineering, Inc. 2023 and 2022, respectively). The two hydrology studies can be found in their entirety in Appendices F-1 and F-2 to this IS/MND.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	☐	☐	☒	☐

WHY? The Project site is within the jurisdiction of the Los Angeles RWQCB. The Project could result in short-term, construction-related impacts to surface water quality from grading and other construction activities (e.g., erosion, spills, and leaks from construction equipment). As discussed under Threshold 2.7(b), compliance with stormwater management and pollution control BMPs, as outlined in the SWPPP required for the Project consistent with the NPDES Construction General Permit, would ensure the pollutant levels in runoff do not violate standards. Operation of the Project would not violate any water quality standards, as the Project would contribute to meeting the ULAR water quality targets and would not introduce new contaminants to the runoff from the site. The Project would include an irrigation system; however, the system has been designed and would be controlled and monitored to minimize runoff. Water percolating into soils from the infiltration basin at the San Rafael site would further treat that water. Construction and operation of the Project would not degrade surface or groundwater quality. There would be less than significant impacts, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒

WHY? The Project would minimally increase demand for water associated with use of the proposed irrigation system to support the new landscaping. Additionally, a nominal amount of water may be used during construction for dust suppression. These potable water supplies may be in part derived from the City's groundwater sources but would not change the volume of water withdrawn from the Raymond Basin, as such withdrawal is controlled by the Raymond Basin Management Board. Further, the Project would result in an estimated water supply benefit of 320 af per year on average, from approximately 258 af of groundwater recharge and approximately 30 af of irrigation reuse at the Arroyo Seco Golf Course. The irrigation reuse would reduce current potable water use at this recreational facility. There would be no adverse impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course or a stream or river or through the addition of impervious surfaces, in a manner that would: i) Result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐

WHY? The Project would change the existing drainage condition on the San Rafael and San Pascual sites. The change at the San Rafael site would represent a new stormwater diversion into new treatment wetlands. The change at the San Pascual site would represent the reuse of an existing diversion and treatment wetland. Regardless, at both sites the stormwater capture and treatment BMPs have been designed to ensure sediment entrained in the stormwater as well as surrounding soils are adequately managed to allow the proper functioning of the BMPs. Therefore, the Project would not result in substantial erosion or siltation on- or off-site. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course or a stream or river or through the addition of impervious surfaces, in a manner that would:				
ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☒	☐
iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐

WHY? The Project would not result in increased stormwater runoff volumes. The proposed BMPs would include a small extent of new impervious surfaces, such as concrete seatwalls and the San Pascual pretreatment infrastructure enclosure that would be partially above ground (refer to Exhibit 14). However, the treatment wetlands have been designed to optimize infiltration and would facilitate a greater amount of on-site infiltration than in the existing condition. Therefore, there would be no adverse effects related to storm water drainage capacity and the Project would not substantially increase the rate or amount of runoff such that on- or off-site flooding would occur. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course or a stream or river or through the addition of impervious surfaces, in a manner that would: iv) Impede or redirect flood flows?	☐	☐	☐	☒

WHY? The Geotechnical Evaluations determined that the Project site is not located in the 100-year Flood Hazard Area. The Project area is designated within “Other Flood Areas – Zone X,” which includes areas potentially subject to 500-year floods, areas of 100-year floods with average depths of less than one foot, and areas protected by levees (Ninyo & Moore 2022a, 2022b). Therefore, the Project would not impede or redirect flood flows. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒

WHY? Threshold 2.10(c)(iv) above addressed flood hazards. Additionally, the site is not located downslope of any large body of water that could affect the site in the event of an earthquake-induced failure or seiche and is located more than 25 miles from the Pacific Ocean. There would be no impacts related to flooding, tsunami, seiche, or inundation, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒

WHY? As discussed under Threshold 2.10(a) above, operation of the Project would not violate any water quality standards. The Project would neither conflict with nor obstruct implementation of the LARWQCB's Water Quality Control Plan. The Raymond Basin, PWP's source of groundwater, is defined by the California Department of Water Resources (DWR) as very-low priority pursuant to the 2014 Sustainable Groundwater Management Act (DWR 2023). As such, there is currently no sustainable groundwater management plan applicable to the Project site. There would be no impact, and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to hydrology and water quality, and no mitigation is required.

2.11 LAND USE AND PLANNING

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒

WHY? The Project would not physically divide an existing community, as the proposed Project consists of water capture and treatment infrastructure and recreational improvements within existing recreation/open space areas. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

WHY? The primary land use planning documents that govern the Project sites are the General Plans and zoning codes of the cities of Pasadena, South Pasadena, and Los Angeles.

The entirety of the San Rafael site is within Pasadena except for the portion extending along the western side of San Rafael Creek that is within an LACFCD easement (refer to Exhibit 9). Most of the San Pascual site is within South Pasadena except for approximately the northern quarter of the site that is in Los Angeles. Pasadena, South Pasadena, and Los Angeles all have a General Plan land use designation and zoning designation of OS/Open Space for each respective city's portions of the two sites.

Per Section 17.26.020(A) of the Pasadena Municipal Code (PMC), "[t]he OS district is applied to sites with open space, parks, and recreational facilities of a landscaped, open character having a minimum contiguous site area of two acres." Section 17.26.030 of the PMC specifies that development of "Park and Recreation Facilities" in the OS zone requires a Conditional Use Permit (CUP). Consultation with the Pasadena Planning Department determined that no entitlement is anticipated to be required. The Project would not be considered a park and recreation facility development (e.g., sports courts, ballfields, disc golf, archery facility). The Project would be reviewed by the City of Pasadena Planning and Community Development Department consistent with the applicable procedures defined in the Pasadena zoning code. The Project would not cause a significant environmental effect due to a conflict with Pasadena's land use designation and zoning code.

Per Section 36.240.020(B) of the South Pasadena Municipal Code (SPMC), "B. The OS zoning district is applied to areas suitable for open space land uses including parks, natural open space areas, recreational facilities, and areas used for flood control. The OS zoning district is consistent with the Open Space land use designation of the [South Pasadena] General Plan." Per Section 36.240.030 of the SPMC, permitted uses in the OS zone include hiking trails and natures preserves and accessory uses. The San Pascual BMP can be considered a nature preserve with accessory uses and would provide hiking trails. As such, the Project would be considered consistent with South Pasadena's land use designation and zoning code.

Per Section 12.05.05(A) of the Los Angeles Municipal Code (LAMC), "It is the purpose of the 'OS' Open Space Zone to provide regulations for publicly owned land in order to implement the City's adopted [Los Angeles] General Plan, including the recreation, parks and open space designations in the City's adopted district and community plans, and other relevant elements, including the Open Space, Conservation and Public Recreation Elements. Implementation of the General Plan will serve to protect and preserve natural resources and natural features of the environment; to provide outdoor recreation opportunities and advance the public health and welfare; to enhance environmental quality; to encourage the management of public lands in a manner which protects environmental characteristics; and to encourage the maintenance of open space uses on all publicly owned park and recreation land, and open space public land which is essentially unimproved." Applicable allowed uses in Los Angeles' Open Space zone include:

- Parks and recreation facilities, including: bicycle trails, equestrian trails, walking trails, nature trails, park land/lawn areas, children's play areas, child care facilities, picnic facilities, and athletic fields (not to exceed 200 seats in park) used for park and recreation purposes; and
- Water conservation areas, including percolation basins and flood plain areas.

The Project is considered a park and recreation facility with trails and a water conservation area. As such, the Project would be considered consistent with Los Angeles' land use designation and zoning code.

Therefore, the Project would not conflict with any applicable land use plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect. There would be no impact, and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to land use and planning, and no mitigation is required.

2.12 MINERAL RESOURCES

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒

WHY? No active mining operations exists in Pasadena, South Pasadena, or Los Angeles on or near the Project sites. The Project area is not identified as by CGS as Mineral Resource Zone (MRZ) 2, which is defined as areas where geologic data indicate that significant Portland Cement Concrete-Grade aggregate resources are present (CGS 1982). Therefore, the Project would not result in the loss of an available known mineral resource with value to the region, including concrete aggregate. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	☒

WHY? As discussed previously, Pasadena, South Pasadena, and Los Angeles all have a General Plan land use designation and zoning designation of OS/Open Space for the respective city's portions of the two sites. There are no active mining operations in the Lower Arroyo Seco. Therefore, the Project would not result in significant impacts from the loss of a locally important mineral resource recovery site. There would be no impact, and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to mineral resources, and no mitigation is required.

2.13 NOISE

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐

WHY?

NOISE DESCRIPTORS

Several rating scales (or noise “metrics”) exist to analyze the effects of noise on a community. These scales include the equivalent noise level (L_{eq}) and the community noise equivalent level (CNEL). Average noise levels over a period of minutes or hours are usually expressed as A-weighted decibels (dBA) L_{eq}, which is the equivalent noise level for that period of time. The period of time averaging may be specified; $L_{eq(3)}$ would be a 3-hour average. When no period is specified, a one-hour average is assumed. Noise of short duration (i.e., substantially less than the averaging period) is averaged into ambient noise during the period of interest. Thus, a loud noise lasting many seconds or a few minutes may have minimal effect on the measured sound level averaged over a one-hour period.

To evaluate community noise impacts, CNEL was developed to account for human sensitivity to evening and night-time noise. CNEL separates a 24-hour day into three periods: daytime (7:00 AM to 7:00 PM), evening (7:00 PM to 10:00 PM), and nighttime (10:00 PM to 7:00 AM). The evening sound levels are assigned a 5 dBA penalty, and the night-time sound levels are assigned a 10 dBA penalty prior to averaging them with daytime hourly sound levels.

Several statistical descriptors are also often used to describe noise, including L_{max} and L_{min}; these are the highest and lowest A-weighted sound levels that occur during a noise event, respectively.

Existing Noise Levels

The existing noise environment in the Project area is primarily influenced by traffic noise on nearby roads. The roadways contributing the most noise to the Project site is State Route 110 located to the south and local residential roadways to a much lesser extent. To characterize the existing noise environment, Psomas conducted an ambient noise survey at the site on June 9, 2023. Short-term (approximately 20 minutes each) noise level measurements were taken using a Larson Davis Laboratories SoundTrack LxT® sound level meter. This sound level meter was placed, approximately five ft above the ground and equipped with a windscreen at each noise monitoring location.

Table 25, Existing Ambient Noise Levels, describes the location of each monitoring location and the existing noise levels measured.

TABLE 25
EXISTING AMBIENT NOISE LEVELS

Noise Monitoring Location	Primary Noise Sources	L_{min} dBA (Minimum)	L_{eq} dBA (Average)	L_{max} dBA (Maximum)
NM1 - At the southern end of the San Pascual site along Stoney Dr. between the Arroyo Seco Channel and Arroyo Park (614 Stoney Dr)	Vehicular Traffic, and Park and Trail Activity	56.7	62.6	77.4
NM2 – At the northern end of the San Pascual site at the Stoney Dr. and San Pascual Ave. intersection across from Arroyo Park	Vehicular Traffic, and Park and Trail Activity	50.5	64.4	80.6
NM3 – Across from the San Rafael site along the hiking trail on the east side of the Channel below the bridge crossing downstream of San Rafael Ave.	Hiking and Equestrian Activity	40.5	57.1	78.6
dBA: A-weight decibels Source: Attachment G				

As shown, existing average noise levels (L_{eq}) ranged from 57.1 dBA to 64.4 dBA, with the highest noise measurement at Site NM2, located near the corner of Stoney Dr. and San Pascual Avenue. Existing noise levels at the Project sites are considered low and typical of recreational areas. Noise monitoring data and calculations are provided in Appendix C of this IS/MND.

<u>Noise-Sensitive Receptors</u>

The State of California defines noise-sensitive receptors as those land uses that require serenity or are otherwise adversely affected by noise events or conditions. Furthermore, Pasadena attempts to minimize exposure to excessive noise levels to residents, workers, and visitors. The land use categories requiring the lowest noise thresholds are schools, libraries, churches, hospitals, and residences. The nearest noise sensitive uses are residential uses proximate to the BMP sites. There are no residences near the Golf Course maintenance yard.

<u>Applicable Noise Standards</u>

City of Pasadena General Plan

The City is affected by several different sources of noise, including automobile traffic, Rose Bowl events, commercial activity, and periodic nuisances such as construction, loud parties, and other events. The Noise Element is intended to identify these sources and provide objectives and policies that ensure that noise from these sources does not create an unacceptable noise environment (Pasadena 2002). The Noise Element contains guidelines for noise compatible land use for long-term operations.

The Noise Element of the Pasadena General Plan acknowledges that noise from major roadways may affect sensitive receptors. The following policy and implementation measures are applicable to the Project:

Policy 2a: The City will encourage noise-compatible land uses along major roadways.

Measure 1: The City will consult the guidelines for noise compatible land use shown on Figure 1 [Table 3 of the Noise Analysis] to guide the appropriateness of land uses relative to roadway noise.

The Noise Element of the Pasadena General Plan recognizes that construction activity is a source of occasional temporary nuisance noise throughout the City of Pasadena and that these and other such nuisance noises are common to cities and, because of their unpredictable nature, must be addressed on a case-by-case basis. The following General Plan policies are applicable to the Project:

Policy 7b: The City will encourage limitations on construction activities adjacent to sensitive noise receptors.

Policy 7c: The City will encourage construction and landscaping activities that employ techniques to minimize noise.

City of Pasadena Municipal Code

Chapter 9.36, Noise Restrictions, of the PMC is Pasadena's Noise Ordinance. It states it is the City's policy ". . . to prohibit unnecessary, excessive and annoying noises from all sources. Noise at certain levels is detrimental to the health and welfare of the general public." The following sections of the Pasadena Noise Ordinance are applicable to the Project:

Section 9.36.040, Ambient Noise Level, of the PMC states:

A. When "ambient noise level" is referred to in this chapter, it means the actual measured ambient noise level.
B. Any sound level measurement made pursuant to the provisions of this chapter shall be measured with a sound level meter using the A weighting.
    1. Where the sound alleged to be offending is of a type or character set forth below, the following values shall be added to the sound level measurement of the offending noise:
        a. Except for noise emanating from any electrical transformer or gas metering and pressure control equipment existing and installed prior to the effective date of the ordinance codified herein, any steady audible tone: + 5;
        b. Repeated impulsive noise: + 5;
        c. Noise occurring more than 5 but less than 15 minutes per hour: - 5;
        d. Noise occurring more than 1 but less than 5 minutes per hour: - 10;
        e. Noise occurring less than 1 minute per hour: -20.
    2. Values of subsections (B)(1)(c), (B)(1)(d), and (B)(1)(e) of this section shall be added to the sound level measurements during daytime (6 AM to 11 PM) periods only.

Section 9.36.050, General Noise Sources, of the PMC states:

9. A. It is unlawful for any person to create, cause, make or continue to make or permit to be made or continued any noise or sound which exceeds the ambient noise level at the property line of any property by more than 5 decibels.

Section 9.36.070, Construction Projects, of the PMC states:

A. No person shall operate any pile driver, power shovel, pneumatic hammer, derrick power hoist, forklift, cement mixer or any other similar construction equipment within a residential district or within a radius of 500 ft therefrom at any time other than as listed below:
    1. From 7:00 AM to 7:00 PM Monday through Friday;
    2. From 8:00 AM to 5:00 PM on Saturday; and
    3. Operation of any of the listed construction equipment is prohibited on Sundays and holidays.

B. No person shall perform any construction or repair work on buildings, structures or projects within a residential district or within a radius of 500 ft there from in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance at any time other than as listed below:

   1. From 7:00 AM to 7:00 PM Monday through Friday;
   2. From 8:00 AM to 5:00 PM on Saturday; and
   3. Performance of construction or repair work is prohibited on Sundays and holidays.

C. For purposes of this section, holidays are New Year's Day, Martin Luther King Jr. Day, Lincoln's Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, Day after Thanksgiving, and Christmas.

Section 9.36.080, Construction Equipment, of the PMC states:

> It is unlawful for any person to operate any powered construction equipment if the operation of such equipment emits noise at a level in excess of 85 dBA when measured within a radius of 100 ft from such equipment.

Construction (Temporary) Noise

Construction of the Project would entail noise generated from site preparation, grading/excavation, and infrastructure construction activities. Project construction would begin in Summer 2024 and occur over a total period of approximately 17 months in a single phase, with semi-consecutive construction of the San Rafael and San Pascual BMPs. The San Rafael construction period would be approximately 9 months and the San Pascual construction period would be approximately 13 months. Construction at the San Pascual site would be initiated after demolition, site preparation, and grading activity at San Rafael are complete, which is expected to require about 4 months. Therefore, there would be construction activity at San Rafael only for 4 months, construction at both sites simultaneously for 5 months, and construction at San Pascual only for 8 months. Installation of the water harvester and related infrastructure at the Golf Course maintenance yard is anticipated to overlap with construction activities at the San Pascual site during the last 8 months of the Project construction period.

Local residents in the vicinity of both Project sites would be subject to elevated noise levels due to the operation of Project-related construction equipment. Construction activities are carried out in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These sequential phases would change the character of the noise levels surrounding the construction site as work progresses. Construction noise levels reported in the USEPA's *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances* were used to estimate construction noise levels for the Project. Typically, the estimated construction noise levels are governed primarily by equipment that produces the highest noise levels. Construction noise levels for each generalized construction phase of the Project are based on a typical construction equipment mix for a mixed-use project and do not include use of atypical, very loud, and vibration-intensive equipment (e.g., pile drivers).

It is noted that noise analysis associated with the Project's construction activities is conservative and may be overestimated because it is based on noise levels from construction engines developed in the 1970s and earlier, which did not have modern engine designs or noise attenuation systems. Construction activities were also assessed with noise for all construction equipment being utilized at the same time, which would not occur for the majority of the construction period. Finally, the construction noise levels presented below do not consider intervening topography or structures that may reduce noise. In particular, it is noted the residential uses near the San Rafael site are situated at elevations from approximately 40 feet to 200 feet above the site.

The degree to which noise-sensitive receptors are affected by construction activities depends heavily on their distance from the noise source. Table 26, Construction Noise Levels at Surrounding Uses, shows both the estimated maximum and average noise levels for the most intense (i.e., noise generating) construction activity anticipated to occur during Project implementation. Maximum noise levels represent the noise levels from construction equipment occurring nearest to the noise sensitive use/receptor. Average noise levels represent the noise exposure to sensitive uses based on the distance to the center of the Project site during construction of each of the Project sites.

TABLE 26
CONSTRUCTION NOISE LEVELS AT SURROUNDING USES

Construction Phase[a]	San Rafael Construction Noise Exposure Levels (L_{eq} dBA)									
	North - San Rafael Avenue Residences		West - Aratina Street Residences		South - San Pascual Stables		East - Arroyo Drive Residences		Noise Level at 100 ft	Exceeds Threshold (85 dBA at 100 ft)?
	Max (80 ft)	Avg (350 ft)	Max (170 ft)	Avg (380 ft)	Max (60 ft)	Avg (130 ft)	Max (340 ft)	Avg (580 ft)		
Ground Clearing/Demo	80	67	73	66	82	76	67	63	78	No
Excavation	74	61	67	60	76	70	61	57	72	No
Foundation Construction	84	71	77	70	86	80	71	67	82	No
Building Construction	74	61	67	60	76	70	61	57	72	No
Paving and Site Cleanup	80	67	73	66	82	76	67	63	78	No
Construction Phase[a]	San Pascual Construction Noise Exposure Levels (Leq dBA)									
	North - San Ramon Drive Residences		West - San Pascual Ave Residences		South - San Pascual Park		East - Arroyo Park		Noise Level at 100 ft	Exceeds Threshold (85 dBA at 100 ft)?
	Max (30 ft)	Avg (460 ft)	Max (70 ft)	Avg (470 ft)	Max (110 ft)	Avg (200 ft)	Max (40 ft)	Avg (130 ft)		
Ground Clearing/Demo	88	65	81	65	77	72	86	76	78	No
Excavation	82	59	75	59	71	66	80	70	72	No
Foundation Construction	92	69	85	69	81	76	90	80	82	No
Building Construction	82	59	75	59	71	66	80	70	72	No
Paving and Site Cleanup	88	65	81	65	77	72	86	76	78	No

L_{eq} dBA: average noise energy level in A-weighted decibels; max: maximum; avg: average; ft: feet

[a] These construction phase names relate to the anticipated equipment mix as applied in the noise model and are named for more typical land development projects.

Note: Noise levels from construction activities do not take into account attenuation provided by intervening structures.

Source: Psomas 2023.

Noise exposure levels are provided for the nearest land uses proximate to the two Project sites for informational purposes. However, Pasadena evaluates excessive noise levels from construction activities based on a reference distance of 100 feet from construction equipment. As shown in Table 26, noise levels from construction equipment would be less than the 85 A-weighted decibels (dBA) noise limit as measured at 100 feet from the equipment pursuant to Section 9.36.080, Construction Equipment, of the PMC. Estimated maximum noise levels from Project-related construction activities would range from 61 to 92 average noise energy level in A-weighted decibels (dBA L_{eq}); and average noise levels would range from 57 to 80 dBA L_{eq}, dependent on distance.

Truck trips are needed for delivery of construction equipment and materials as well as the export of greenwaste, excavated soil, and other construction debris. Noise generated from truck trips would add to the ambient noise level generated by vehicle traffic. However, noise increases associated with construction truck traffic would be less than the 3 dBA increase threshold that is discernable to human hearing due to the small magnitude of traffic resulting from hauling of grading materials relative to background traffic. It is anticipated that excavation of the Project sites, which would involve the greatest number of daily truck trips, would result in between approximately 3 to 6 one-way truck trips per day. These truck trips, in addition to worker and staff trips, would not result in an audible increase in traffic noise and would not, therefore, represent a substantial increase in noise levels.

In summary, noise from construction activities on the sites would be clearly audible above the existing ambient noise environment. However, construction would occur during the least noise-sensitive portions of the day consistent with Section 9.36.070, Construction Projects, of the PMC. Also, noise levels from construction equipment would not exceed the noise level limit established under Section 9.36.080 of the PMC of 85 dBA at 100 ft. Because the Project would comply with Pasadena's construction noise limit and be limited to the least noise-sensitive hours of the day consistent with the PMC, noise associated with Project construction would result in less than significant impact, and no mitigation is required.

Operational (Permanent) Noise Increases

Off-site Traffic Noise Generation

A three-decibel increase occurs when traffic volumes double or a project increases the percentage of noisy trucks on roadways. Three decibels is considered the minimum change needed for humans to detect a change in noise levels in outdoor environments.

The Project would provide expanded and improved physical facilities and open space resources to existing users of the Lower Arroyo Seco. However, the Project is not anticipated to directly increase use of the Lower Arroyo Seco area as a destination. It is expected that existing users of the Arroyo Seco area would use the proposed Project features, as they are similar to passive and active recreation features existing in the area. As such, there would not be substantial additional vehicle trips by visitors traveling to and from the sites.

Long-term maintenance is expected to involve, on average, a single visit to both sites per month by a two- to four- person crew during a one-day (e.g., up to eight-hour) visit. The maintenance performed during each visit would vary depending on the equipment status and the season (wet or dry). It is expected that maintenance personnel would travel to and from the sites in one to two vehicles – such as a pickup truck, or pickup truck and a vacuum truck, for instance. Occasional visits for more intensive maintenance activity or to respond to equipment issues may occur. This level of maintenance activity would not result in a substantial permanent increase in ambient noise levels.

There would be a less than significant impacts related to Project-related traffic noise, and no mitigation is required.

Equipment Noise Generation

Operational noise sources associated with the proposed Project would include, but are not limited to, landscape maintenance equipment, and infrastructure such as water pumps at the San Rafael and San Pascual sites and the water harvester sited at the Arroyo Seco Golf Course maintenance yard. Noise from landscape maintenance would be similar to noise currently being generated by landscape maintenance in the more naturalized areas of the Arroyo Seco. There would be pumps installed at both Project sites. A small low flow pump would function year-round, but larger pumps would only work when it rains and likely once every few weeks to ensure proper functionality during long-term dry periods. The pumps would be constructed with a subsurface installation at a depth of at least 10 feet underground. Subsurface installation of these pumps will attenuate noise levels such that they would comply with the noise limits identified in the PMC. A stormwater harvester would be installed in a prefabricated building in the existing maintenance yard at Arroyo Seco Golf Course, and it would be essentially silent outside the enclosure. The adjacent AST would not be housed in a structure but would not generate noise that would be heard outside the immediate vicinity. Compliance with Pasadena's requirements would result in noise levels that would not violate Pasadena standards. As such, noise impacts from the long-term operation and maintenance of the Project would not result in a substantial increase in ambient noise levels at the nearest off-site noise-sensitive receptors. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐

WHY? Depending on the type of construction activities employed, construction of the proposed Project could generate groundborne vibration. Pasadena uses the vibration-induced structural damage criteria developed by the California Department of Transportation (Caltrans). Caltrans vibration structural damage potential guideline thresholds are shown in Table 27, Vibration Damage Threshold Criteria.

TABLE 27
VIBRATION DAMAGE THRESHOLD CRITERIA

Building Class	Continuous Source PPV (in/sec)	Single-Event Source PPV (in/sec)
Class I: buildings in steel or reinforced concrete, such as factories, retaining walls, bridges, steel towers, open channels, underground chambers and tunnels with and without concrete alignment	0.5	1.2
Class II: buildings with foundation walls and floors in concrete, walls in concrete or masonry, stone masonry retaining walls, underground chambers and tunnels with masonry alignments, conduits in loose material	0.3	0.7
Class III: buildings as mentioned above but with wooden ceilings and walls in masonry	0.2	0.5
Class IV: construction very sensitive to vibrations; objects of historic interest	0.12	0.3
ppv: peak particle velocity; in/sec: inch(es) per second Source: Psomas 2020.		

The structural damage threshold of 0.2 in/sec for Class III buildings are selected for residential buildings for this analysis. These thresholds represent the vibration limits for structural damage to buildings proximate to the Project sites from continuous sources of vibration. Caltrans' vibration annoyance thresholds are shown in Table 28, Vibration Annoyance Criteria. Based on the guidance in Table 28, the "strongly perceptible" vibration level of 0.9 peak particle velocity in inches per second (ppv in/sec) is considered as a threshold for a potentially significant vibration impact for human annoyance.

TABLE 28
VIBRATION ANNOYANCE CRITERIA

Average Human Response	ppv (in/sec)
Severe	2.0
Strongly perceptible	0.9
Distinctly perceptible	0.24
Barely perceptible	0.035
ppv: peak particle velocity; in/sec: inch(es) per second Source: Caltrans 2013.	

Table 29, Vibration Levels for Construction Equipment, summarizes typical vibration levels measured during construction activities for various vibration-inducing pieces of equipment. Pile driving and blasting are generally the sources of the most severe vibration during construction. Neither pile driving nor blasting would be used during Project construction. Conventional construction equipment would be used for Project construction.

TABLE 29
VIBRATION LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment		ppv at 25 ft (in/sec)
Pile driver (impact)	upper range	1.518
	typical	0.644
Pile driver (sonic)	upper range	0.734
	typical	0.170
Vibratory roller		0.210
Large bulldozer		0.089
Caisson drilling		0.089
Loaded trucks		0.076
Jackhammer		0.035
Small bulldozer		0.003
ppv: peak particle velocity; ft: feet; in/sec: inches per second. Source: USEPA 1971.		

Table 30, Vibration Levels at Nearby Land Uses, shows the estimated vibration level (in ppv) from construction activities at the Project sites compared to both structural damage and annoyance criteria. The distances at which vibration levels were calculated represent the distance from the nearest construction activity to the nearest structure, rather than nearest property line.

TABLE 30
VIBRATION LEVELS AT NEARBY LAND USES

Equipment	San Rafael Site Vibration Levels (ppv)			
	North - San Rafael Ave Residences	West - Aratina St Residences	South - San Pascual Stables	East - Arroyo Dr Residences
	(ppv @ 115 ft)	(ppv @ 190 ft)	(ppv @ 125 ft)	(ppv @ 360 ft)
Large Bulldozer	0.01	0.00	0.01	0.00
Small bulldozer	0.00	0.00	0.00	0.00
Loaded trucks	0.01	0.00	0.01	0.00
Structural Damage Criteria	***0.2***	***0.2***	***0.2***	***0.2***
Annoyance Criteria	***0.9***	***0.9***	***0.9***	***0.9***
Exceeds Criteria?	**No**	**No**	**No**	**No**
Equipment	**San Pascual Site Vibration Levels (ppv)**			
	North - San Ramon Drive Residences	**West - San Pascual Ave Residences**	**South - San Pascual Park**	**East - Arroyo Park**
	(ppv @ 65 ft)	**(ppv @ 120 ft)**	**(ppv @ 630 ft)**	**(ppv @ 80 ft)**
Large Bulldozer	0.02	0.01	0.00	0.02
Small bulldozer	0.00	0.00	0.00	0.00
Loaded trucks	0.02	0.01	0.00	0.01
Structural Damage Criteria	***0.2***	***0.2***	***0.2***	***0.2***
Annoyance Criteria	***0.9***	***0.9***	***0.9***	***0.9***
Exceeds Criteria?	**No**	**No**	**No**	**No**

ppv: peak particle velocity; ft: feet
Source: Psomas 2023.

As shown in Table 30, the vibration levels generated by Project construction activities at surrounding land uses near both sites would not exceed the significance criteria when construction activities occur under maximum (i.e., closest to the receptor) exposure conditions against Caltrans' structural damage significance criteria. Construction-related vibration levels would be substantially less under average conditions when construction activities are located further away. Because vibration levels would be below the criteria, vibration generated by the Project's construction equipment would not be expected to generate either strongly perceptible levels of vibration or structural damage at the nearest uses. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

WHY? There are no public or private airports located within two miles of the Project sites. The Project sites are located approximately 8 miles northwest of the San Gabriel Valley Airport and approximately 12 miles southeast of the Hollywood-Burbank (formerly Bob Hope) Airport at the closest points. The Project sites are located well outside the existing and projected 65-dBA CNEL noise contour of either of these airports and is not located within the vicinity of a private airstrip. Aircraft overflights do not significantly contribute to the noise environment at the Project sites. There would be no impact, and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to noise, and no mitigation is required.

2.14 POPULATION AND HOUSING

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through the extension of roads or other infrastructure)?	☐	☐	☐	☒

WHY? No residential units are included in the Project; therefore, the Project would not directly induce unplanned population growth. Also, the Project is not anticipated to directly increase use of the Lower Arroyo Seco area as a destination. It is expected that existing users of the Arroyo Seco area would use the proposed Project features, as they are similar passive and active recreation features existing in the area. Additionally, the Project would not indirectly induce growth, such as through provision of employment or extension of infrastructure. Development of the Project would not require extending or improving infrastructure in a manner that would facilitate off-site growth in Pasadena, South Pasadena, or Los Angeles. The Project sites are designated for open space and recreation uses. Implementation of the Project would maintain the existing open space uses and would not displace established housing. Therefore, the proposed Project would not induce substantial population growth. There would be no impact and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

WHY? The Project sites are undeveloped open space and do not contain any existing residential units. Therefore, Project implementation would not displace substantial numbers of existing people or housing, necessitating replacement housing elsewhere whose construction could result in environmental impacts. There would be no impact related to construction of replacement housing, and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to population and housing, and no mitigation is required.

2.15 PUBLIC SERVICES

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection?	☐	☐	☐	☒

WHY? As discussed in Section 2.14, Population and Housing, above, the Project would not result in direct or indirect population growth. The Project would include construction of water treatment and expanded recreational facilities in the Lower Arroyo Seco. These Project elements would not alter demand and would not result in demand for additional fire protection facilities, such as a new fire station, that would in turn cause adverse environmental impacts. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for police protection?	☐	☐	☐	☒

WHY? As discussed in Section 2.14, Population and Housing, above, the Project would not result in direct or indirect population growth. The Project would include construction of water treatment and expanded recreational facilities in the Lower Arroyo Seco. These Project elements would not alter demand and would not result in demand for additional police protection facilities, such as a new police station, that would in turn cause adverse environmental impacts. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for schools?	☐	☐	☐	☒

WHY? As discussed in Section 2.14, Population and Housing, above, the proposed Project would not result in direct or indirect population growth. Therefore, there would be no additional demand for school services. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for parks?	☐	☐	☐	☒

WHY? As discussed in Section 2.14, Population and Housing, above, the Project would not result in direct or indirect population growth. Therefore, there would be no additional demand for parks due to new population. The Project would include the construction of water treatment and expanded recreational facilities in the Lower Arroyo Seco, whose environmental impacts are addressed in this IS/MND. The Project would not directly or indirectly increase the demand for or usage of other parks and recreation facilities such that new parks and recreational facilities would be required, construction of which would adversely affect the environment. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for other public facilities?	☐	☐	☐	☒

WHY? As discussed in Section 2.14, Population and Housing, above, the Project would not result in direct or indirect population growth. Therefore, there would be no additional demand for other public facilities, such as libraries. There would be no impact, and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to public services, and no mitigation is required.

2.16 RECREATION

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒

WHY? As discussed in Section 2.14, Population and Housing, above, the Project would not result in direct or indirect population growth and would not therefore directly or indirectly increase the demand for or usage of existing parks and other recreational facilities. The Project includes the development of new water treatment and expanded recreation facilities, whose environmental impacts are addressed in this IS/MND. The Project would not directly or indirectly increase the demand for or usage of other parks and recreation facilities such that existing neighborhood and regional parks or other recreational facilities would experience substantial physical deterioration. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☒	☐	☐

WHY? As discussed under Threshold 2.16(a) above, the Project would not result in direct or indirect population growth and would not therefore directly or indirectly increase the demand for or usage of existing parks and other recreational facilities. The Project includes the development of new water treatment and expanded recreation facilities, whose environmental impacts are addressed in this IS/MND. As discussed in Section 2.1 through 2.20 of this IS/MND, there would be less than significant impacts with implementation of the identified mitigation measures for biological resources, cultural resources, and geology and soils (paleontological resources).

MITIGATION MEASURES

There would be less than significant impacts with implementation of the identified mitigation measures for biological resources, cultural resources, and geology and soils (paleontological resources).

2.17 TRANSPORTATION

Information in this section is derived in part from the *Arroyo Seco Water Reuse Project Traffic Evaluation* (Traffic Evaluation), dated October 27, 2023, and prepared by Psomas (Psomas 2023b). The Traffic Evaluation is provided in Appendix H to this IS/MND.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐

WHY? Pasadena developed and adopted its *Transportation Impact Analysis Current Practice and Guidelines* (TIA Guidelines) to ensure that transportation system improvements necessary to support new development while maintaining the quality of life within the community are identified prior to project approval and funded prior to construction. As the CEQA Lead Agency, Pasadena's transportation guidelines apply to the Project. Pursuant to Senate Bill (SB) 743, Pasadena TIA Guidelines establish CEQA transportation analysis metrics including: vehicle miles traveled (VMT) per Capita, vehicle trips (VT) per Capita, Proximity and Quality of the Bicycle and Transit Networks, and Pedestrian Accessibility (Pasadena 2022).

Construction Traffic

As discussed in Section 1.0, Project Information, of this IS/MND, the Project would be constructed beginning in Summer 2024 over a total period of 17 months and would be completed in a single phase, with semi-consecutive construction of the San Rafael and San Pascual BMPs. The San Rafael construction period would be approximately 9 months and the San Pascual construction period would be approximately 13 months. Construction at the San Pascual site would be initiated after demolition, site preparation, and grading activity at San Rafael are complete, which is expected to require about 4 months. Therefore, there would be construction activity at San Rafael only for 4 months, construction at both sites simultaneously for 5 months, and construction at San Pascual only for 8 months. Project construction is anticipated to occur from Monday through Friday, between the hours of 7:00 AM and 5:00 PM, without activity on weekends or federal holidays.

Construction would not require staging along adjacent public roadways or other areas that would disrupt existing traffic patterns. There may be occasions where large construction equipment or construction materials are transported across Stoney Drive (i.e., between the staging/laydown area and the site), requiring temporary traffic control. Additionally, a two-inch-diameter water line would be installed across Stoney Drive between the San Pascual site and Arroyo Park via trenching. This would involve closure of one lane of the road at a time. However, no street or other lane closures, or street improvements, would be required to implement the Project. The primary access point for construction traffic at the San Rafael site would be via San Pascual Avenue, then north through the paved parking lot at San Pascual Stables and continuing west along the unpaved road immediately north of the stables until it ends at the Channel. A temporary concrete bridge would span the Arroyo Seco Channel at this point to access the west side of the Channel. This temporary bridge is necessary to have access to the San Rafael site that would accommodate the potential weight of all anticipated construction vehicles. The main point of ingress and egress for construction traffic, including private worker vehicles, at the San Pascual site would be via San Pascual Avenue and Stoney Drive. Ingress and egress for construction traffic associated with installation of the water harvester and related infrastructure would be via Lohman Lane.

A safe path for equestrian and pedestrian traffic at the northern (upstream) end of the San Rafael site during construction would be made available to the maximum extent feasible. There would be brief periods where the existing trail alignment on the west side of the Channel at the bridge crossing would be restricted to public access for safety and/or to allow the proposed improvements in this portion of the site to be completed. At least a single lane for vehicular traffic along Stoney Drive at the San Pascual site as well as a safe detour for equestrian and pedestrian traffic would be available at all times throughout the construction period. The City of Pasadena has been in communication with the San Pascual Stables and would continue to communicate regarding equestrian access at both sites throughout the construction period.

The Traffic Evaluation assumes that truck trips would be evenly spaced throughout the workday, and that all workers would arrive during the same hour in the morning and would depart in the same hour in the afternoon/evening. Table 31, Total Construction Trip Generation, summarizes the total construction traffic expected for all Project activities; and Table 32, Peak Day Construction Trip Generation (8th Month), summarizes the peak day (highest) construction trip generation. As shown in Table 32, the peak day construction activity is estimated to occur in the eighth month of construction (counting from the beginning on San Rafael site construction) and would result in an estimated 57 daily trips, including 23 trips in the peak hour. For much of the Project's construction period, the main daily traffic would be generated by the workers. Therefore, even with conservative assumptions about construction traffic for this Project, the level of construction traffic would not conflict with a program plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities.

TABLE 31
TOTAL CONSTRUCTION TRIP GENERATION

Month	Activity	Total Trips	Work Days	Daily Trips	Peak Hour Trips
San Rafael Site					
1	Demolition	6	20	Assumes 2 trips on 3 consecutive days	0
2	Site Preparation	200	20	10	1
3-4	Grading/Excavation	400	40	10	1
5-8	Infrastructure Construction	4	80	Assumes 4 trips in same day	1
9	Paving	0	20	0	0
Construction worker trips (per day rate only)				20	10
San Pascual Site					
5	Demolition	0	20	0	0
6-7	Site Preparation	400	40	10	1
8-10	Grading/Excavation	800	60	13	2
11-16	Infrastructure Construction	10	120	Assumes 2, 2, and 1 trips on 3 single days distributed through phase	0
17	Paving	0	20	0	0
Construction worker trips (per day rate only)				20	10
Source: Psomas 2023b; Appendix H.					

TABLE 32
PEAK DAY CONSTRUCTION TRIP GENERATION (8TH MONTH)

Component	Activity	Total Trips	Work Days	Daily Trips	Peak Hour Trips
San Rafael Site	Infrastructure Construction	4	80	4	1
	Construction worker trips (per day rate only)			20	10
San Pascual Site	Grading	800	60	13	2
	Construction worker trips (per day rate only)			20	10
			Peak Day Trips	**57**	**23**
Source: Psomas 2023b; Appendix H.					

Operational Traffic

Per the Pasadena TIA Guidelines, a CEQA transportation analysis shall be conducted for development projects which satisfy any of the following conditions: (1) proposes 50 or more net new residential dwelling units, or (2) project proposes 50,000 or more net new non-residential square feet (Pasadena 2022). The Project is not a development project and does not meet any conditions requiring a CEQA transportation analysis.

As discussed in Section 1.0 of this IS/MND, the Project is not anticipated to directly increase use of the Lower Arroyo Seco area as a destination. It is expected that existing users of the Arroyo Seco area would use the proposed Project features, as they are similar passive and active recreation features existing in the area. Long-term maintenance is expected to involve, on average, a single visit to both sites per month by a two- to four- person crew during a one-day (e.g., up to eight-hour) visit. The maintenance performed during each visit would vary depending on the equipment status and the season (wet or dry). It is expected that maintenance personnel would travel to and from the sites in one to two vehicles – such as a pickup truck, or pickup truck and a vacuum truck, for instance. Occasional visits for more intensive maintenance activity or to respond to equipment issues may occur. Therefore, no Project-level analysis of CEQA impacts is required. Also, Pasadena does not require analysis of construction traffic part of the CEQA analysis. However, an assessment of construction traffic associated with both Project sites was conducted.

Alternative Transportation Policies

Pasadena has set forth policies for public transit, bicycle, and pedestrian facilities in its General Plan. One of the eight guiding principles of the General Plan is that “Pasadena will be a city where people can circulate without cars.” More specific policies regarding non-vehicular transportation modes are provided in the Mobility Element of the General Plan. Objective 2 of the Mobility Element is to “Encourage walking, biking, transit and other alternatives to motor vehicles.” This objective is supported by policies including: “Continue to strengthen the marketing and promotion of non-auto transportation to residents, employees and visitors,” “Ensure that secure and convenient bicycle parking is available at destinations,” and “Provide convenient, safe and accessible transit stops” (Pasadena 2015). The Project would not conflict with the City’s policies to encourage walking, biking, and transit. The Project would support some of these policies, as it would improve ease of access and safety of alternative transportation (pedestrian) as well as equestrian use within the Lower Arroyo Seco, including in the cities of South Pasadena and Pasadena.

There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	**Less than Significant with Mitigation**	**Less than Significant Impact**	**No Impact**
Would the project:				
b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)(1)?	☐	☐	☐	☒

WHY? Section 15064.3(b)(1) of the State CEQA Guidelines refers to evaluating transportation impacts using vehicle miles traveled for land use projects. The City’s *Transportation Impact Analysis Current Practice and Guidelines* were prepared to reflect the requirements of SB 743. The Project is not a land use project and would not generate any long-term change in traffic associated with the Lower Arroyo Seco.

As discussed under Threshold 2.17(a) above, although not required, an assessment of construction traffic was prepared for the Project. This analysis determined there would be less than significant direct and cumulative impacts related to construction traffic. As such, the Project would not conflict with or be inconsistent with Section 15064.3(b)(1) of the State CEQA Guidelines or the City’s transportation plans and policies. There would be a less than significant impact and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒

WHY? The Project would not involve any alterations to existing public or private roadways. Therefore, the Project would not increase hazards due to a geometric design feature or incompatible use. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
d) Result in inadequate emergency access?	☐	☐	☐	☒

WHY? The construction and operation of the Project would not place any permanent or temporary physical barriers on any existing public streets, nor involve any alterations to existing public or private roadways. As such, the Project would not affect emergency access. There would be no impact, and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to transportation, and no mitigation is required.

2.18 TRIBAL CULTURAL RESOURCES

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)?	☐	☐	☐	☒

WHY? As mentioned in Section 2.5, Cultural Resources, the Project is subject to compliance with AB 52, which requires consideration of impacts to "tribal cultural resources" (TCRs), defined in Section 21074 of the *Public Resources Code,* as part of the CEQA process. AB 52 requires the City to notify any groups (who have requested notification) who are traditionally or culturally affiliated with the geographic area of a project for which a negative declaration, mitigation negative declaration, or environmental impact report is required pursuant to CEQA. The AB 52 process was initiated on April 3, 2023, and this consultation process has been completed. Based on the cultural resources analysis conducted for the Project (refer to Section 2.5, Cultural Resources, of this IS/MND), there are no known tribal cultural resources within the Project site and therefore no resources listed or eligible for listing in the California Register of Historic Resources (CRHR) or other local register of historical resources. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	**Less than Significant with Mitigation**	**Less than Significant Impact**	**No Impact**
Would the project:				
a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?	☐	☒	☐	☐

WHY? As discussed under Threshold 2.18(a), on April 3, 2023, Pasadena sent notification of the Project to Native American tribal contacts pursuant to AB 52–the Gabrieleno Band of Mission–Indians - Kizh Nation (Kizh Nation) and the Gabrielino-Tongva tribe. The Kizh Nation requested consultation and the Gabrielino-Tongva tribe did not respond.

Kizh Nation has indicated that the City of Pasadena lies within an area where ancestral territories of Gabrieleño Tribe villages adjoined and overlapped, at least during the Late Prehistoric (i.e., before European contact) and Protohistoric Periods (i.e., Post-contact). Kizh Nation has stated that several Native American burials, foot trails, and water conveyance systems known as *zanja* irrigation systems built by the local Native American population under the supervision of the Spanish are documented nearby. Maps and documents have been provided by Kizh Nation, and while the documentation does not conclusively identify these resources within the City, they do highlight the overall sensitivity of the area.

This area of Los Angeles County was inhabited by Native Americans, but as discussed above under Threshold 2.18(a) existing site records and field surveys do not indicate archaeological resources significant to Native Americans on the Project sites. It should be noted, though, there is always the possibility that undiscovered intact cultural resources, including tribal cultural resources, may be present below the surface in native sediments.

On June 6, 2023, the initial consultation between Pasadena and the Kizh Nation was conducted via telephone. The history of the tribe in the vicinity of the Project area was provided, and the tribe requested information regarding the disposition of soils on the two sites. On June 6, 2023, a follow up email was sent by Kizh Nation further describing the history of the area surrounding the Project sites. On June 28, 2023, Pasadena responded to the request for soils information by submitting the Geotechnical Evaluations performed for their use. Between July 7 and September 21, 2023, consultation regarding the mitigation measures recommended by Kizh Nation continued via several e-mail communications culminating in another conference call on September 21, 2023. The issue under discussion during these communications revolved around Kizh Nation's assertion they are the sole Gabrieleno tribe with ancestral affiliation in the area and as such any mitigation should specify that Native American monitoring during grading activity be conducted solely by tribal members approved by Kizh Nation. The City had retained most of the mitigation measure language recommended by Kizh Nation except for stating that the Project applicant will accommodate a Native American monitor that is culturally affiliated with the Project sites as recognized by the NAHC. On the September 21st call, the City explained that per California code related to contracting it was not permissible to require the Native American monitoring to be sole source (i.e., not competitively contracted). Additionally, the City did not feel it was appropriate for them to be an entity to decide or affirm that Kizh Nation is the sole tribe that existed in the Project area. As such, the mitigation measures requested by the tribe are not considered feasible pursuant to Sections 15041 et. seq. and 15364 of the State CEQA Guidelines. At an impasse, the City contacted the NAHC for further guidance but NAHC, on October 17th, indicated they did not have authority regarding the selection of a qualified Native American monitor or the monitoring activities of a construction project. After further consultation, the City reached mutual agreement regarding the mitigation measures cannot be reached with Kizh Nation. MMs TCR-1 through TCR-3 would be implemented during construction activities to recognize Kizh Nation's concerns. With implementation of MMs TCR-1 through TCR-3, impacts to tribal cultural resources would be reduced to a less than significant level.

MITIGATION MEASURES

TCR-1 Retain a Native American Monitor Prior to Commencement of Ground Disturbing Activities:

Prior to the commencement of any ground disturbing activities at the two project sites, the project applicant/lead agency shall retain a Native American Monitor from or approved by the Gabrieleño Band of Mission Indians – Kizh Nation. The tribal monitor will only be present on-site during the construction phases that involve ground disturbing activities. Ground disturbing activities are defined by the tribe as activities that may include demolition, pavement removal, potholing, auguring, grubbing, tree removal, boring, grading, excavation, drilling, and trenching within the project areas.

The tribal monitor will complete daily monitoring logs that will provide descriptions of the day's activities, including type of construction activities performed, location of activities, soil types, and any cultural materials identified. The on-site monitoring shall end when all ground-disturbing activities on the project sites are completed, or when the tribal monitor has indicated that all upcoming ground-disturbing activities at the project sites have little to no potential for impacting Tribal Cultural Resources. Copies of the monitor logs will be provided to the lead agency upon written request to the consulting tribe.

TCR-2 Unanticipated Discovery of Tribal Cultural Resource Objects (Non-Funerary/Non-Ceremonial):

Upon discovery of any Tribal Cultural Resources, all construction activities shall cease in the immediate vicinity of the discovery (not less than the surrounding 50 feet) and shall not resume until the find can be assessed. All Tribal Cultural Resources unearthed by Project activities shall be evaluated by the tribal monitor and a qualified Archaeologist if one is present. If the resources are Native American in origin, the consulting tribe will retain it/them in the form and/or manner the tribe deems appropriate, for educational, cultural, and/or historic purposes.

TCR-3 Unanticipated Discovery of Human Remains and Associated Funerary or Ceremonial Objects:

If human remains and/or grave goods are discovered or recognized at the Project sites, all ground disturbance shall immediately cease, and the County coroner shall be notified per Public Resources Code Section 5097.98, and Health & Safety Code Section 7050.5. Human remains and grave/burial goods shall be treated alike per California Public Resources Code section 5097.98(d)(1) and (2). Work may continue in other parts of the Project sites while evaluation and, if necessary, mitigation takes place (CEQA Guidelines Section 15064.5[f]). Preservation in place (i.e., avoidance) is the preferred manner of treatment for human remains and/or burial goods. If preservation in place is not feasible, treatment may include implementation of archaeological data recovery excavations to remove the resource along with subsequent laboratory processing and analysis. Any discovery of human remains/burial goods that are Native American in origin shall be kept confidential to prevent further disturbance.

Any historic archaeological material that is not Native American in origin (non-TCR) shall be curated at a public, non-profit institution with a research interest in the materials, such as the Natural History Museum of Los Angeles County or the Fowler Museum, if such an institution agrees to accept the material. If no institution accepts the archaeological material, it shall be offered to a local school or historical society in the area for educational purposes.

2.19 UTILITIES AND SERVICE SYSTEMS

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐

WHY? The Project would minimally increase demand for water associated with use of the proposed irrigation system to support the new landscaping. A two-inch-diameter water line would be installed across Stoney Drive between the San Pascual site and Arroyo Park. The water line would have a meter and backflow preventer on site and would connect to an existing six-inch-diameter water line on the east side of Stoney Drive. The purpose of this water line and the water line connection at the San Rafael site would initially be to provide irrigation water to the newly planted landscaping; after the landscaping is established the on-site irrigation infrastructure would be removed but the water line connection would remain in the event of extended drought conditions, “hot spots” in the landscape that require temporary supplemental water, and/or for maintenance needs. However, this long-term water use beyond initial landscape irrigation is expected to be only periodic and in minimal volumes. Additionally, a nominal amount of water may be used during construction for dust suppression. However, the Project would result in an estimated water supply benefit of 320 af per year on average, from approximately 258 af of groundwater recharge and approximately 30 af of irrigation reuse at the Arroyo Seco Golf Course. The irrigation reuse would reduce current potable water use at this recreational facility. Therefore, this demand would not result in the need for new or expanded water supply infrastructure beyond that installed as part of the Project.

The Project would not result in wastewater generation and would not, therefore, result in the need for new or expanded wastewater treatment facilities. There would be no increase in stormwater runoff. The proposed BMPs would include a small extent of new impervious surfaces, such as concrete seatwalls and the San Pascual pretreatment infrastructure enclosure that would be partially above ground (refer to Exhibit 14). However, the treatment wetlands have been designed to optimize infiltration and would facilitate a greater amount of on-site infiltration than in the existing condition. Therefore, the Project would not, therefore, result in the need for new or expanded stormwater drainage facilities.

A new wooden utility pole would be installed near the existing utility pole at the northern end of the San Pascual site and used to connect electric (i.e., SCE) service; all power lines connecting to this utility pole would be installed underground in the remainder of the site. While operation of the water treatment infrastructure and irrigation system would generate demand for electricity, this demand would not result in the need for new or expanded electric power facilities outside the Project site. Finally, the proposed Project would not require natural gas or telecommunications facilities.

Implementation of the Project would not result in the need for water, wastewater, storm water drainage, electricity, natural gas, or telecommunication facilities the construction of which could cause significant effects. Impacts on utilities would be less than significant, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☒	☐

WHY? As discussed under Threshold 2.19(a) above, the Project would minimally increase demand for water associated with use of the proposed irrigation system to support the new landscaping. As discussed, the water supply infrastructure at the two sites would initially provide irrigation water to the newly planted landscaping; after the landscaping is established the on-site irrigation infrastructure would be removed but the water line connection would remain in the event of extended drought conditions, “hot spots” in the landscape that require temporary supplemental water, and/or for maintenance needs. However, this long-term water use beyond initial landscape irrigation is expected to be only periodic and in minimal volumes. Additionally, a nominal amount of water may be used during construction for dust suppression. However, the Project would result in an estimated water supply benefit of 320 af per year on average, from approximately 258 af of groundwater recharge and approximately 30 af of irrigation reuse at the Arroyo Seco Golf Course. The irrigation reuse would reduce current potable water use at this recreational facility. Therefore, the temporary dust suppression water use during construction and long-term, but nominal, irrigation water use on the sites would not result in insufficient water supplies, such that Pasadena (for the San Rafael site) or South Pasadena (for the San Pascual site) would be unable to meet the Project’s demands and existing and foreseeable demands for potable water. Impacts would be less than significant, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) Result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒

WHY? As discussed under Threshold 2.19(a) above, the Project would not generate wastewater. Therefore, there would not be a determination by the wastewater treatment provider that there is inadequate capacity. There would be no impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐

WHY? Construction of the Project would generate an estimated 600 cy of demolition debris, 3,000 cy of greenwaste, and 6,000 cy of excavated soil. Waste from the Project site would be exported to Scholl Canyon Landfill, located at 3001 Scholl Canyon Road. Section 8.62 et. seq. of the PMC is the City's construction and demolition waste management ordinance (C&D ordinance). The Project would be subject to the C&D ordinance and therefore required to divert at least 75 percent of the construction waste stream from landfill disposal, not including excavated soil. Clean (i.e., uncontaminated) excavated soil as well as clean greenwaste can be used as alternative daily cover or other on-site beneficial uses that do not directly contribute to landfill space at Scholl Canyon Landfill. However, to provide a conservative analysis, all construction waste generated is considered against the facility's remaining capacity. Therefore, for purposes of this analysis, implementation of the Project would generate an estimated 6,900 cy of construction waste. As of the end of 2020, the Scholl Canyon Landfill had a maximum daily capacity of 3,400 tons and a remaining permitted capacity of approximately 5.8 million cubic yards (3.4 million tons) (LACPW 2021). The one-time disposal of approximately 6,900 cy would represent approximately 0.2 percent of Scholl Canyon Landfill's remaining permitted capacity.

Operation of the Project would not generate any additional solid waste compared to existing conditions. The volume of waste disposed at Scholl Canyon Landfill after diversion would not be expected to result in inadequate landfill capacity. Therefore, the Project would be served by a landfill with sufficient permitted capacity. There would be a less than significant impact and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
e) Comply with federal, State, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

WHY? As discussed under Threshold 2.19(f) above, the Project would be subject to, and comply with, the City's C&D ordinance. The finite amount of construction waste requiring landfill disposal after diversion efforts would not interfere with attainment of waste management goals pursuant to AB 939, the California Integrated Waste Management Act. As such, the Project would comply with federal, State, and local regulations related to solid waste. There would be no impact, and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to utilities and service systems, and no mitigation is required.

2.20 WILDFIRE

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
If located in or near State Responsibility Areas or lands classified as Very High Fire Hazard Severity Zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

WHY? As discussed previously under Threshold 2.9(h), the Project sites are not within a VHFHSZ-designated area (CAL FIRE 2023) or near a State Responsibility Area. There would be no impacts, and no mitigation is required.

MITIGATION MEASURES

There would be no significant impacts related to wildfire, and no mitigation is required.

2.21 EARLIER ANALYSIS

Earlier analysis may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. See CEQA Guidelines Section 15063(c)(3)(D). The CEQA review for the Project is not being tiered from a Program EIR, Master EIR, or other, prior CEQA document. All documents used in the preparation of this IS/MND are provided in Section 3.0, Initial Study Reference Documents.

2.22 MANDATORY FINDINGS OF SIGNIFICANCE

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Does the project:				
a) Have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐

WHY? As discussed in Section 2.4, Biological Resources, construction of the Project would impact a special status vegetation type, protected trees, and jurisdictional resources; has the potential to impact bats; and has the potential to impact nesting birds and raptors if construction activities are initiated during the nesting season. With implementation of MMs BIO-1 through BIO-4, such potential impacts would be less than significant. Construction and operation of the Project would not degrade the quality of the environment; would not substantially reduce the habitat of fish or wildlife species; would not cause a fish or wildlife population to drop below self-sustaining levels; would not threaten to eliminate a plant or animal community; and would not reduce the number of or restrict the range of a Rare or Endangered plant or animal with implementation of mitigation. Implementation of the Project would result in a greater number of native trees and other plants on both sites than in the existing condition. Accordingly, the Project is expected to result in a net benefit to coast live oak-western sycamore woodland vegetation and improve habitat functions and values for native species of the region.

As discussed in Section 2.5, Cultural Resources, Section 2.7, Geology and Soils, and Section 2.18, Tribal Cultural Resources, no impacts would occur to known historic, archaeological, tribal cultural, and/or paleontological resources. Potential impacts to unknown human remains from implementation of the Project would be less than significant through compliance with State regulations. Potential impacts to unknown archaeological resources would be less than significant with implementation of MM CUL-1. Potential impacts to unknown paleontological resources would be less than significant with implementation of MM GEO-1. Potential impacts to unknown tribal cultural resources would be less than significant with implementation of MMs TCR-1 through TCR-3. Therefore, the Project does not have the potential to eliminate important examples of the major periods of California history or prehistory with implementation of mitigation.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
b) Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐

WHY? As shown in the analysis in Sections 2.1 through 2.20 above, all construction-related impacts would be either less than significant or mitigated to a less than significant level. As demonstrated by the analysis in this IS/MND, there would be no long-term significant operational impacts. As such, there is no potential contribution to long-term cumulative impacts from operation of the Project. There are no projects sponsored by Pasadena, South Pasadena, or Los Angeles within or near the Project sites and there are no known projects within approximately one mile of the Project site. Based on the small scale of the Project and limited impacts, only projects ongoing within this relatively close distance could potentially result in cumulatively considerable impacts. Therefore, the Project would not result in impacts that are individually limited but cumulatively considerable. There would be a less than significant impact, and no mitigation is required.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
Would the project:				
c) Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

WHY? As shown in the analysis in Sections 2.1 through 2.20 above, the Project would not have environmental effects that could cause substantial adverse effects on human beings, either directly or indirectly. There would be no impact, and no mitigation is required.

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SECTION 3.0 INITIAL STUDY REFERENCE DOCUMENTS

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Appendix A

CalEEMod Data

Arroyo Seco Water Reuse v2 Detailed Report

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Data Field	Value
Project Name	Arroyo Seco Water Reuse v2
Construction Start Date	3/1/2024
Operational Year	2025
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	0.50
Precipitation (days)	7.20
Location	34.12065303999505, -118.16760703700828
County	Los Angeles-South Coast
City	South Pasadena
Air District	South Coast AQMD
Air Basin	South Coast
TAZ	4945
EDFZ	7
Electric Utility	Pasadena Water & Power
Gas Utility	Southern California Gas
App Version	2022.1.1.14

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description

City Park	2.50	Acre	2.50	0.00	2.50	2.50	—	—
City Park	1.70	Acre	1.70	0.00	1.70	1.70	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.25	11.7	13.4	0.02	0.55	0.34	0.84	0.51	0.07	0.54	2,596
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.66	15.8	17.0	0.03	0.78	0.68	1.39	0.71	0.13	0.83	3,578
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.59	5.53	6.18	0.01	0.28	0.23	0.51	0.26	0.04	0.30	1,263
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.11	1.01	1.13	< 0.005	0.05	0.04	0.09	0.05	0.01	0.06	209

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
2024	1.25	11.7	13.4	0.02	0.55	0.34	0.84	0.51	0.07	0.54	2,596

2025	0.57	5.52	5.68	0.01	0.21	0.00	0.21	0.19	0.00	0.19	1,339
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
2024	1.66	15.8	17.0	0.03	0.78	0.68	1.39	0.71	0.13	0.83	3,578
2025	0.98	9.24	11.1	0.02	0.48	0.61	1.09	0.44	0.11	0.55	2,225
Average Daily	—	—	—	—	—	—	—	—	—	—	—
2024	0.59	5.53	6.18	0.01	0.28	0.23	0.51	0.26	0.04	0.30	1,263
2025	0.23	2.22	2.34	< 0.005	0.09	0.01	0.09	0.08	< 0.005	0.08	531
Annual	—	—	—	—	—	—	—	—	—	—	—
2024	0.11	1.01	1.13	< 0.005	0.05	0.04	0.09	0.05	0.01	0.06	209
2025	0.04	0.41	0.43	< 0.005	0.02	< 0.005	0.02	0.01	< 0.005	0.01	87.9

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Area	< 0.005	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Energy	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Water	—	—	—	—	—	—	—	—	—	—	< 0.005
Waste	—	—	—	—	—	—	—	—	—	—	0.68
Refrig.	—	—	—	—	—	—	—	—	—	—	0.00
Total	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Area	< 0.005	—	—	—	—	—	—	—	—	—	—
Energy	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Water	—	—	—	—	—	—	—	—	—	—	< 0.005
Waste	—	—	—	—	—	—	—	—	—	—	0.68
Refrig.	—	—	—	—	—	—	—	—	—	—	0.00
Total	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Area	< 0.005	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Energy	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Water	—	—	—	—	—	—	—	—	—	—	< 0.005
Waste	—	—	—	—	—	—	—	—	—	—	0.68
Refrig.	—	—	—	—	—	—	—	—	—	—	0.00
Total	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68

Annual	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Area	< 0.005	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Energy	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Water	—	—	—	—	—	—	—	—	—	—	< 0.005
Waste	—	—	—	—	—	—	—	—	—	—	0.11
Refrig.	—	—	—	—	—	—	—	—	—	—	0.00
Total	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11

3. Construction Emissions Details

3.1. Demolition (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.61	5.78	6.95	0.01	0.33	—	0.33	0.30	—	0.30	1,029
Demolition	—	—	—	—	—	0.02	0.02	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.61	5.78	6.95	0.01	0.33	—	0.33	0.30	—	0.30	1,029
Demolition	—	—	—	—	—	0.02	0.02	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.04	0.35	0.42	< 0.005	0.02	—	0.02	0.02	—	0.02	62.0
Demolition	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	10.3
Demolition	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.05	0.75	0.00	0.00	0.13	0.13	0.00	0.03	0.03	143
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.04	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	30.3
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.06	0.64	0.00	0.00	0.13	0.13	0.00	0.03	0.03	135
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.04	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	30.3
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.30
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.83
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.37
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.30

3.3. Demolition (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.61	5.78	6.95	0.01	0.33	—	0.33	0.30	—	0.30	1,029
Demolition	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.35	0.42	< 0.005	0.02	—	0.02	0.02	—	0.02	62.0
Demolition	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	10.3
Demolition	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.05	0.75	0.00	0.00	0.13	0.13	0.00	0.03	0.03	143
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.30
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.37
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Site Preparation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.50	4.57	5.03	0.01	0.27	—	0.27	0.25	—	0.25	738
Dust From Material Movement	—	—	—	—	—	0.14	0.14	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.29	0.32	< 0.005	0.02	—	0.02	0.02	—	0.02	46.5

Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.70
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.04	0.57	0.00	0.00	0.10	0.10	0.00	0.02	0.02	107
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.48	0.18	< 0.005	< 0.005	0.10	0.11	< 0.005	0.03	0.03	403
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	6.51
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.03	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	25.4
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.08
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	4.20

3.7. Site Preparation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.50	4.57	5.03	0.01	0.27	—	0.27	0.25	—	0.25	738
Dust From Material Movement	—	—	—	—	—	0.14	0.14	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.50	4.57	5.03	0.01	0.27	—	0.27	0.25	—	0.25	738
Dust From Material Movement	—	—	—	—	—	0.14	0.14	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.56	0.62	< 0.005	0.03	—	0.03	0.03	—	0.03	91.0
Dust From Material Movement	—	—	—	—	—	0.02	0.02	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.11	< 0.005	0.01	—	0.01	0.01	—	0.01	15.1
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.04	0.57	0.00	0.00	0.10	0.10	0.00	0.02	0.02	107
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.49	0.19	< 0.005	< 0.005	0.10	0.11	< 0.005	0.03	0.03	412
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.04	0.48	0.00	0.00	0.10	0.10	0.00	0.02	0.02	102
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.51	0.19	< 0.005	< 0.005	0.10	0.11	< 0.005	0.03	0.03	411
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.06	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	12.7
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.06	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	50.7
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.11
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	8.40

3.9. Grading (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.50	4.57	5.03	0.01	0.27	—	0.27	0.25	—	0.25	738

Dust From Material Movement	—	—	—	—	—	0.14	0.14	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.55	0.61	< 0.005	0.03	—	0.03	0.03	—	0.03	88.9
Dust From Material Movement	—	—	—	—	—	0.02	0.02	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.11	< 0.005	0.01	—	0.01	0.01	—	0.01	14.7
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.04	0.57	0.00	0.00	0.10	0.10	0.00	0.02	0.02	107
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.50	0.19	< 0.005	0.01	0.11	0.11	0.01	0.03	0.03	421
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.06	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	12.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.06	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	50.7

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.06
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	8.40

3.11. Grading (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.99	9.15	10.1	0.01	0.54	—	0.54	0.50	—	0.50	1,476
Dust From Material Movement	—	—	—	—	—	0.28	0.28	—	0.03	0.03	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	1.56	1.71	< 0.005	0.09	—	0.09	0.09	—	0.09	251
Dust From Material Movement	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.28	0.31	< 0.005	0.02	—	0.02	0.02	—	0.02	41.6

Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.08	0.96	0.00	0.00	0.20	0.20	0.00	0.05	0.05	203
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.69	0.26	< 0.005	0.01	0.14	0.15	0.01	0.04	0.05	561
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.17	0.00	0.00	0.03	0.03	0.00	0.01	0.01	35.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.12	0.04	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	95.5
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	5.82
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	15.8

3.13. Grading (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.91	8.50	9.99	0.01	0.47	—	0.47	0.43	—	0.43	1,475
Dust From Material Movement	—	—	—	—	—	0.28	0.28	—	0.03	0.03	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	17.3
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	2.87
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.07	0.88	0.00	0.00	0.20	0.20	0.00	0.05	0.05	199
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.67	0.25	< 0.005	0.01	0.14	0.15	0.01	0.04	0.05	550
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.37
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	6.47

Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.39
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.07

3.15. Building Construction (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.59	5.86	5.71	0.01	0.22	—	0.22	0.21	—	0.21	1,339
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.59	5.86	5.71	0.01	0.22	—	0.22	0.21	—	0.21	1,339
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	1.41	1.38	< 0.005	0.05	—	0.05	0.05	—	0.05	323
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.26	0.25	< 0.005	0.01	—	0.01	0.01	—	0.01	53.4
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.17. Building Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.57	5.52	5.68	0.01	0.21	—	0.21	0.19	—	0.19	1,339
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.57	5.52	5.68	0.01	0.21	—	0.21	0.19	—	0.19	1,339
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	1.97	2.02	< 0.005	0.07	—	0.07	0.07	—	0.07	477
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.36	0.37	< 0.005	0.01	—	0.01	0.01	—	0.01	79.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.19. Paving (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.26	2.31	2.81	< 0.005	0.12	—	0.12	0.11	—	0.11	423
Paving	0.00	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	26.7
Paving	0.00	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	4.42
Paving	0.00	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.03	0.32	0.00	0.00	0.07	0.07	0.00	0.02	0.02	67.7

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	4.34
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.72
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.21. Architectural Coating (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	2.25	2.81	< 0.005	0.11	—	0.11	0.10	—	0.10	424
Architectural Coatings	0.00	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	27.9
Architectural Coatings	0.00	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	4.61
Architectural Coatings	0.00	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
City Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
City Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
City Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	0.00

Total	—	—	—	—	—	—	—	—	—	—	0.00

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
City Park	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
City Park	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
City Park	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00

4.3. Area Emissions by Source

4.3.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	< 0.005	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00	—	—	—	—	—	—	—	—	—	—

Landscape Equipment	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Total	< 0.005	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	< 0.005	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00	—	—	—	—	—	—	—	—	—	—
Total	< 0.005	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	< 0.005	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Total	< 0.005	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00

4.4. Water Emissions by Land Use

4.4.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	< 0.005
Total	—	—	—	—	—	—	—	—	—	—	< 0.005
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	< 0.005

Total	—	—	—	—	—	—	—	—	—	—	< 0.005
Annual	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	< 0.005
Total	—	—	—	—	—	—	—	—	—	—	< 0.005

4.5. Waste Emissions by Land Use

4.5.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	0.68
Total	—	—	—	—	—	—	—	—	—	—	0.68
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	0.68
Total	—	—	—	—	—	—	—	—	—	—	0.68
Annual	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	0.11
Total	—	—	—	—	—	—	—	—	—	—	0.11

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

City Park	—	—	—	—	—	—	—	—	—	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
City Park	—	—	—	—	—	—	—	—	—	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.00

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—

Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description

San Rafael Demolition	Demolition	3/1/2024	4/1/2024	5.00	22.0	—
San Pascual Demolition	Demolition	7/4/2024	8/4/2024	5.00	22.0	—
San Rafael Site Preparation	Site Preparation	4/2/2024	5/2/2024	5.00	23.0	—
San Pascual Site Preparation	Site Preparation	8/5/2024	10/5/2024	5.00	45.0	—
San Rafael Grading	Grading	5/3/2024	7/3/2024	5.00	44.0	—
San Pascual Grading	Grading	10/6/2024	1/6/2025	5.00	66.0	—
San Rafael Building Construction	Building Construction	7/4/2024	11/4/2024	5.00	88.0	—
San Pascual Building Construction	Building Construction	1/7/2025	7/7/2025	5.00	130	—
San Rafael Paving	Paving	11/5/2024	12/5/2024	5.00	23.0	—
San Pascual Paving	Architectural Coating	7/8/2025	8/8/2025	5.00	24.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
San Rafael Demolition	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
San Rafael Demolition	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
San Rafael Demolition	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
San Rafael Demolition	Crawler Tractors	Diesel	Average	1.00	8.00	87.0	0.43
San Pascual Demolition	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
San Pascual Demolition	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
San Pascual Demolition	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
San Pascual Demolition	Crawler Tractors	Diesel	Average	1.00	8.00	87.0	0.43
San Rafael Site Preparation	Excavators	Diesel	Average	1.00	8.00	36.0	0.38

San Rafael Site Preparation	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
San Rafael Site Preparation	Crawler Tractors	Diesel	Average	1.00	8.00	87.0	0.43
San Pascual Site Preparation	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
San Pascual Site Preparation	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
San Pascual Site Preparation	Crawler Tractors	Diesel	Average	1.00	8.00	87.0	0.43
San Rafael Grading	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
San Rafael Grading	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
San Rafael Grading	Crawler Tractors	Diesel	Average	1.00	8.00	87.0	0.43
San Pascual Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
San Pascual Grading	Skid Steer Loaders	Diesel	Average	2.00	8.00	71.0	0.37
San Pascual Grading	Crawler Tractors	Diesel	Average	2.00	8.00	87.0	0.43
San Rafael Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
San Rafael Building Construction	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
San Rafael Building Construction	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
San Rafael Building Construction	Pumps	Diesel	Average	1.00	8.00	11.0	0.74
San Pascual Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
San Pascual Building Construction	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
San Pascual Building Construction	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
San Pascual Building Construction	Pumps	Diesel	Average	1.00	8.00	11.0	0.74

San Rafael Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
San Rafael Paving	Rollers	Diesel	Average	1.00	6.00	36.0	0.38
San Pascual Paving	Rollers	Diesel	Average	1.00	6.00	36.0	0.38
San Pascual Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
San Rafael Demolition	—	—	—	—
San Rafael Demolition	Worker	10.0	18.5	LDA,LDT1,LDT2
San Rafael Demolition	Vendor	—	10.2	HHDT,MHDT
San Rafael Demolition	Hauling	0.41	20.0	HHDT
San Rafael Demolition	Onsite truck	—	—	HHDT
San Rafael Site Preparation	—	—	—	—
San Rafael Site Preparation	Worker	7.50	18.5	LDA,LDT1,LDT2
San Rafael Site Preparation	Vendor	—	10.2	HHDT,MHDT
San Rafael Site Preparation	Hauling	5.43	20.0	HHDT
San Rafael Site Preparation	Onsite truck	—	—	HHDT
San Rafael Grading	—	—	—	—
San Rafael Grading	Worker	7.50	18.5	LDA,LDT1,LDT2
San Rafael Grading	Vendor	—	10.2	HHDT,MHDT
San Rafael Grading	Hauling	5.68	20.0	HHDT
San Rafael Grading	Onsite truck	—	—	HHDT
San Rafael Building Construction	—	—	—	—
San Rafael Building Construction	Worker	0.00	18.5	LDA,LDT1,LDT2
San Rafael Building Construction	Vendor	0.00	10.2	HHDT,MHDT

San Rafael Building Construction	Hauling	0.00	20.0	HHDT
San Rafael Building Construction	Onsite truck	—	—	HHDT
San Rafael Paving	—	—	—	—
San Rafael Paving	Worker	5.00	18.5	LDA,LDT1,LDT2
San Rafael Paving	Vendor	—	10.2	HHDT,MHDT
San Rafael Paving	Hauling	0.00	20.0	HHDT
San Rafael Paving	Onsite truck	—	—	HHDT
San Pascual Demolition	—	—	—	—
San Pascual Demolition	Worker	10.0	18.5	LDA,LDT1,LDT2
San Pascual Demolition	Vendor	—	10.2	HHDT,MHDT
San Pascual Demolition	Hauling	0.00	20.0	HHDT
San Pascual Demolition	Onsite truck	—	—	HHDT
San Pascual Site Preparation	—	—	—	—
San Pascual Site Preparation	Worker	7.50	18.5	LDA,LDT1,LDT2
San Pascual Site Preparation	Vendor	—	10.2	HHDT,MHDT
San Pascual Site Preparation	Hauling	5.56	20.0	HHDT
San Pascual Site Preparation	Onsite truck	—	—	HHDT
San Pascual Grading	—	—	—	—
San Pascual Grading	Worker	15.0	18.5	LDA,LDT1,LDT2
San Pascual Grading	Vendor	—	10.2	HHDT,MHDT
San Pascual Grading	Hauling	7.58	20.0	HHDT
San Pascual Grading	Onsite truck	—	—	HHDT
San Pascual Building Construction	—	—	—	—
San Pascual Building Construction	Worker	0.00	18.5	LDA,LDT1,LDT2
San Pascual Building Construction	Vendor	0.00	10.2	HHDT,MHDT
San Pascual Building Construction	Hauling	0.00	20.0	HHDT
San Pascual Building Construction	Onsite truck	—	—	HHDT

San Pascual Paving	—	—	—	—
San Pascual Paving	Worker	0.00	18.5	LDA,LDT1,LDT2
San Pascual Paving	Vendor	—	10.2	HHDT,MHDT
San Pascual Paving	Hauling	0.00	20.0	HHDT
San Pascual Paving	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Control Strategies Applied	PM10 Reduction	PM2.5 Reduction
Water unpaved roads twice daily	55%	55%

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
San Pascual Paving	0.00	0.00	0.00	0.00	—

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (Ton of Debris)	Acres Paved (acres)
San Rafael Demolition	0.00	0.00	0.00	36.0	—
San Pascual Demolition	0.00	0.00	0.00	0.00	—
San Rafael Site Preparation	—	1,000	11.0	0.00	—
San Pascual Site Preparation	—	2,000	22.0	0.00	—
San Rafael Grading	—	2,000	33.0	0.00	—

San Pascual Grading	—	4,000	44.0	0.00	—
San Rafael Paving	0.00	0.00	0.00	0.00	0.00

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	3	74%	74%
Water Demolished Area	2	36%	36%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
City Park	0.00	0%
City Park	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2024	0.00	1,028	0.03	< 0.005
2025	0.00	1,028	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
City Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
City Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0	0.00	0.00	0.00	—

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	250

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
City Park	0.00	79.6	0.0330	0.0040	0.00
City Park	0.00	79.6	0.0330	0.0040	0.00

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)

City Park	0.00	77.9
City Park	0.00	53.0

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
City Park	0.21	—
City Park	0.15	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
City Park	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
City Park	Stand-alone retail refrigerators and freezers	R-134a	1,430	0.04	1.00	0.00	1.00
City Park	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
City Park	Stand-alone retail refrigerators and freezers	R-134a	1,430	0.04	1.00	0.00	1.00

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type
—	—

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	15.4	annual days of extreme heat
Extreme Precipitation	7.00	annual days with precipitation above 20 mm
Sea Level Rise	0.00	meters of inundation depth
Wildfire	0.00	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider different increments of sea level rise coupled with extreme storm events. Users may select from four model simulations to view the range in potential inundation depth for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 50 meters (m) by 50 m, or about 164 feet (ft) by 164 ft.
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	2	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	0	0	N/A

Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	2	1	1	3
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	71.7
AQ-PM	59.2
AQ-DPM	88.5
Drinking Water	87.2
Lead Risk Housing	73.0
Pesticides	0.00
Toxic Releases	69.1
Traffic	69.4
Effect Indicators	—
CleanUp Sites	54.3
Groundwater	14.9
Haz Waste Facilities/Generators	38.7
Impaired Water Bodies	33.2
Solid Waste	52.9
Sensitive Population	—
Asthma	9.70
Cardio-vascular	6.54
Low Birth Weights	24.3
Socioeconomic Factor Indicators	—
Education	16.2
Housing	56.5
Linguistic	46.0
Poverty	29.2

Unemployment	51.3

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	68.77967407
Employed	91.37687668
Median HI	58.24457847
Education	—
Bachelor's or higher	85.38431926
High school enrollment	100
Preschool enrollment	59.16848454
Transportation	—
Auto Access	53.75336841
Active commuting	70.76863852
Social	—
2-parent households	61.91453869
Voting	76.97934043
Neighborhood	—
Alcohol availability	46.27229565
Park access	50.48120108
Retail density	80.73912486
Supermarket access	80.11035545
Tree canopy	90.63261902
Housing	—
Homeownership	17.51571924

Housing habitability	44.87360452
Low-inc homeowner severe housing cost burden	83.60066727
Low-inc renter severe housing cost burden	79.18644938
Uncrowded housing	58.74502759
Health Outcomes	—
Insured adults	52.90645451
Arthritis	0.0
Asthma ER Admissions	98.1
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	41.7
Cognitively Disabled	74.6
Physically Disabled	54.0
Heart Attack ER Admissions	95.3
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	40.5
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0

No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	19.9
Elderly	61.3
English Speaking	74.0
Foreign-born	48.3
Outdoor Workers	58.4
Climate Change Adaptive Capacity	—
Impervious Surface Cover	59.6
Traffic Density	60.6
Traffic Access	56.5
Other Indices	—
Hardship	18.2
Other Decision Support	—
2016 Voting	65.4

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	35.0
Healthy Places Index Score for Project Location (b)	77.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Characteristics: Utility Information	Located within the City of Pasadena
Construction: Construction Phases	Based on project specific durations
Construction: Off-Road Equipment	Project specific equipment estimates. AC phase equipment used to represent 2nd paving phase - equipment has been adjusted appropriately.
Operations: Vehicle Data	No daily trip generation.
Construction: Dust From Material Movement	Developer provided export

Appendix B

Biological Resources Assessment

PSOMAS

Balancing the Natural and Built Environment

November 16, 2023

Ms. Christina Monde
Project Manager
City of Pasadena Department of Public Works
100 North Garfield Avenue, Room N306
Pasadena, California 91109

VIA EMAIL
cmonde@cityofpasadena.net

Subject: Biological Resources Assessment for the Arroyo Seco Water Reuse Project in the Cities of Pasadena, South Pasadena, and Los Angeles, California

Dear Ms. Monde:

This Biological Resources Assessment Letter Report presents the findings of a biological and jurisdictional waters resources assessment for Arroyo Seco Water Reuse Project (hereinafter referred to as the “Project”) located in the cities of Pasadena, South Pasadena, and Los Angeles in Los Angeles County, California (Exhibit 1, Regional Location and Local Vicinity). The purpose of the biological assessment is to document biological resources, evaluate potential biological constraints on the Project, identify potential impacts to biological and jurisdictional water resources that could result from implementation of the Project; and recommend protective measures to ensure avoidance of impacts or to reduce impacts to a level of less than significant.

PROJECT DESCRIPTION AND LOCATION

The proposed Project involves the diversion of stormwater runoff from San Rafael Creek into treatment wetlands that would be created in an approximate 1.4-acre adjacent upland area (San Rafael Site). These treatment wetlands would improve water quality and allow for soil infiltration before discharging this treated water into the Arroyo Seco Channel. Further downstream, water would be diverted from the Arroyo Seco via existing facilities to treatment wetlands constructed in the approximate 2.2-acre San Pascual Site.

The Arroyo Seco Water Reuse Project survey area is generally centered along a portion of the Arroyo Seco Channel that begins just south of the San Rafael Avenue bridge overpass of the Arroyo Seco Channel in the City of Pasadena and extends approximately ½-mile south (downstream) to immediately north of the State Route 110 overpass in the City of South Pasadena. The survey area referenced herein includes: (1) the San Rafael area at the northern end of the survey area, which consists of a concrete-lined drain that conveys water from adjacent residential areas located northwest of the survey area and drain into the Arroyo Seco; (2) the Arroyo Seco Channel, which consists of the concrete-lined channel extending between the Project site along with an adjacent dirt trail that runs along the eastern bank adjacent to the San Pascual Stables; and (3) the San Pascual area, a densely vegetated area that accepts flows diverted from the Arroyo Seco Channel through existing infrastructure and is located immediately northwest of Arroyo Park. The Golf Course maintenance yard was not included in the survey area because it is in a heavily disturbed condition and no special status biological resources are present within the fenced area. The

225 South Lake Avenue
Suite 1000
Pasadena, CA 91101

Tel 626.351.2000
Fax 626.351.2030
www.Psomas.com

survey area captures all direct and indirect jurisdictional waters and biological resources that may be affected by Project implementation.

The Project area was assessed for impacts to biological resources encompasses the two discrete Project sites, construction staging areas, and adjacent areas. The San Rafael site is situated southwest of the San Rafael Avenue overpass of the Arroyo Seco Channel and adjacent to Pasadena's southern boundary. In addition to the property within Pasadena, the San Rafael site includes a linear feature that is within the limits of the San Rafael Creek easement under Los Angeles County Flood Control District (LACFCD) jurisdiction. The San Pascual site is situated southeast of the San Pascual Avenue overpass of the Arroyo Seco Channel and is primarily within South Pasadena with a small portion of this site within the City of Los Angeles. The survey area is located on the U.S. Geological Survey's (USGS') Pasadena and Los Angeles 7.5-minute quadrangles of the San Bernardino Meridian at Township 1 North, Range 12 West, Section 32 and Township 1 South, Range 12 West, Section 5 (Exhibit 2, U.S. Geological Survey Quadrangle Topographic Map; Exhibit 3, Survey Area).

METHODS

A literature review and field studies were conducted to document the biological resources as well as jurisdictional drainage features on and adjacent to the sites using the methods described below. An additional temporary staging area, the parking lot located on the southeast corner of the intersection of San Pascual Avenue and Stoney Drive was included in all field surveys at the San Pascual Site.

Literature Review

Prior to the survey, a literature review was conducted to identify special status plants, wildlife, and habitats that have been reported to occur in the vicinity of the survey area. The California Native Plant Society's (CNPS') Inventory of Rare and Endangered Plants (CNPS 2023) and the California Department of Fish and Wildlife's (CDFW's) California Natural Diversity Database (CDFW 2023a) were reviewed. Database searches included the USGS' Pasadena and Los Angeles 7.5-minute quadrangles. Resources reviewed to assist in the delineation of jurisdictional features included the U.S. Department of Agriculture, Natural Resources Conservation Service's (USDA NRCS') Web Soil Survey, the USDA NRCS' Hydric Soils List (USDA NRCS 2023), and the U.S. Fish and Wildlife Service's (USFWS') National Wetlands Inventory (NWI) Wetland Mapper (USFWS 2023).

Vegetation Mapping and General Survey

Psomas Senior Biologist Sarah Thomas conducted a general plant and wildlife survey and verified vegetation within the Project's survey area on June 16, 2023. Vegetation was mapped on a 1-inch equals 100-foot (1″=100′) scale color aerial. Nomenclature for vegetation types generally follows that of *A Manual of California Vegetation* (Sawyer et. al. 2009) when feasible. All plant species observed were recorded in field notes. Plants were identified using taxonomic keys, descriptions, and illustrations in Jepson Flora Project (2023), Baldwin et al. (2012), Hickman (1993), and Munz (1974). Nomenclature of plant taxa conform to the Special Vascular Plants, Bryophytes, and Lichens List (CDFW 2023b) for special status species and the Jepson eFlora (Jepson Flora Project 2023) for all other taxa.

All wildlife species detected during the survey were documented in field notes. Active searches for reptiles and amphibians included lifting, overturning, and carefully replacing rocks and debris. Birds were identified by visual and auditory recognition. Surveys for mammals were conducted during the day and included searching for and identifying diagnostic signs, including scat, footprints, scratch-outs, dust bowls, burrows, and trails. Taxonomy and nomenclature for wildlife generally follows the *Special Animals List* (CDFW 2022b) for special status species; for other species, Center for North American

Herpetology (2015) for amphibians and reptiles, the American Ornithological Society (2021) for birds, and the Smithsonian National Museum of Natural History (2011) for mammals.

A tree survey was conducted to identify and quantify trees regulated by the cities of Pasadena, South Pasadena, Los Angeles, and/or the California Fish and Game Code, and to assess impacts resulting from Project implementation. Detailed methods and results can be found in the *Tree Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project* (Tree Report, Psomas 2023a), provided as Attachment A.

Focused Special Status Plant Survey

Botanical surveys were floristic in nature and consistent with the protocols created by the California Department of Fish and Wildlife (CDFW) (CDFW 2018). Prior to the field surveys, a literature search was conducted to identify special status plant species reported from the vicinity of the Project sites. Sources reviewed included the USGS Pasadena, Burbank, Hollywood, Los Angeles, El Monte, and Mt. Wilson 7.5-minute quadrangles in the California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California (CNPS 2023) and the CDFW's California Natural Diversity Database (CDFW 2023a). Additionally, a soils map (Exhibit 4; Soils Map) of the sites was prepared to assist in determining potentials for plant species occurrence.

Rainfall received in the winter and spring determines the germination of many annual and perennial herb species. The region received approximately 9.96 inches of precipitation between July 2021 and June 2022 (data taken from Burbank Station) (CIMIS 2023). The average annual precipitation for this area is between 13.91 inches.

Reference populations were monitored for annual and difficult-to-detect target species to ensure that the surveys were comprehensive. This is especially relevant during periods of unusual rainfall patterns or below average rainfall. If conditions at a nearby reference population are suitable for germination and growth, then it can be inferred that conditions would also be suitable on the Project sites. Reference populations were not monitored for species with a California Rare Plant Rank (CRPR) of 3 or 4, large perennials which would be identifiable throughout the year, or for species lacking a publicly accessible reference population.

Psomas Biologist Sarah Thomas conducted special status plant survey for special status plants on June 16, 2023. The plant survey area included the entire boundary of the Project sites. The potentially suitable habitats for special status plants on the project sites were systematically surveyed to the extent possible during the site visit. All plant species observed were recorded in field notes. Plants were identified using taxonomic keys, descriptions, and illustrations in Jepson Flora Project (2023), Baldwin et al. (2012), Hickman (1993), and Munz (1974). Nomenclature of plant taxa conform to the Special Vascular Plants, Bryophytes, and Lichens List (CDFW 2023b) for special status species and the Jepson eFlora (Jepson Flora Project 2023) for all other taxa.

Any special status plant species observed on the project sites would be mapped Garmin handheld Global Positioning System unit and data would be collected on the number and phenology of individuals (estimated for large populations) and microsite characteristics (e.g., slope, aspect, soil texture, surrounding habitat, and associated species).

Jurisdictional Delineation

Section 404 of the federal Clean Water Act (CWA) and Section 1602 of the *California Fish and Game Code* regulate activities affecting resources under the jurisdiction of the U.S. Army Corps of Engineers

(USACE) and the CDFW, respectively. Waters of the United States (WOTUS) under the jurisdiction of the USACE include navigable coastal and inland waters, lakes, rivers, streams, and their tributaries; interstate waters and their tributaries; wetlands adjacent to such waters; intermittent streams; and other waters that could affect interstate commerce. The CDFW has jurisdictional authority over resources associated with rivers, streams, and lakes. Section 401 of the CWA provides the Regional Water Quality Control Board (RWQCB) with the authority to regulate, through a Water Quality Certification, any proposed federally permitted activity that may affect water quality. The RWQCB also has jurisdiction over isolated wetlands and waters of the State under the Porter-Cologne Water Quality Control Act.

A delineation of jurisdictional water resource boundaries was conducted by Psomas Senior Regulatory Specialist David Hughes and Biologist Trevor Bristle on February 10, 2022, to describe the type and extent of waters regulated by the USACE, the RWQCB, and/or the CDFW within the survey area. Jurisdictional features were mapped on an aerial. Non-wetland waters of the United States under the jurisdiction of the USACE were assessed based on the presence of an Ordinary High Water Mark (OHWM). The presence of wetland waters of the United States was assessed using a three-parameter approach for wetland hydrology, hydrophytic vegetation, and hydric soils, as described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008). It should be noted that the RWQCB shares USACE jurisdiction unless isolated conditions are present. If conditions indicating isolated waters are present, the RWQCB takes jurisdiction using the USACE's definition of the OHWM and/or the three-parameter wetlands methods. The CDFW's jurisdiction is generally defined as the top of the bank of a river, stream, or lake or to the outer limit of riparian vegetation located within or immediately adjacent to the river, stream, or lake. Detailed methods and results can be found in the *Jurisdictional Delineation for the Arroyo Seco Water Reuse and Natural Stream Restoration Project* (Jurisdictional Delineation Report, Psomas 2023b), provided as Attachment B.

SURVEY RESULTS

Vegetation Types and Other Landcovers

The survey area consists of disturbed coast live oak woodland, coast live oak-western sycamore woodland, Peruvian pepper tree – coast live oak woodland, non-native ornamental woodland, disturbed blue elderberry – laurel sumac scrub, non-native grassland, bare ground, disturbed, and developed (Exhibit 5, Vegetation Types and Other Areas) areas. These areas are each described below.

Disturbed Coast Live Oak Woodland

Disturbed coast live oak woodland occurs directly adjacent to trails, channels, and within generally disturbed areas within and near the San Rafael site and within the Arroyo Seco Channel. This vegetation type consists of coast live oak (*Quercus agrifolia*) as the dominant tree, with a mostly closed overstory. Other tree species also occurring include blue elderberry (*Sambucus nigra* ssp. *caerulea*). Understory species include but are not limited to western poison oak (*Toxicodendron diversilobum*), hollyleaf redberry (*Rhamnus ilicifolia*), toyon (*Heteromeles arbutifolia*), dwarf nettle (*Urtica urens*), and foxtail chess (*Bromus madritensis*). This vegetation type corresponds to the *Quercus agrifolia* Woodland Alliance in Sawyer et. al. (2009). It is not considered a sensitive natural community by the CDFW.

Coast Live Oak – Western Sycamore Woodland

Coast live oak – western sycamore woodland occurs on the south end of the Project, along the edges of the San Pascual site. This vegetation type consists mostly of areas with mature coast live oaks and Western sycamore (*Platanus racemosa*) trees with a closed canopy. Other tree species also occurring include blue elderberry, black willow (*Salix gooddingii*), toyon (*Heteromeles arbutifolia*), and shamel ash (*Fraxinus uhdei*). The understory is relatively sparse with species such as but not limited to mule fat (*Baccharis salicifolia* ssp. *salicifolia*), sisymbrium (*Sisymbrium* sp.), bitter gooseberry, common horehound (*Marrubium vulgare*), toyon, and brome. This vegetation type corresponds to the *Platanus racemosa - Quercus agrifolia* Alliance in Sawyer et. al. (2009). It is considered a sensitive natural community by the CDFW.

Peruvian Pepper Tree – Coast Live Oak Woodland

Peruvian pepper tree – coast live oak woodland occurs along the eastern edge of survey area, adjacent to the Arroyo Channel and opposite the San Rafael site. This vegetation type consists mostly of areas with large Peruvian pepper trees and coast live oaks with a closed canopy. Other tree species also occurring include blue elderberry. The understory is relatively sparse with species such as, but not limited to, mule fat (*Baccharis salicifolia* ssp. *salicifolia*), sisymbrium (*Sisymbrium* sp.), bitter gooseberry, common horehound (*Marrubium vulgare*), toyon, and brome.

This vegetation type does not correspond to a named alliance or association in Sawyer et. al. (2009). Its composition is similar to the California Sycamore – coast live oak riparian woodlands, though the cover of coast live oak is less than the required cover (i.e., greater than 50 percent) for that alliance. Since the alliance is not considered a sensitive natural community by the CDFW, the Peruvian pepper tree – coast live oak woodland within the survey area is not considered sensitive.

Disturbed Blue Elderberry – Laurel Sumac Scrub

Disturbed blue elderberry – laurel sumac scrub occurs in the north side of the survey area throughout the San Rafael site west of San Rafael Creek, in open areas to the west of the Creek that show signs of past disturbance and maintenance, and along the western edge of the survey area adjacent to the Arroyo Seco Channel. These areas are dominated by laurel sumac (*Malsoma laurina*) and blue elderberry with an open canopy. The understory is sparse, but some co-occurring species include California sagebrush, toyon, and horehound.

This vegetation type does not correspond to a named alliance or association in Sawyer et. al. (2009). Its composition is similar to the *Malosma laurina* Shrubland Alliance, though the cover of laurel sumac is less than the required cover (i.e., greater than 50 percent) for this alliance. Since this alliance is not considered a sensitive natural community by the CDFW, the disturbed blue elderberry – laurel sumac scrub within the survey area is not considered sensitive.

Non-Native Grassland

Non-native grassland occurs in a small strip in the northeastern corner of the survey area. This vegetation type is dominated by brome. This vegetation type corresponds to the *Bromus rubens – Schismus (arabicus, barbatus)* Herbaceous Semi-Natural Alliance in Sawyer et. al. (2009). Being dominated by a non-native species, it is not considered a sensitive natural community by the CDFW.

Non-Native Ornamental Woodland

Non-native ornamental woodland consists of areas with non-native ornamental landscaped trees and occurs in linear areas in the Arroyo Seco Channel and throughout the central portion of the San Pasqual site. In the survey area, this vegetation type includes trees such as Brazilian pepper tree, eucalyptus, Mexican fan palm, Chinese elm, carob, shamel ash, and chitalpa.

Bare Ground

Bare ground consists of undeveloped areas devoid of any vegetation. Bare ground areas in the survey area includes the unpaved trails on either side of the Arroyo Seco Channel.

Disturbed

Disturbed areas show signs of past disturbance and are unvegetated or contain sparse weedy vegetation. Disturbed areas in the survey area occur at the intersection of San Pascual Avenue and Stoney Drive adjacent to the channel at the northeast corner of the San Pasqual site.

Developed

Developed areas in the survey area consist of paved roads and highways, buildings and structures, and concrete flood control facilities (i.e., Arroyo Seco Channel and San Rafael Creek). One additional developed area, the concrete bridge over San Rafael Creek, is not reflected because it located under the adjacent woodland canopy at the San Rafael site.

A discussion of individual tree resources, separate from vegetation types, is provided in impacts section further below and reflected on Exhibits 6a and 6b, Tree Locations.

Jurisdictional Resources

As previously described, the survey area encompasses the two discrete Project sites, construction staging areas, and adjacent areas which are divided into three general sub-areas for ease of reference. These sub-areas include: (1) the San Rafael area at the northern end of the survey area, which consists of a concrete-lined drain that conveys water from adjacent residential areas located northwest of the survey area and drain into the Arroyo Seco; (2) the Arroyo Seco Channel, which consists of the concrete-lined channel extending between the Project site along with an adjacent a dirt trail than runs along the eastern bank adjacent to the San Pascual Stables; and (3) the San Pascual area, a densely vegetated area that accepts flows diverted from the Arroyo Seco Channel through existing infrastructure and is located immediately northwest of Arroyo Park. Within the survey area, an interconnected drainage system flows downstream from San Rafael Creek and from the Arroyo Seco Channel and exits in part via an existing diversion into the San Pasqual site and in part continuing downstream through the Arroyo Seco Channel. This drainage system is shown on Exhibits 7a and 7b, Jurisdictional Resources. A summary of these resources within the survey area is provided in Table 1.

TABLE 1
SUMMARY OF JURISDICTIONAL RESOURCES IN THE SURVEY AREA

Survey Area	Latitude/Longitude (decimal degrees)		Feature Length (lf)	OHWM Width Range (feet)	USACE Jurisdiction (acres)		RWQCB Jurisdiction (acres)		CDFW Jurisdiction (acres)
	Upstream End	Downstream End			Wetland	Non-Wetland	Wetland	Non-Wetland	
San Rafael Creek Area	34.125844°, -118.166938°	34.124887°, -118.166877°	405	6–10	0.000	0.098	0.00	0.098	0.098
Arroyo Seco Channel	34.125528°, -118.166729°	34.119197°, -118.167141°	2,730	40–50	0.000	2.604	0.00	2.604	3.018
San Pascual Area	34.121016°, -118.167599°	34.119819°, -118.167001°	580	5–36	0.064	0.219	0.064	0.221	1.798
				Totals	**0.064**	**2.921**	**0.064**	**2.923**	**4.914**

OHWM: Ordinary High Water Mark; USACE: U.S. Army Corps of Engineers; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife; lf: linear feet

Three sampling points were assessed for the presence of hydrophytic vegetation, hydric soils, and wetland hydrology. All three points were located within the San Pascual site as it was the only portion of the survey area that contained an earthen-bottom drainage feature. One of these points, located at the southern end of the San Pascual site, was determined to meet the criteria of wetland conditions. The additional two sampling points, located upstream within the site, did not meet the criteria for wetland conditions.

Wildlife Habitat

The survey area provides moderate quality habitat for wildlife. There are patches of vegetation with a high percentage of native plant species as well as some connectivity between patches and further up- and downstream; however, the presence of routine human intrusion into the area on trails and within surrounding urban development decreases the wildlife value relative to more undisturbed areas. The lack of habitat in the area in general, relegates the habitat on the sites as higher value to some degree due to limited availability locally.

No fish species were observed during the biological resource surveys on the sites and the drainages in the survey area provide minimal habitat for fish due to the limited amount, depth of surface water present, and the isolated nature of the drainages in the survey area. During storm events and/or releases from Devil's Gate Dam located approximately 4.5 miles upstream of the survey area, fish may pass through the Arroyo Seco. No native fish breeding habitat occurs in the survey area. Fish species that may occur include, but are not limited to, common species such as the non-native, historically stocked, rainbow trout (*Onocorhynchus mykiss*); green sunfish (*Lepomis cyanellus*); and western mosquitofish (*Gambusia affinis*).

No amphibian species were observed during the biological survey. Common species that may occur include black-bellied slender salamander (*Batrachoseps nigriventris*), garden slender Salamander (*Batrachoseps major major*), California toad (*Anaxyrus boreas halophilus*), and Baja California treefrog (*Pseudacris hypochondriaca*).

One reptile species was observed during the survey, the common side-blotched lizard (*Uta stansburiana*). Other common species that may occur include western fence lizard (*Sceloporus occidentalis*), western skink (*Plestiodon skiltonianus*), southern alligator lizard (*Elgaria multicarinata*), California kingsnake

(*Lampropeltis californiae*), gopher snake (*Pituophis catenifer*), and southern Pacific rattlesnake (*Crotalus oreganus helleri*).

Bird species observed on or adjacent to the survey area include mourning dove (*Zenaida macroura*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), acorn woodpecker (*Melanerpes formicivorus*), Nuttall's woodpecker (*Picoides nuttallii*), California scrub-jay (*Aphelocoma californica*), oak titmouse (*Baeolophus inornatus*), bushtit (*Psaltriparus minimus*), common raven (*Corvus corax*), California thrasher (*Toxostoma redivivum*), northern mockingbird (*Mimus polyglottos*), house finch (*Haemorhous mexicanus*), lesser goldfinch (*Spinus psaltria*), spotted towhee (*Pipilo maculatus*), California towhee (*Melozone crissalis*), song sparrow (*Melospiza melodia*), and yellow-rumped warbler (*Setophaga coronata*). Other common bird species that may occur include black phoebe (*Sayornis nigricans*), Bewick's wren (*Thryomanes bewickii*), and Anna's hummingbird (*Calypte anna*)

One mammal species was observed during the survey, the California ground squirrel (*Otospermophilus beecheyi*). Other common species that may occur include but are not limited to Botta's pocket gopher (*Thomomys bottae*), common raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), bobcat (*Lynx rufus*), and coyote (*Canis latrans*). Common bat species with potential to forage in the survey area include canyon bat (*Parastrellus hesperus*).

Wildlife Movement

Within large open space areas where few or no man-made or naturally occurring physical constraints to wildlife movement are present, wildlife corridors may not yet exist. However, once open space areas become constrained and/or fragmented as a result of urban development or the construction of physical obstacles (e.g., roads and highways), the remaining landscape features or travel routes that connect the larger open space areas become corridors as long as they provide adequate space, cover, food, and water and do not contain obstacles or distractions (e.g., man-made noise, lighting) that would generally hinder wildlife movement.

The survey area is located at the urban-wildland interface. Residential development, stables, community parks, parking lots, roadways, and flood control facilities surround the area. Within the survey area, vehicular use is low and pedestrian, bicyclist, and/or equestrian use is moderate to high in some areas and low in others. Vehicular use is typically restricted to maintenance vehicles along the channel and pedestrian use is mainly limited to the walkways east and north within the survey area.

Wildlife movement through the survey area consist largely of species common in urban or suburban landscapes such as common birds and flying invertebrates, reptiles, and amphibians able to persist in small habitat patches and within developed lands as well as mammals such as coyote, common raccoon, striped skunk, and Virginia opossum, among others. Regional movement for these species may occur to a greater degree along green belts such as the Arroyo Seco but movement is also expected to occur throughout the suburban landscape. Therefore, the survey area is not expected to support a critical regional movement pathway for any local native species.

Special Status Vegetation Types

The CDFW Vegetation Classification and Mapping Program provides a list of vegetation Alliances, Associations, and Special Stands that are considered "Sensitive Natural Communities" based on their rarity and threat (CDFW 2022d). Information on rarity is based on the range and distribution of a given type of vegetation, and the proportion of occurrences that are of good ecological integrity. Threats and trends are considered in categories like residential and commercial development; agriculture, energy production, and mining; and invasive and other problematic plant species. One vegetation type present in the survey area, coast live oak – western sycamore woodland, is considered sensitive by the CDFW.

Special Status Plant and Wildlife Species

Plants or wildlife may be considered "special status" due to declining populations, vulnerability to habitat change, or restricted distributions. Certain special status species have been listed as Threatened or Endangered under the State and/or Federal Endangered Species Acts.

Special Status Plants

Fifty special status plant species have been reported in the vicinity of the survey area (CNPS 2023; CDFW 2023a) [summarized in Table 1 of the *Focused Special Status Plant Survey Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project* (Special Status Plant Survey Report, Psomas 2023c)].

Of the 50 species reported from the literature review, 10 species are federally and/or State-listed Endangered, Threatened, or are candidates for listing: Braunton's milk-vetch (*Astragalus brauntonii*), Santa Susana tarplant (*Deinandra minthornii*), Agoura Hills dudleya (*Dudleya cymose ssp. Agourensis*), marcescent dudleya (*Dudleya cymose ssp. Marcescens*), Santa Monica dudleya (*Dudleya cymose ssp. Ovatifolia*), conejo dudleya (*Dudleya parva*), Verity's dudleya (*Dudleya verity*), conejo buckwheat (*Eriogonum crocatum*), California Orcutt grass (*Orcuttia californica*), and Lyon's pentachaeta (*Pentachaeta lyonia*). None of these species has potential to occur within the survey area either due to lack of suitable habitat or because the survey area is outside the known range.

In addition to species formally listed by the resource agencies, 20 species reported in the vicinity of the survey area have a California Rare Plant Rank (CRPR). One list 4.3 species, club-haired mariposa lily (*Calochortus clavatus* var. clavatus), and one list 4.2 species, Plummer's mariposa-lily (*Calochortus plummerae*), have limited potential to occur due to the presence of marginally suitable habitat. One list 4.2 species, southern California black walnut, has potential and is known to occur near the survey area. The remainder of these 20 species do not have potential to occur in the survey area due to a lack of potentially suitable soils or habitat. Focused special status plant survey results identified only one species, California black walnut, occurring within the project vicinity. This individual is located adjacent to the survey area boundary near the San Rafael site (Psomas 2023c). Exhibits 6a and 6b, Tree Locations, shows the location and type of all trees surveyed within the survey area.

Special Status Wildlife

A total of 24 special status wildlife species have been reported in the vicinity of the survey area (CDFW 2023a). Of the species reported from the literature review, six species are federally and/or State-listed Endangered or Threatened or are candidates for listing: southwestern willow flycatcher (*Empidonax traillii extimus*), coastal California gnatcatcher (*Polioptila californica californica*), southern mountain yellow-legged frog (Rana muscosa), bank swallow (*Riparia riparia*), least Bell's vireo (*Vireo bellii pusillus*), and Crotch bumble bee (*Bombus crotchii*). Marginally suitable habitat for bank swallow is present within the survey area. The remaining species are not expected to occur in the survey area due to lack of suitable habitat.

In addition to species formally listed by the resource agencies, 13 special status species (i.e., California Species of Special Concern) have been reported near the survey area. Six of these species – big free-tailed bat (*Nyctinomops macrotis*), western yellow bat (*Lasiurus xanthinus*), western mastiff bat (*Eumops perotis californicus*), pallid bat (*Antrozous pallidus*), Southern California legless lizard (*Anniella *stebbinsi*), and coast range newt (*Taricha tarosa*) – have potential to occur in the survey area due to the presence of potentially suitable or marginally suitable habitat. The remaining seven species are not expected to occur in the survey area due to lack of suitable habitat.

Critical Habitat

Critical Habitat is designated by the USFWS for the survival and recovery of species listed as Threatened or Endangered under the Federal Endangered Species Act (FESA). Areas designated as Critical Habitat include the physical or biological features that are essential to the survival and eventual recovery of that species. The survey area does not include any designated or proposed Critical Habitat areas for any species.

PROJECT IMPACTS

To evaluate the potential impacts on biological and jurisdictional water resources, it is necessary to understand the various Project components and whether their effects are direct or indirect and/or temporary or permanent. Exhibits 5, 6a-b, and 7a-b illustrate both the survey area and the Projects limits of disturbance (i.e., construction footprint) and staging areas. For the San Rafael site, four separate, irregularly-shaped, areas at the Project footprint boundary have been identified for staging and collectively encompass 0.30 acre. For the San Pascual site, the paved parking lot with approximately 18 spaces that serves the adjacent ballfields in the southeast corner of the San Pascual Avenue and Stoney Drive, in South Pasadena, has been identified as a staging and laydown area. The staging area at the San Pascual site encompasses 0.25 acre. The following impact analysis considers the extent of adverse effects within the Project's disturbance footprint (i.e., permanent impact area) and staging areas (i.e., temporary impact area).

As discussed further below, the Project's implementation would have no net effect on biological or jurisdictional water resources because: (1) they would not represent any permanent conversions from native to non-native vegetation/unvegetated landcover, (2) because the effects are temporary, and/or (3) recommended measures would reduce impacts to less than significant.

Vegetation Types and Other Areas

The Project would temporarily and permanently impact a variety of vegetation types. However, most of these impacts, at both the San Rafael and San Pascual sites, are either minimal in extent (under one acre of an individual vegetation type) or would affect degraded and/or non-native/ornamental vegetation or unvegetated areas. Acreage of impacts from both temporary and permanent are listed in Table 2, Summary of Impacts to Vegetation Types and Other Areas, below.

TABLE 2
SUMMARY OF PROPOSED IMPACTS
TO VEGETATION TYPES AND OTHER AREAS

Vegetation Type	San Rafael Site Impacts (acres)		San Pascual Site Impacts (acres)		Total Impacts (acres)	
	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent
Disturbed coast live oak woodland	0.00	0.066	0.00	0.00	0.00	0.066
Coast live oak – western sycamore woodland	0.00	0.00	0.00	1.234	0.00	1.234
Peruvian pepper tree – coast live oak woodland	0.00	0.00	0.00	0.00	0.00	0.00
Non-native ornamental woodland	0.00	0.00	0.00	0.705	0.00	0.705
Disturbed blue elderberry – laurel sumac scrub	0.143	1.288	0.00	0.00	0.143	1.288
Non-native grassland	0.00	0.00	0.00	0.00	0.00	0.00
Bare ground	0.098	0.056	0.00	0.00	0.098	0.056
Developed	0.011	0.009	0.25	0.133	0.261	0.142
Disturbed	0.00	0.00	0.00	0.137	0.00	0.137
TOTALS	**0.252**	**1.419**	**0.25**	**2.209**	**0.502**	**3.628**

In the San Pascual site, 1.23 acres of coast live oak-western sycamore woodland (a CDFW sensitive vegetation type) would also be impacted. However, these Project impacts are associated with the removal of non-native species and installation of additional native plants representative of this vegetation type. The Project is expected to result in a net benefit to coast live oak-western sycamore woodland vegetation and improve habitat functions and values for native species of the region. Therefore, Project impacts on vegetation types and other areas would be considered less than significant.

Jurisdictional Areas

The proposed modifications include modifying the side wall and channel bottom of the San Rafael Creek to divert water into water treatment wetlands in areas that are currently uplands. The greater extent of Project-related impacts would occur at the San Pascual site, which would be regraded to accommodate proposed facilities to treat water diverted from the Arroyo Seco Channel for subsequent re-use. Impacts to these jurisdictional areas are discussed further below and are shown on Exhibits 7a and 7b.

Impacts to USACE WOTUS would result from creating a diversion structure within San Rafael Creek. This would be a permanent impact to WOTUS, though it would not affect flows to downstream waters other than a beneficial impact through improving the quality of the water flowing into the Arroyo Seco Channel from the San Rafael Creek drainage area. Permanent impacts to WOTUS would occur in the San Pascual site from grading activities and vegetation removal to construction the proposed facilities. A summary of Project impacts related to WOTUS is provided in Table 3.

TABLE 3
SUMMARY OF PROPOSED IMPACTS TO "WATERS OF THE U.S."

Agency	Impact Type	Impacts (acres)			Total
		San Rafael Site	Arroyo Seco Channel	San Pascual Site	
Wetlands					
USACE	Existing	0.000	0.000	0.064	**0.064**
	Permanent	0.000	0.000	0.064	**0.064**
	Temporary	0.000	0.000	0.000	**0.000**
Non-wetland waters					
USACE	Existing	0.098	2.604	0.219	**2.921**
	Permanent	0.001	0.000	0.219	**0.220**
	Temporary	0.000	0.000	0.000	**0.000**
USACE: U.S. Army Corps of Engineers					

Impacts to RWQCB "waters of the State" largely mirror those of WOTUS. The construction of a diversion structure is considered a permanent impact to the unvegetated concrete-lined San Rafael Creek. The Project proposes a concrete cap or bridge over San Rafael Creek. While the USACE regulates only discharges to jurisdictional waterways, the RWQCB typically considers the installation of structures that cover channels (such as the concrete cap/bridge over the San Rafael Creel) to be a permanent, though indirect, impact because it may have an impact on water quality. Impacts to jurisdictional "waters of the State" slightly exceed those of WOTUS at the San Pascual site because the basin includes an existing side channel that drains adjacent upland areas into the San Pasqual site. This side channel is not considered WOTUS but still falls under the jurisdiction of the Los Angeles RWQCB as an isolated feature. A summary of Project impacts related to "waters of the State" under the jurisdiction of the Los Angeles RWQCB is provided in Table 4.

TABLE 4
SUMMARY OF PROPOSED IMPACTS TO
LOS ANGELES RWQCB "WATERS OF THE STATE"

Agency	Impact Type	Impacts (acres)			Total
		San Rafael Creek	Arroyo Seco Channel	San Pascual Basin	
Wetlands					
RWQCB	Existing	0.000	0.000	0.064	**0.064**
	Permanent	0.000	0.000	0.064	**0.064**
	Temporary	0.000	0.000	0.000	**0.000**
Non-wetland Waters					
RWQCB	Existing	0.098	2.604	0.221	**2.923**
	Permanent	0.008	0.000	0.221	**0.229**
	Temporary	0.000	0.000	0.000	**0.000**
RWQCB: Regional Water Quality Control Board					

Impacts to CDFW jurisdictional waters would result from modifications to San Rafael Creek for the creation of the diversion structure to allow water to reach the proposed treatment wetlands. The proposed construction of the concrete cap/bridge over San Rafael Creek would likely not be considered as an impact by the CDFW because there is no aquatic habitat in the concrete channel to be affected. A summary of Project impacts to CDFW jurisdictional areas is provided in Table 5.

TABLE 5
SUMMARY OF PROPOSED IMPACTS TO
CDFW JURISDICTIONAL WATERS

Agency	Impact Type	Impacts per Project Area (acres)			Total
		San Rafael Creek	Arroyo Seco	San Pascual Basin	
CDFW	Existing	0.098	3.018	1.798	**4.914**
	Permanent	0.001	0.000	1.617	**1.618**
	Temporary	0.000	0.000	0.000	**0.000**
CDFW: California Department of Fish and Wildlife					

As impacts to jurisdictional waters would result from the Project, as described for each agency above, the Project would acquire jurisdictional permits pursuant to the Clean Water Act prior to any impacts on jurisdictional resources. Pasadena must ensure implementation of and compliance with all measures required by the RWQCB, ACOE, and CDFW permits. Compensatory mitigation may include restoration (i.e., reestablishment or rehabilitation), establishment (i.e., creation), enhancement, and/or preservation of jurisdictional resources. Compensatory mitigation may occur through permittee-responsible mitigation, payment to an in-lieu fee program, or purchase of compensatory mitigation credits from an approved mitigation bank. As part of the required permitting process, mitigation ratios (i.e., the amount of mitigation acreage compared to the amount of impacted habitat) would be negotiated with the regulatory agencies with a minimum 1:1 replacement of impacted jurisdictional resources with jurisdictional resources of equivalent or higher quality habitat value.

A temporary bridge would span the Arroyo Seco Channel to have access to the San Rafael site that would accommodate the potential weight of all anticipated construction vehicles. The abutments on either side of the temporary bridge would not touch the limits of the Channel itself. Therefore, there would be no impacts to jurisdictional features related to the temporary bridge at the San Rafael site.

Further details related to USACE, RWQCB, and CDFW jurisdictional impacts can be found in the Jurisdictional Delineation Report (Psomas 2023b).

Wildlife Movement

Implementation of the Project components would not create any additional constraints to wildlife movement and local wildlife are expected to move throughout the Project sites and surrounding areas in a similar manner to existing conditions. Therefore, impacts on wildlife movement would be considered less than significant.

Special Status Plant Species

No impacts on federally or State listed, or CRPR 1B or 2B plant species are expected to occur. Impacts on species with a CRPR of 3 or 4 are not typically considered constraints on development.

One CRPR list 4.2 species that occurs within the survey area, southern California black walnut, is not expected to be impacted as it is immediately outside the southwest boundary of the San Rafael site and staging area (see Exhibit 7a). Although Project construction and operational activities are expected to have no impact on special status plant species, protective measures are recommended to ensure avoidance of the southern California black walnut and other biological resources. Implementation of Mitigation Measure 1 would ensure potential impacts on special status plants are reduced to a less than significant level.

Special Status Wildlife Species

No impacts on federally or State listed species are expected to occur. Although several other special status wildlife species may occur within the Project sites, they are only expected to occur temporarily while passing through the area and not sheltering from prey, breeding, or roosting within these areas. Therefore, Project construction and operational activities are expected to have no impact on special status wildlife species.

OTHER CONSIDERATIONS

Protected Trees

As described above, the Project would pass through three cities that regulate impacts to trees: Pasadena, South Pasadena, and Los Angeles. The boundaries of these cities are represented on Exhibits 6a and 6b, Tree Locations. Additionally, CDFW regulates the removal of native trees associated with stream channels. The following is a summary of how each jurisdiction addresses tree preservation and removal. Detailed tree data is located within the Tree Report (Psomas 2023a).

City of Pasadena

Trees that are regulated by the City of Pasadena are described in Chapter 8.52 of the Pasadena Municipal Code, hereinafter referred to as the Pasadena Tree Ordinance. Under the Pasadena Tree Ordinance, removal of or injury to any protected trees requires a permit from Pasadena. Protected trees include native trees that have a trunk diameter at breast height (dbh) of at least 8 inches and various other non-native "specimen" trees of varying minimum sizes as provided in the Pasadena Tree Ordinance. The Pasadena Tree Ordinance also protects any tree designated as a "landmark" tree (trees having significant cultural or historical importance). Native trees that are specified in the Pasadena Tree Ordinance include California buckeye (*Aesculus californica*), white alder (*Alnus rhombifolia*), Southern California black walnut (*Juglans californica*), native oaks (coast live oak [*Quercus agrifolia*], scrub oak [*Q. berberidifolia*], canyon oak [*Q. chrysolepis*], Engelmann oak [*Q. engelmannii*], and valley oak [*Q. lobata*]), western sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremonttii*), black cottonwood (*Populus trichocarpa*), arroyo willow (*Salix lasiolepis*), and California bay laurel (*Umbellularia californica*). Replacement requirements under the Pasadena Tree Ordinance are determined on a case-by-case basis by a matrix in which the quantity of replacement trees to be required is based on the size of trees to be removed and the size of trees that are subsequently planted. A total of 6 trees would be removed that fall under the City of Pasadena's jurisdiction.

City of South Pasadena

The City of South Pasadena regulates impacts to "protected trees" that are defined in Section 34.1 of the South Pasadena Municipal Code, hereafter referred to as the South Pasadena Tree Ordinance. Protected trees include heritage trees (historically significant trees as determined by the City of South Pasadena); any tree species with a dbh of 12 inches or more; any oak tree species with a minimum dbh of 4 inches;

all native tree species with minimum dbh of 4 inches; and shrubs that are at least 16 feet tall with a single trunk that has a dbh of 4 inches or more. Replacement trees requirements are based on a matrix that is similar to the procedure used by the City of Pasadena. A total of 117 trees would be removed that fall under the City of South Pasadena's jurisdiction.

City of Los Angeles

The City of Los Angeles regulates trees that are designated as "protected trees" as defined by Section 17.02 of the Los Angeles Municipal Code, hereafter referred to as the Los Angeles Tree Ordinance. This category includes all native oak trees, Southern California black walnuts, western sycamores, California bay laurels, toyon (*Heteromeles arbutifolia*), and blue elderberry (*Sambucus nigra* ssp. *caerulea*) that have a minimum trunk dbh of 4 inches. Additionally, the City of Los Angeles requires that all non-protected trees with a minimum dbh of 8 inches are documented. A total of 14 trees would be removed that fall under the City of Los Angeles' jurisdiction.

California Department of Fish and Wildlife

Many trees on the survey area are also subject to regulation by the *California Fish and Game Code*. The CDFW is charged with issuing Streambed Alteration Agreements that would allow for the removal of native tree species that occur within the bed, channel, or bank of any river, stream, or lake. The minimum size requirement for regulation by the CDFW is two inches dbh. Mitigation/replacement ratios for trees within CDFW jurisdiction is based on the size of the tree dbh (i.e., mitigation ratios increase as the size of the impacted tree increases). It should be noted that many trees on the survey area are subject to regulation by both the various city tree ordinances described above and the *California Fish and Game Code.*

A total of 40 trees would be removed or encroached upon that fall under the CDFW's jurisdiction within the riparian habitat identified as part of this assessment(13 of these trees are toyon and blue elderberry that CDFW often considers as large shrubs and may not require compensatory mitigation). The project would acquire appropriate jurisdictional approval from the cities of Pasadena, South Pasadena, and Los Angeles, as applicable, prior to tree removal or trimming. As discussed in Section 1.0 of this IS/MND, it is anticipated that 3 of the removed trees would be solely under CDFW jurisdiction (i.e., trees that do not overlap removals regulated by the cities. The precise number of replacement trees would be dependent on negotiation with the CDFW during the Clean Water Act permitting process, subsequent to the CEQA process.

Summary of Tree Impacts

A total of 195 trees or shrubs (shrubs of a scale or trunk size, dependent on species, that are considered trees) (hereinafter collectively referred to solely as trees) were surveyed within the San Rafael and San Pascual sites as being under the jurisdiction of either Pasadena, South Pasadena, or Los Angeles. Of these, a total of 142 trees, including 42 protected trees (i.e., subject to respective city tree ordinances), would be removed or would experience encroachment. Tree encroachment is assumed to result in a tree loss and is therefore considered as an impact. However, in reality, encroachment may or may not result in a tree loss or other negative outcomes. Most of the affected trees are located at the San Pascual site, which has dense existing vegetation. The remaining 53 trees would be protected in place during construction.

Table 6 provides the number of existing trees, total proposed tree removals, total protected tree removals, and required tree replacements broken down by each city within the Project site but not including trees under CDFW jurisdiction.

TABLE 6
SUMMARY OF TREE REMOVALS AND REPLACEMENTS

Jurisdiction	Existing Trees within Site	Total Tree Removals	Protected Tree Removals	Required Tree Replacements
San Rafael Site				
Pasadena	29	6	6	20
San Pascual Site				
South Pasadena	141	121	27	128
Los Angeles	25	15	9	36
San Pascual Subtotals	*166*	*136*	*36*	*164*
Project Totals	***195***	***142***	***42***	***184***
Source: Psomas				

Based on application of each city's tree ordinance, the Project is expected to require a total of 184 replacement trees in various sizes ranging from 15-gallon to 36-inch boxes. Additionally, based on anticipated removal of 3 trees under CDFW jurisdiction that do not overlap removals identified for the cities (i.e., would only be regulated by CDFW) an additional 9 replacement trees are expected to be required as part of Clean Water Act permitting, specifically the Streambed Alteration Agreement. This results in an estimated tree replacement total of 193 trees.

As shown in Table 6, there were total of 195 existing trees surveyed within the Project sites. The Project's landscape concept proposes to plant a total of 193 native trees as well as native shrubs and groundcovers as part of landscaping activities. This would result in an estimated net total of 246 trees on the San Rafael and San Pascual sites, in addition to new native understory (i.e., shrubs and groundcover) plantings. No trees or other vegetation would be removed or trimmed as part of water harvester installation. These figures are estimated and would be finalized as part of permitting processes with the affected agencies. However, all required tree replacements to fully meet each agency's requirements would be planted and would be located within the San Rafael and San Pascual sites.

Nesting Raptors

Raptor species (i.e., birds of prey) have the potential to nest within mature trees in and adjacent to the Project sites and their nests may be impacted by Project implementation. If construction activities occur during the raptor nesting season (i.e., generally February 1 to June 30), the loss of an active nest of any raptor species, including common raptor species, would be considered a violation of Sections 3503, 3503.5, and 3513 of the *California Fish and Game Code*. Therefore, Project impacts on nesting raptors would be considered potentially significant. Implementation of Mitigation Measure No. 4 is recommended to reduce the impacts to less than significant.

Nesting Birds

The federal Migratory Bird Treaty Act (MBTA) protects migratory birds and their nests and eggs, both common and special status. Bird species protected under the provisions of the MBTA are identified by the List of Migratory Birds (50 *Code of Federal Regulations* [CFR] §10.13, as amended). Birds have the potential to nest in the vegetation in the survey area, and their nests may be impacted by the Project. In addition to the MBTA, Sections 3503 and 3503.5 of the *California Fish and Game Code* protect nesting migratory birds and raptors. Impacts to nesting birds, both on and adjacent to the Project site, would be considered a significant impact prior to mitigation. Therefore, if Project construction, on either site, is initiated during the typical breeding season for nesting birds (i.e., February 1 to September 15) and nesting raptors (i.e., as early as January 1 for some raptors to June 30), MM BIO-3 requires a pre-construction nesting bird/raptor survey to ensure compliance with the MBTA and describes the process for protecting any active nests identified while construction is ongoing. If construction activities are initiated during the non-breeding season, implementation of Mitigation Measure 3 would not be required and there would be no potential impact to nesting birds and raptors.

Roosting Bats

Several bat species may forage throughout the Project sites and roost in mature trees or under bridges. However, large roosting colonies have not been documented on or near the Project sites and are not expected to occur. Impacts on individual roosting bats, or small colonies (i.e., less than ten individuals), are a potential constraint on development. Indirect impacts on individual roosting bats or small colonies may occur with Project implementation and may result in bats avoiding the site temporarily. Therefore, the Project would implement Mitigation Measure 4, which requires a two-step tree removal process to prevent bat mortality.

Noise

During active construction, temporary noise impacts have the potential to disrupt foraging, nesting, roosting, and/or denning activities for a variety of wildlife species. Construction noise could deter wildlife from using habitat located adjacent to construction activity. This impact would be considered adverse but would not be considered a significant impact because a substantial amount of similar conditions are present in the vicinity of the Project sites where the animals may disperse. Following construction, the ambient noise levels adjacent to the Project sites are not expected to increase above current conditions. The Project impacts from temporary increases in noise levels are, therefore, expected to be less than significant.

RECOMMENDATIONS

Based on the impacts assessment described above, the following mitigation measures are recommended to reduce impacts to a level of less than significant:

1. Biological Monitoring. Prior to initiation of Project construction activities, a qualified Biologist shall ensure the limits of construction are clearly marked in the field in the vicinity of natural resources, such as the California black walnut situated near the San Rafael site and jurisdictional drainages, to avoid impacts to special status natural resources being protected in place during construction. Field marking shall include 4-foot high, orange, construction safety fencing (snow fencing) staked at sufficient intervals to prevent failure. Safety fencing shall be maintained throughout the construction phase by the Contractor and replaced or moved as needed. The biologist shall monitor work activities on the first day of construction, during all vegetation removal, and on an as-needed basis thereafter.

2. Trees. All trees to be preserved on-site during the construction process shall have the following measures implemented:

   Prior to initiation of construction activities, protective fencing shall be placed around the critical root zone (five feet outside the outer canopy) of all trees that are in the Project construction area and are intended to remain in place. No ground disturbance or storage of construction materials should occur within the critical root zone during construction.

A Certified Arborist shall be retained to monitor construction activities of any ground disturbance planned within or adjacent to the critical root zone for any tree to be preserved during construction.

3. Nesting Birds/Raptors. The Project shall be conducted in compliance with the conditions set forth in the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code with methods approved by the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) to protect active bird/raptor nests. To avoid impacts on active nests for common and special status birds and raptors, no vegetation removal or ground-disturbing activities shall occur during avian breeding season which generally runs from February 1 through September 15 (as early as January 1 for some raptors). The applicant shall schedule vegetation clearing during the non-breeding season (i.e., September 16 to December 31) to the extent feasible. If Project timing requires that vegetation clearing occur between February 1 and September 15, the applicant or its designee shall retain a qualified Biologist to conduct a pre-construction survey for nesting birds and raptors. The pre-construction survey shall be conducted by a qualified Biologist within three days prior to vegetation clearing. The pre-construction nesting bird survey area shall include the Project impact area (i.e., disturbance footprint) plus a 250-foot buffer to search for nesting birds and a 500-foot buffer to search for nesting raptors. If no active nests are found, no further mitigation would be required.

   If an active nest is located in the pre-construction nesting bird survey area, the Biologist shall delineate an appropriate buffer to protect the nest based on the sensitivity of the species. A minimum 300-foot no disturbance buffer shall be used around each active bird nest. A protective buffer of 500 feet shall be used to protect nesting raptors and 0.5 mile for special status species (e.g., California Endangered Species Act [CESA]-listed), if feasible. If appropriate, a smaller buffer may be considered around active nests that are not considered special status species (e.g., CESA-listed). Adjustments to the buffer size may be based on site topography, existing disturbance, sensitivity of the individuals (established by observing the individuals at the nest), and the type of construction activity. Personnel working on the Project, including all contractors working on site, shall be instructed on the presence of nesting birds, area sensitivity, and adherence to no-disturbance buffers. No construction activities shall be allowed in the designated buffer until the Biologist determines that nesting activity has ended. Construction may proceed within the buffer once the Biologist determines that nesting activity has ceased (i.e., fledglings have left the nest or the nest has failed). The designated buffer will be clearly marked in the field and will be mapped as Environmentally Sensitive Areas (ESAs) on construction plans.

   Prior to the initiation of construction activities, an email summary of the results shall be submitted to Pasadena with a map of any active nests found and their designated buffers. Construction shall be allowed to proceed if appropriate buffer distances are employed for all active nests. The Biologist shall then prepare a formal Letter Report describing methods used, results of the survey, recommended buffers, and/or justification for buffer reductions. The Letter Report shall be submitted to Pasadena within one week of completion of the survey. If an active nest is observed during the survey, the Letter Report shall include a map showing the designated protective buffer.

4. Bats. A two-step tree removal process shall be implemented to prevent bat mortality. Prior to tree removal, a qualified biologist shall conduct a pre-construction bat habitat assessment. If the tree potentially supports roosting bats, at the direction of the biologist, some level of disturbance (such as trimming of lower branches of trees) shall be applied three days prior to removal to allow bats to escape. The trees shall be removed on day three (i.e., there shall be no less or more than two nights between initial disturbance and the tree removal). On each of the three days of the tree removal process, the tree to be removed will be visually inspected by a qualified biologist to confirm no bats are roosting immediately prior to removal.

If you have any questions or comments, please contact Marc Blain at 626.351.2000.

Sincerely,

PSOMAS

Ann M. Johnston
Vice President, Resource Management

Marc T. Blain
Senior Project Manager

Enclosures: Exhibit 1 – Regional Location and Local Vicinity
Exhibit 2 – U.S. Geological Survey Quadrangle Topographic Map
Exhibit 3 – Survey Area
Exhibit 4 – Soils Map
Exhibit 5 – Vegetation Types and Other Areas
Exhibits 6a and 6b –Tree Locations
Exhibits 7a and 7b – Jurisdictional Resources
Attachment A – Tree Survey Report
Attachment B – Jurisdictional Delineation Report

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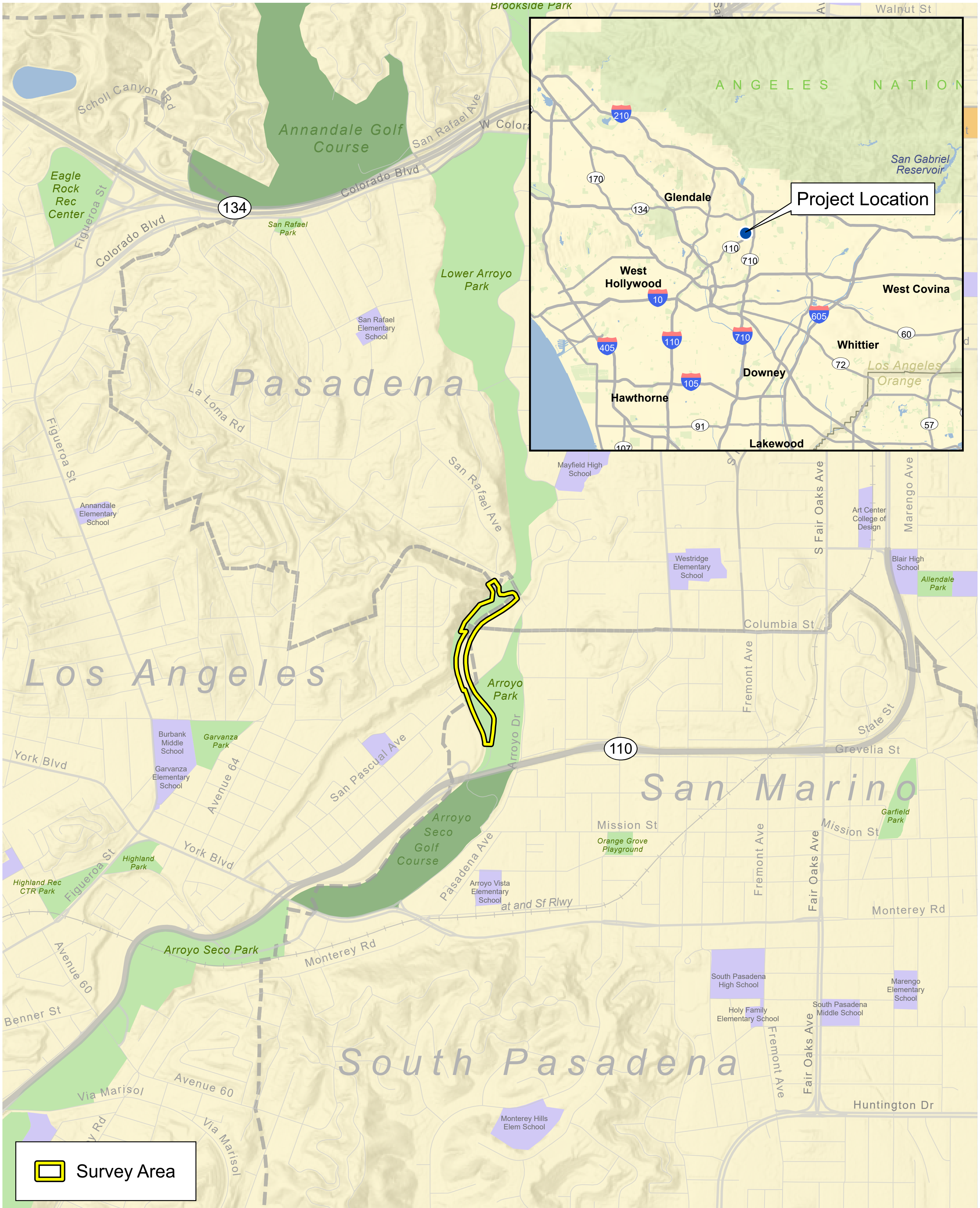

Local Vicinity

Exhibit 1

Arroyo Seco Water Reuse and Natural Stream Restoration Project

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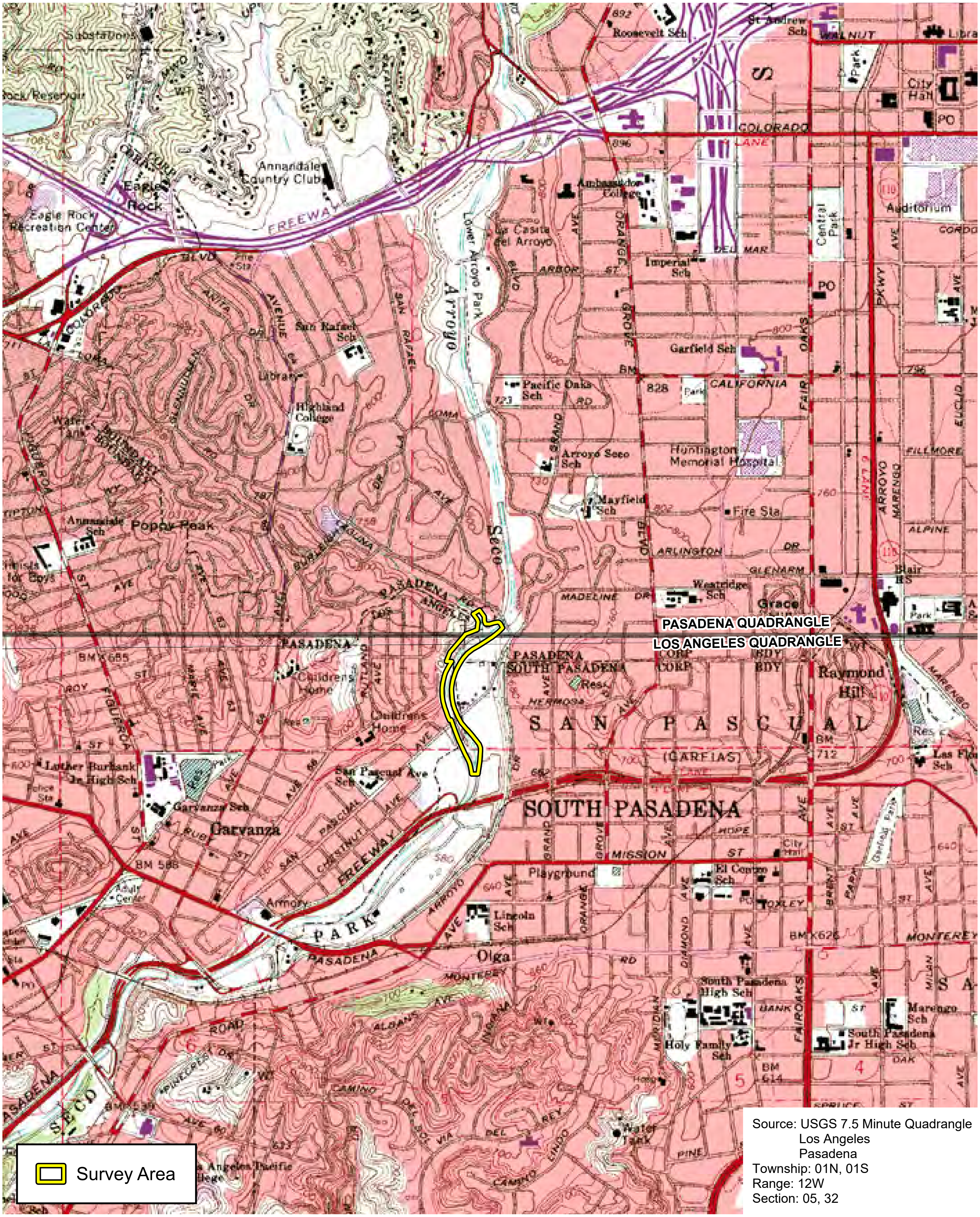

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U.S. Geological Survey Quadrangle Topographic Map

Exhibit 2

Arroyo Seco Water Reuse and Natural Stream Restoration Project

N W E S

2,000 1,000 0 2,000 Feet

PSOMAS

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Project Site

Exhibit 3

Arroyo Seco Water Reuse and Natural Stream Restoration Project

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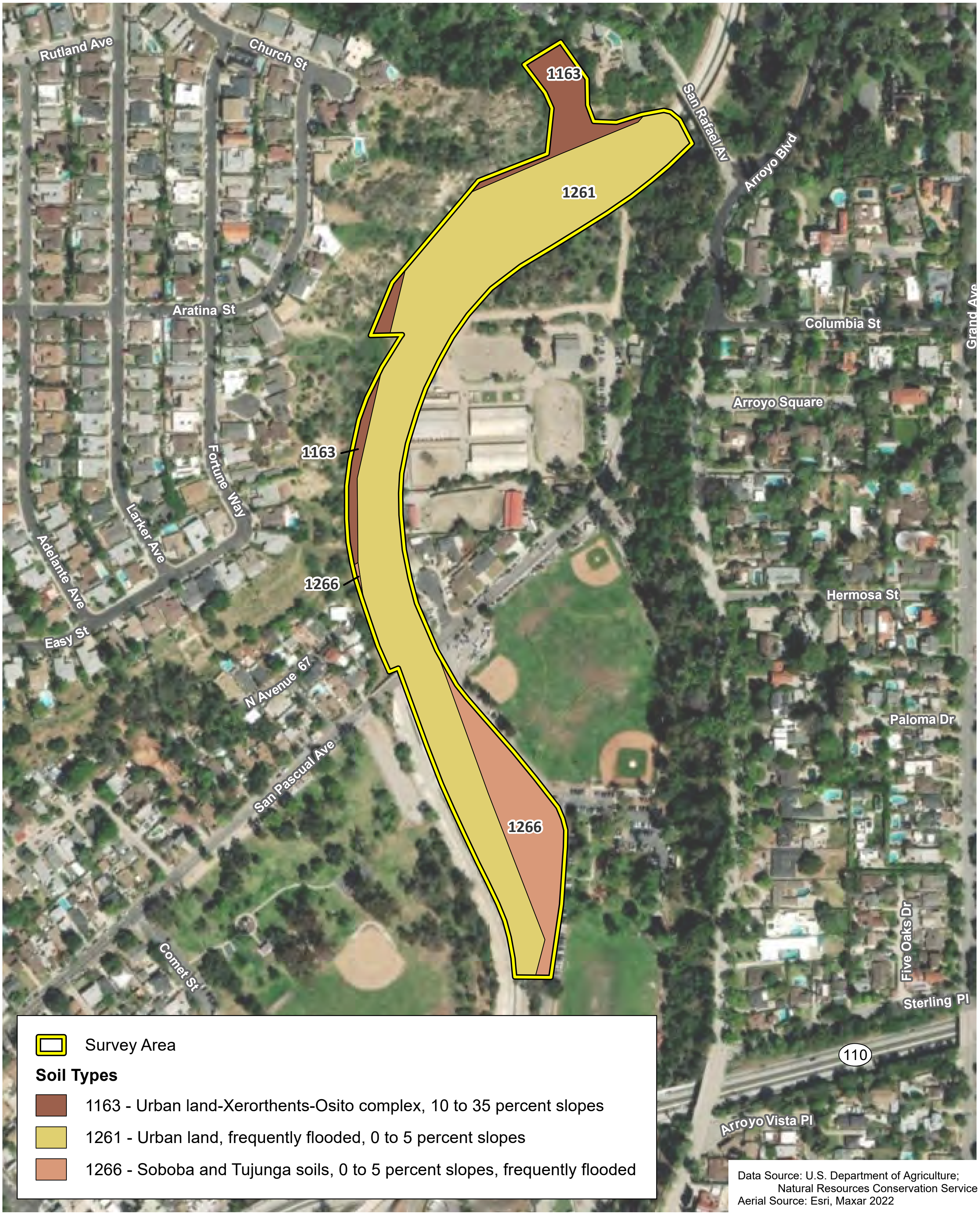

Soils Map

Exhibit 4

Arroyo Seco Water Reuse and Natural Stream Restoration Project

N W E S

350 175 0 350 Feet

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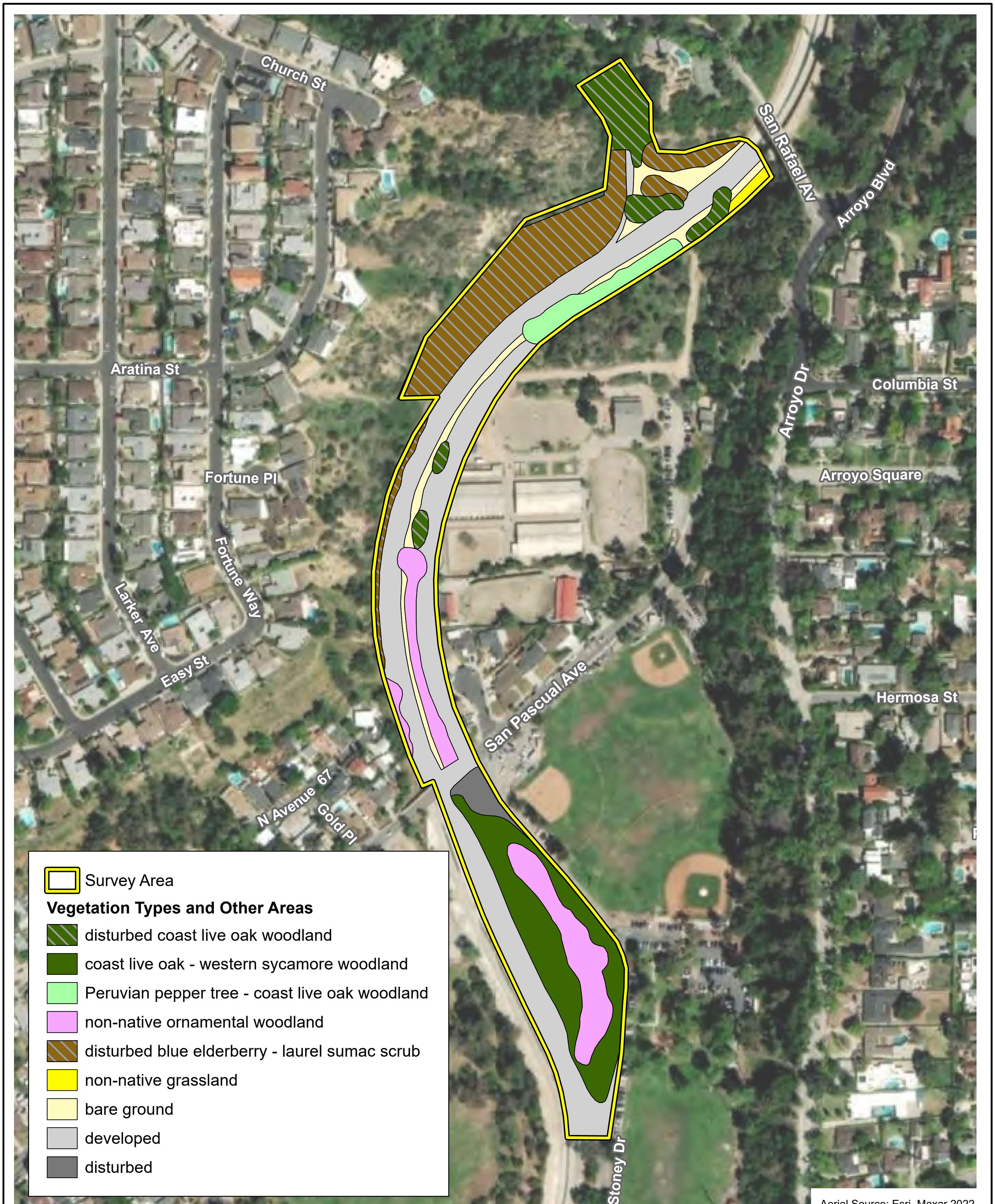

Vegetation Types and Other Areas

Exhibit 5

Arroyo Seco Water Reuse and Natural Stream Restoration Project

N W E S

300 150 0 300 Feet

PSOMAS

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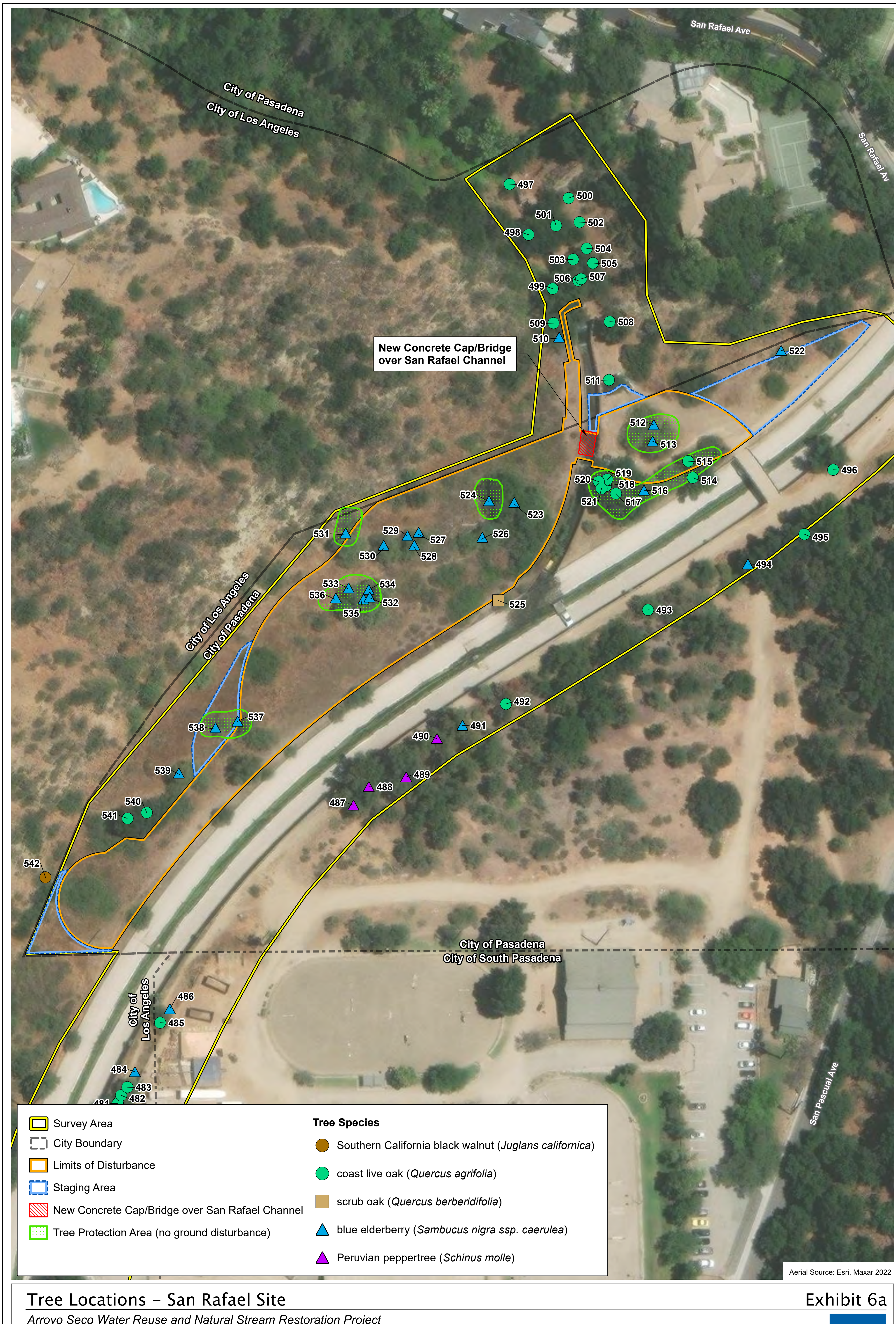

Tree Locations – San Rafael Site

Exhibit 6a

Arroyo Seco Water Reuse and Natural Stream Restoration Project

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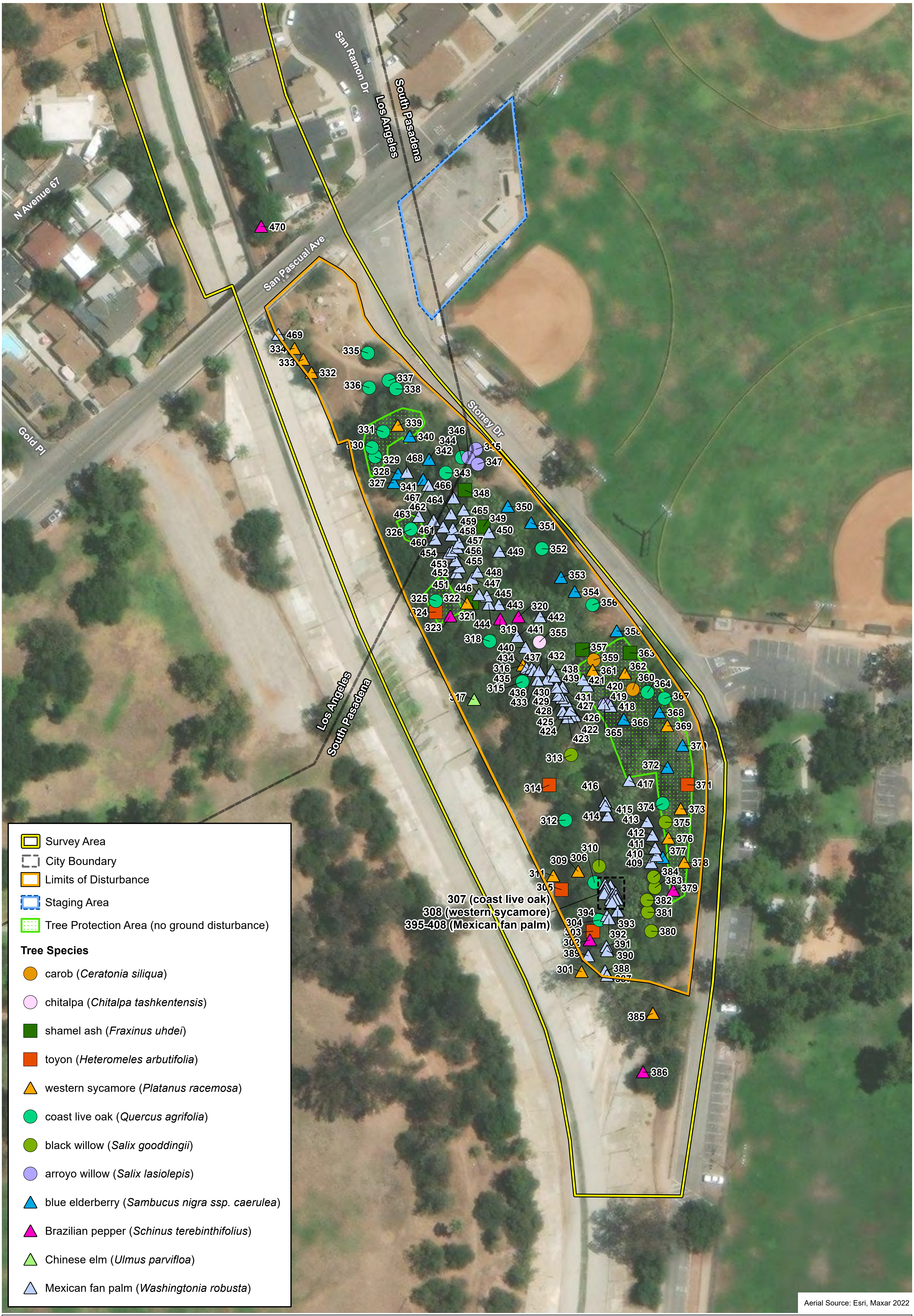

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Tree Locations – San Pascual Channel Area

Exhibit 6b

Arroyo Seco Water Reuse and Natural Stream Restoration Project

80 40 0 80
Feet

PSOMAS

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Impacts to Jurisdictional Waters – San Rafael

Exhibit 7a

Arroyo Seco Water Reuse and Natural Stream Restoration Project

N W E S

120 60 0 120 Feet

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Impacts to Jurisdictional Waters - San Pascual

Exhibit 7b

Arroyo Seco Water Reuse and Natural Stream Restoration Project

N W E S

120 60 0 120 Feet

PSOMAS

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ATTACHMENT A

TREE SURVEY REPORT

Tree Survey Report

Arroyo Seco Water Reuse and Natural Stream Restoration Project Cities of Pasadena, South Pasadena, and Los Angeles, California

Prepared for
City of Pasadena
Department of Public Works
100 North Garfield Avenue
Pasadena, California 91101
Contact: Brent Maue, Assistant City Engineer

Prepared by
Psomas
225 South Lake Avenue, Suite 1000
Pasadena, California 91101
David T. Hughes, Senior Project Manager
T: 626.204.6530

November 13, 2023

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ATTACHMENTS

Attachment

A Tree Data Summary

1.0 INTRODUCTION

The purpose of this report is to identify and quantify trees and assess tree impacts resulting from implementation of the Arroyo Seco Water Reuse and Natural Stream Restoration Project (hereafter referred to as the Project) that are regulated by the cities of Pasadena, South Pasadena, Los Angeles, and/or the *California Fish and Game Code.*

1.1 PROJECT LOCATION

The survey area for this report is generally centered along a portion of the Arroyo Seco Channel that begins just south of the San Rafael Avenue bridge in the City of Pasadena and extends approximately ½-mile south (downstream), near the 110 freeway overpass in the City of South Pasadena. The survey area encompasses the two discrete Project sites, construction staging areas, and adjacent areas. (Exhibit 1). In addition to Pasadena and South Pasadena, the Project includes lands in the City of Los Angeles. The survey area is located on the U.S. Geological Survey's (USGS') Pasadena and Los Angeles 7.5-minute quadrangles of the San Bernardino Meridian at Township 1 North, Range 12 West, Section 32 and Township 1 South, Range 12 West, Section 5.

The survey area is divided into three general sub-areas for ease of reference. These include: (1) the San Rafael Creek area (San Rafael site) at the northern end of the survey area, which consists of a concrete-lined drain that conveys water from the Johnston Lake area that is located west of the survey area into the Arroyo Seco Channel; (2) the Equestrian Trail area, which is a dirt trail that runs along the easterly bank of the Arroyo Seco Channel and is adjacent to the San Pasqual Stables; and (3) the San Pascual Basin area (San Pascual site), a densely vegetated basin that accepts flows directed from the Arroyo Seco and is located at the northern end of Arroyo Park in the City of South Pasadena. These sub-areas are shown in Exhibit 2.

1.2 PROJECT DESCRIPTION

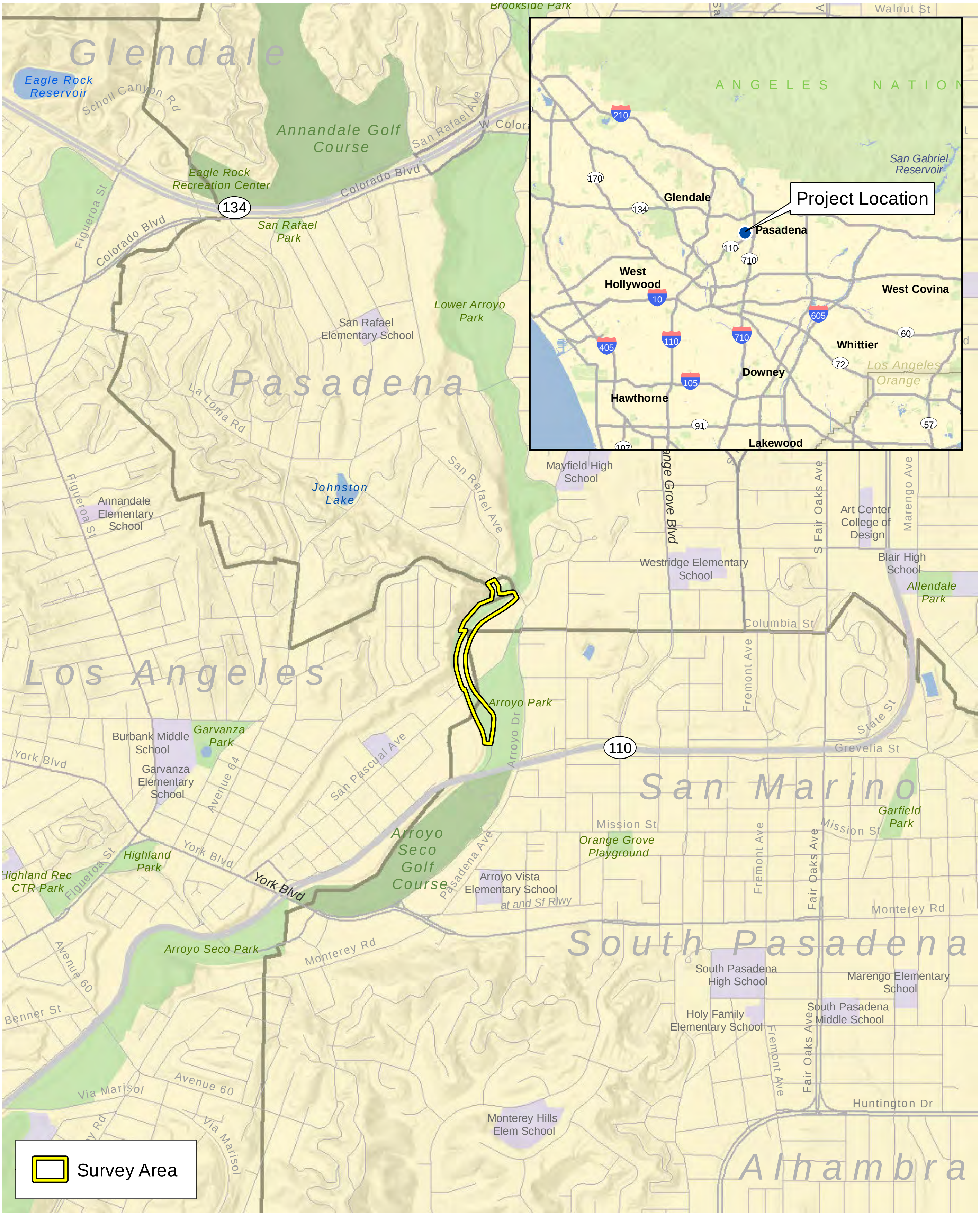
The proposed Project involves the diversion of stormwater runoff from San Rafael Creek into treatment wetlands that would be created in an adjacent upland area. These treatment wetlands would improve water quality and allow for soil infiltration before discharging this treated water into the Arroyo Seco. Further downstream, water would be diverted from the Arroyo Seco to water treatment facilities and infiltration basins constructed in the approximate 2.5-acre San Pascual site. Trees that occur along a dirt equestrian trail that runs along the easterly bank of the Arroyo Seco were also documented in case any of these trees may be affected by Project implementation.

1.3 REGULATORY AUTHORITY

As described above, the Project would pass through three cities that regulate impacts to trees: (1) the City of Pasadena; (2) the City of Los Angeles; and (3) the City of South Pasadena. The boundaries of these cities are represented on Exhibit 2. Additionally, the California Department of Fish and Wildlife (CDFW) regulates the removal of native trees that are associated with stream channels. The following is a summary how each jurisdiction addresses tree preservation and removal.

City of Pasadena

Trees that are regulated by the City of Pasadena are described in Chapter 8.52 of the Pasadena Municipal Code, hereafter referred to as the Pasadena Tree Ordinance. Under the Pasadena Tree Ordinance, public trees (in addition to native, landmark, specimen, and mature trees) are



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Local Vicinity

Exhibit 1

Tree Survey Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

N W E S

2,000 1,000 0 2,000 Feet

PSOMAS

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Project Areas

Exhibit 2

Tree Survey Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

(Rev: 4-06-2023 JVR) R:\Projects\PAS_Pasaden\3PAS010750\Graphics\Tree_Report\ex_Project_Areas.pdf considered protected which would require approval by the City Manager. Other tree definitions that are pertinent to the resources in the survey area include native trees that have a trunk diameter at breast height (dbh) of at least 8 inches and various other non-native “specimen” trees of varying minimum sizes as provided in the Pasadena Tree Ordinance. The Pasadena Tree Ordinance also protects any tree designated as a “landmark” tree (trees having significant cultural or historical importance). Native trees that are specified in the Pasadena Tree Ordinance include California buckeye (*Aesculus californica*), white alder (*Alnus rhombifolia*), Southern California black walnut (*Juglans californica*), native oaks (coast live oak [*Quercus agrifolia*], scrub oak [*Q. berberidifolia*], canyon oak [*Q. chrysolepis*], Engelmann oak [*Q. engelmannii*], and valley oak [*Q. lobata*]), western sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremonttii*), black cottonwood (*Populus trichocarpa*), arroyo willow (*Salix lasiolepis*), and California bay laurel (*Umbellularia californica*). Replacement requirements under the Pasadena Tree Ordinance are determined on a case-by-case basis by a matrix in which the quantity of replacement trees to be required is based on the size of trees to be removed and the size of trees that are subsequently planted.

City of South Pasadena

The City of South Pasadena regulates impacts to “protected trees” that are defined in Section 34.1 of the South Pasadena Municipal Code, hereafter referred to as the South Pasadena Tree Ordinance. Protected trees include heritage trees (historically significant trees as determined by the City of South Pasadena); any tree species with a dbh of 12 inches or more; any oak tree species with a minimum dbh of 4 inches; all native tree species with minimum dbh of 4 inches; and shrubs that are at least 16 feet tall with a single trunk that has a dbh of 4 inches or more. Replacement trees requirements are based on a matrix that is similar to the procedure used by the City of Pasadena.

City of Los Angeles

The City of Los Angeles regulates trees that are designated as “protected trees” as defined by Section 17.02 of the Los Angeles Municipal Code, hereafter referred to as the Los Angeles Tree Ordinance. This category includes all native oak trees, Southern California black walnuts, western sycamores, California bay laurels, toyons (*Heteromeles arbutifolia*), and blue elderberry (*Sambucus nigra* ssp. *caerulea*) that have a minimum trunk dbh of 4 inches. Additionally, the City of Los Angeles requires documentation of all trees with a minimum dbh of 8 inches (referred to as significant “non-protected” trees).

California Department of Fish and Wildlife

Many trees on the survey area are also subject to regulation by the *California Fish and Game Code*. The CDFW is charged with issuing Streambed Alteration Agreements that would allow for the removal of native tree species that occur within the bed, channel, or bank of any river, stream, or lake. The minimum size requirement for regulation by the CDFW is two inches dbh. Mitigation/replacement ratios for trees within CDFW jurisdiction is based on the size of the tree dbh (i.e., mitigation ratios increase as the size of the impacted tree increases). It should be noted that many trees on the survey area are subject to regulation by both the various city tree ordinances described above and the *California Fish and Game Code.*

2.0 METHODOLOGY

Psomas Certified Arborists David Hughes (International Society of Arboriculture [ISA] Certificate WE-7752A) and Trevor Bristle (ISA Certificate WE-10233A) performed surveys throughout the survey area on February 3 and September 9, 2022. During the surveys, the location of each tree was mapped and given an individual number. Additionally, the following data were collected: trunk dbh, tree height, and canopy width. Qualitative ratings for each tree's overall health and aesthetic quality were also given. The collected data are included in Attachment A and described in more detail below.

2.1 MAPPING

Each tree that was surveyed was mapped using a hand-held global positioning system (GPS) device. Locations were confirmed in the field by using geo-referenced field maps. Metal tags were affixed to trees in the San Pascual site, though tree numbers were simply marked on the field map for trees in other parts of the survey area since they could be easily distinguished on the field map. Tree numbers in the survey area range from 301 through 542.

2.2 DIAMETER

Using a diameter tape, measurements were taken at four and one-half feet above mean natural grade; multiple trunks were measured separately. For multi-trunk trees, the dbh is represented as the cumulative dbh of all the trunks. The dbh was estimated for trees that could not be safely accessed.

2.3 HEIGHT AND CANOPY

The height of each tree was estimated from mean natural grade to the highest branch. Also, the diameter of each tree's canopy was estimated at its widest point.

2.4 AESTHETICS

Each tree assessed was inspected and compared to an archetype tree (considered excellent on all points mentioned below) of the same species. Tree aesthetics were evaluated with respect to overall form and symmetry, crown balance, branching pattern, and broken branches.

The trees were rated on a scale of 1 to 5, as follows:

1: Very Poor
2: Poor
3: Fair
4: Good
5: Excellent

2.5 HEALTH

The health of each tree was assessed based on visual evidence of vigor, such as the amount of foliage; leaf color and size; presence of branch or twig dieback; severity of insect infestation; the presence of disease; heart rot; fire damage; mechanical damage; amount of new growth; appearance of bark; and rate of callous development over wounds. The tree's structural integrity was also evaluated with respect to branch attachment, branch placement, root health, and stability. In addition, the health assessment considered such elements as the presence of decay, weak branch attachments, and the presence of exposed roots due to soil erosion.

The trees were rated on the 1 to 5 scale, noted above.

3.0 RESULTS

A total of 242 trees were mapped in the survey area, consisting of 2 carob trees (*Ceratonia siliqua*), 1 chitalpa (*Chitalpa tashkentensis*), 5 shamel ash (*Fraxinus uhdei*), 5 toyons, 1 Southern California black walnut, 17 western sycamores, 57 coast live oaks, 1 scrub oak (*Quercus berberidifolia*), 1 valley oak, 8 black willows (*Salix gooddingii*), 4 arroyo willows, 45 blue elderberries, 4 Peruvian pepper trees (*Schinus molle*), 7 Brazilian pepper trees (*Schinus terebinthifolia*), 1 Chinese elm (*Ulmus parviflora*), and 83 Mexican fan palms (*Washingtonia robusta*). The locations of these trees are shown on Exhibits 3a through 3c and a summary of the jurisdictions in which they are found is provided in Table 1. A description of trees found within each jurisdiction is provided below.

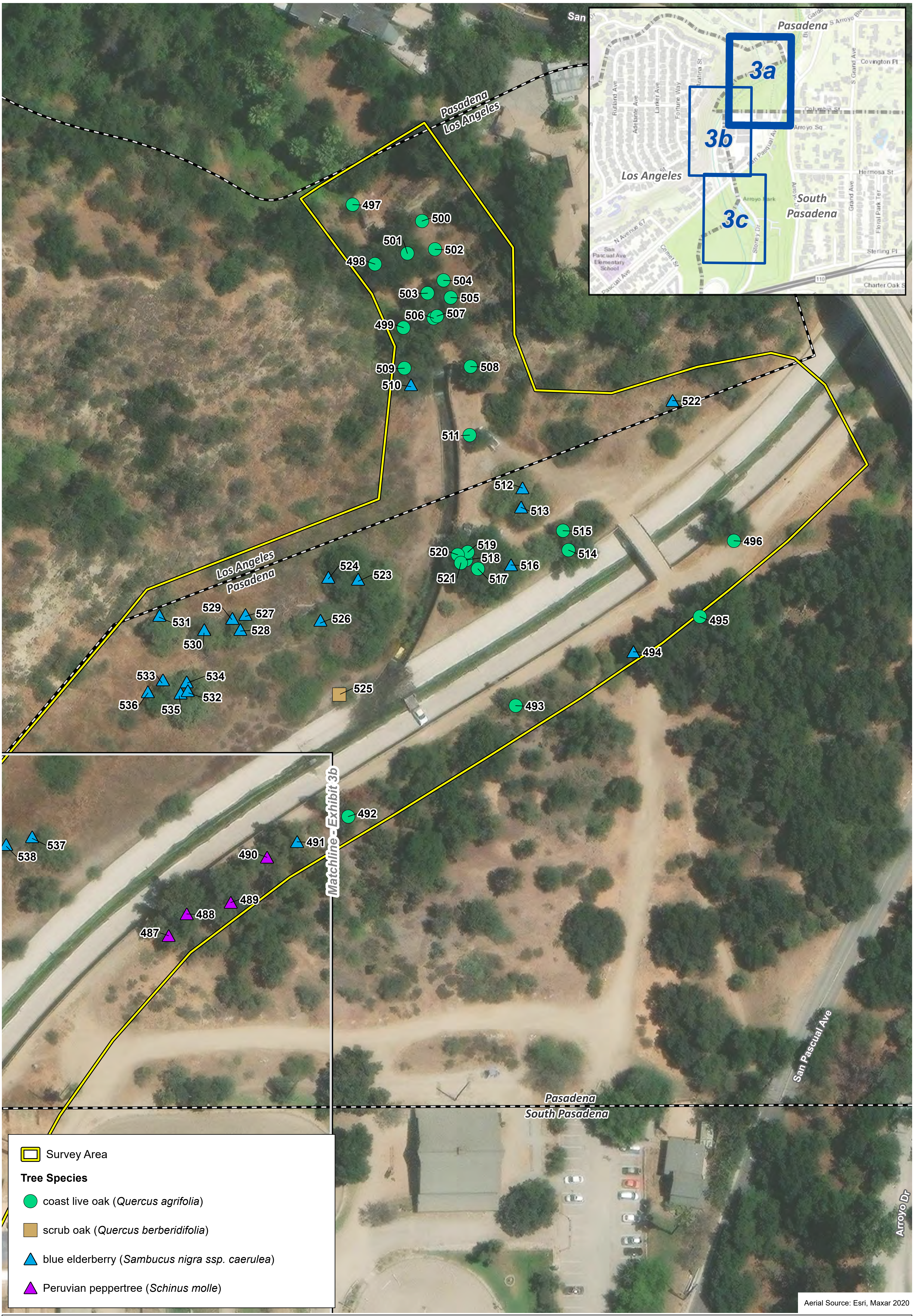
General guidelines of expected mitigation are discussed in this section, though the final tree replacement requirements would be determined once project design is complete.

TABLE 1
SUMMARY OF TREES WITHIN THE SURVEY AREA

Tree Species		Total on Project Site	Applicable Jurisdictions			
Common Name	**Botanical Name**		**City of Pasadena**	**City of South Pasadena**	**City of Los Angeles**	**CDFW**
carob	*Ceratonia siliqua*	2	0	2	0	0
chitalpa	*Chitalpa tashkentensis*	1	0	1	0	0
shamel ash	*Fraxinus uhdei*	5	0	4	1	0
toyon	*Heteromeles arbutifolia*	5	0	1	0	5
Southern California black walnut	*Juglans californica*	1	1	0	0	0
western sycamore	*Platanus racemosa*	17	0	13	4	17
coast live oak	*Quercus agrifolia*	57	13	13	31	38
scrub oak	*Quercus berberidifolia*	1	0	0	0	1
valley oak	*Quercus lobata*	1	0	0	1	0
black willow	*Salix gooddingii*	8	0	8	0	8
arroyo willow	*Salix lasiolepis*	4	0	1	0	4
blue elderberry	*Sambucus nigra ssp. caerulea*	45	21	11	13	0
Peruvian pepper	*Schinus molle*	4	4	0	0	0
Brazilian pepper	*Schinus terebinthifolia*	7	0	6	1	0
Chinese elm	*Ulmus parviflora*	1	0	1	0	0
Mexican fan palm	*Washingtonia robusta*	83	0	78	5	0
	Total	**242**	**39**	**139**	**56**	**73**

CDFW: California Department of Fish and Wildlife

Please note: CDFW jurisdiction overlaps with the other jurisdictions so that the totals provided above are not necessarily additive (there are trees whose removal is regulated by a City and the CDFW).



Tree Locations

Exhibit 3a

Tree Survey Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

N W E S

70 35 0 70 Feet

PSOMAS

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Tree Locations

Exhibit 3b

Tree Survey Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

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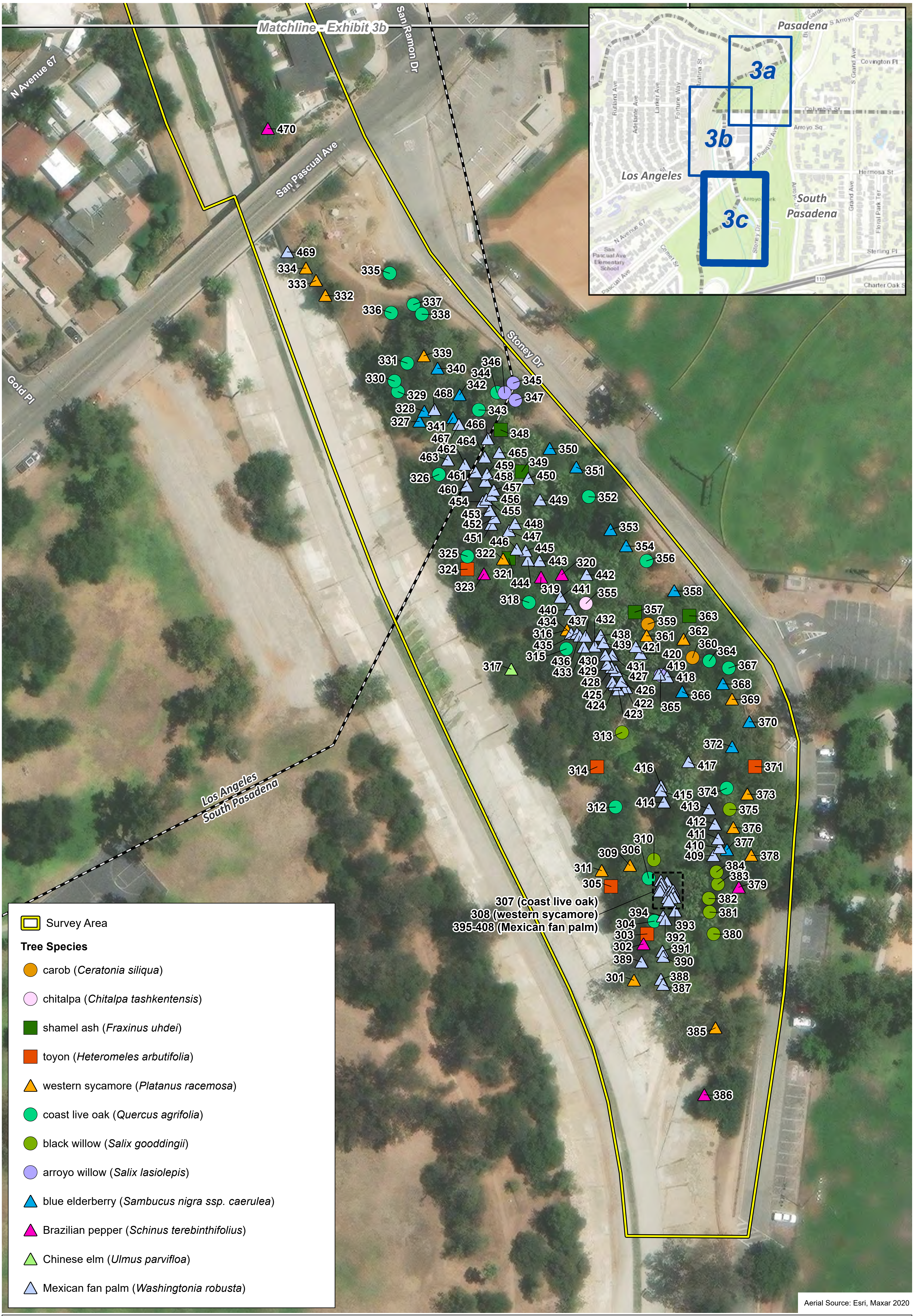

Tree Locations

Exhibit 3c

Tree Survey Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

70 35 0 70
Feet

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3.1 CITY OF PASADENA

Portions of the survey area that are within the Pasadena city boundaries include a portion of the San Rafael site and the northern half of the Equestrian Trail area (Exhibit 2). Trees found in the survey area that are subject to the Pasadena Tree Ordinance include 1 Southern California black walnut, 13 coast live oaks, 21 blue elderberries, and 4 Peruvian pepper trees. Surveyed trees that are within the Pasadena city limits and subject to the Pasadena Tree Ordinance are summarized in Table 2.

TABLE 2
SUMMARY OF TREES SURVEYED IN CITY OF PASADENA

Project Area	Tree Species		Quantity	DBH Range (in)	Height Range (ft)	Canopy Range (ft)
	Common Name	Botanical Name				
San Rafael Site	Southern California black walnut	*Juglans californica*	1	8.0	20	25
	coast live oak	*Quercus agrifolia*	9	9.1–59.5	15–40	10–30
	blue elderberry	*Sambucus nigra ssp. caerulea*	19	15.0–62.0	10–40	20–45
		Subtotal	**29**			
Equestrian Trail	coast live oak	*Quercus agrifolia*	4	12.4–47.3	20–60	15–40
	blue elderberry	*Sambucus nigra ssp. caerulea*	2	15.5–24.7	18–30	18–25
	Peruvian pepper tree	*Schinus molle*	4	33.3–73.4	25–45	20–40
		Subtotal	**10**			
		TOTAL	**39**			

DBH: diameter at breast height; in: inches; ft: feet

3.2 CITY OF SOUTH PASADENA

Portions of the survey area that are within the South Pasadena city boundaries include most of the San Pascual site and a small portion of the Equestrian Trail area. Surveyed trees that are within the South Pasadena city limits and subject to the South Pasadena Tree Ordinance are summarized in Table 3.

TABLE 3
SUMMARY OF TREES SURVEYED IN CITY OF SOUTH PASADENA

Project Area	Tree Species		Quantity	DBH Range (in)	Height Range (ft)	Canopy Range (ft)
	Common Name	Botanical Name				
Equestrian Trail	coast live oak	*Quercus agrifolia*	1	9.9	20	15
	blue elderberry	*Sambucus nigra ssp. caerulea*	1	18.4	15	12
		Subtotal	**2**			
San Pascual Site	carob	*Ceratonia siliqua*	2	13.7–16.9	20–20	20–20
	chitalpa	*Chitalpa tashkentensis*	1	35.5	35	20
	shamel ash	*Fraxinus uhdei*	4	12.2–64.8	30–45	12–30
	toyon	*Heteromeles arbutifolia*	1	18.0	20	15
	western sycamore	*Platanus racemosa*	13	4.2–85.2	20–60	8–40
	coast live oak	*Quercus agrifolia*	12	4.0–33.1	12–60	8–40
	black willow	*Salix gooddingii*	8	4.0–15.0	20–35	10–20
	arroyo willow	*Salix lasiolepis*	1	20.5	25	15
	blue elderberry	*Sambucus nigra ssp. caerulea*	10	6.5–47.5	10–25	10–25
	Brazilian pepper	*Schinus terebinthifolia*	6	12.2–58.0	15–30	15–30
	Chinese elm	*Ulmus parviflora*	1	32.2	30	20
	Mexican fan palm	*Washingtonia robusta*	78	14.0–20.0	30–60	10–12
		Subtotal	**137**			
		TOTAL	**139**			
DBH: diameter at breast height; in: inches; ft: feet						

According to replacement guidelines in the South Pasadena Municipal Code (Chapter 34.12-5[b]), tree replacement ratios are determined based on the size of the tree to be removed. For mature native tree species and all oak species, 2 replacement trees (24-inch box container) are required for each 6 inches of trunk dbh of the tree to be impacted. For all other tree species, 1 replacement tree (24-inch box container) is required for each 6 inches of trunk dbh of the tree to be impacted.

3.3 CITY OF LOS ANGELES

Portions of the survey area that are within the Los Angeles city limits include the upstream half of the San Rafael site, the southern portion of the Equestrian Trail area, and the northern portion of the San Pascual site. Surveyed trees that are within the Los Angeles city limits and subject to the Los Angeles Tree Ordinance are summarized in Table 4.

TABLE 4
SUMMARY OF TREES SURVEYED IN CITY OF LOS ANGELES

Project Area	Tree Species		Quantity	DBH Range (in)	Height Range (ft)	Canopy Range (ft)
	Common Name	Botanical Name				
San Rafael Site	coast live oak	*Quercus agrifolia*	14	6.3–63.1	15–50	12–40
	blue elderberry	*Sambucus nigra ssp. caerulea*	3	9.5–29.4	15–20	12–15
		Subtotal	**17**			
Equestrian Trail	coast live oak	*Quercus agrifolia*	7	6.5–14.5	20–50	10–20
	valley oak	*Quercus lobata*	1	18.0	40	15
	blue elderberry	*Sambucus nigra ssp. caerulea*	5	15.5–45.9	20–35	15–20
	Brazilian pepper	*Schinus terebinthifolia*	1	104.1	25	20
	Subtotal		**14**			
San Pascual Site	shamel ash	*Fraxinus uhdei*	1	17.6	50	25
	western sycamore	*Platanus racemosa*	4	7.5–64.8	25–55	8–50
	coast live oak	*Quercus agrifolia*	10	5.1–29.8	12–40	8–30
	blue elderberry	*Sambucus nigra ssp. caerulea*	5	4.5–18.4	12–15	10–15
	Mexican fan palm	*Washingtonia robusta*	5	8.0–36.0	30–60	10–12
		Subtotal	**25**			
		TOTAL	**56**			
DBH: diameter at breast height; in: inches; ft: feet						

3.4 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

The CDFW asserts jurisdiction over native trees that are within the bed and bank of a streambed or partially overhang a streambed. In all, 71 trees were mapped in the survey area that fall within CDFW jurisdictional areas. Most of these trees occur at the San Pascual site, with several others occurring at the San Rafael site. Surveyed trees that are subject to the jurisdiction of the CDFW are summarized in Table 5.

TABLE 5
SUMMARY OF TREES SURVEYED UNDER CDFW JURISDICTION

Project Area	Tree Species		Quantity	DBH Range (in)	Height Range (ft)	Canopy Range (ft)
	Common Name	Botanical Name				
San Rafael Site	coast live oak	*Quercus agrifolia*	14	6.3–37.7	15–50	12–40
	scrub oak	*Quercus berberidifolia*	1	2.3	9	12
		Subtotal	**15**			
Equestrian Trail Area	coast live oak	*Quercus agrifolia*	2	14.5–22.7	20–40	10–20
		Subtotal	**2**			
San Pascual Site	toyon	*Heteromeles arbutifolia*	5	4.7–10.5	10–15	12–15
	western sycamore	*Platanus racemosa*	17	4.2–63.7	20–60	8–50
	coast live oak	*Quercus agrifolia*	22	4.0–33.1	12–60	8–30
	black willow	*Salix gooddingii*	8	4.0–15.0	20–35	10–20
	arroyo willow	*Salix lasiolepis*	4	4.8–16.5	12–25	10–15
		Subtotal	**56**			
		TOTAL	**73**			
DBH: diameter at breast height; in: inches; ft: feet						

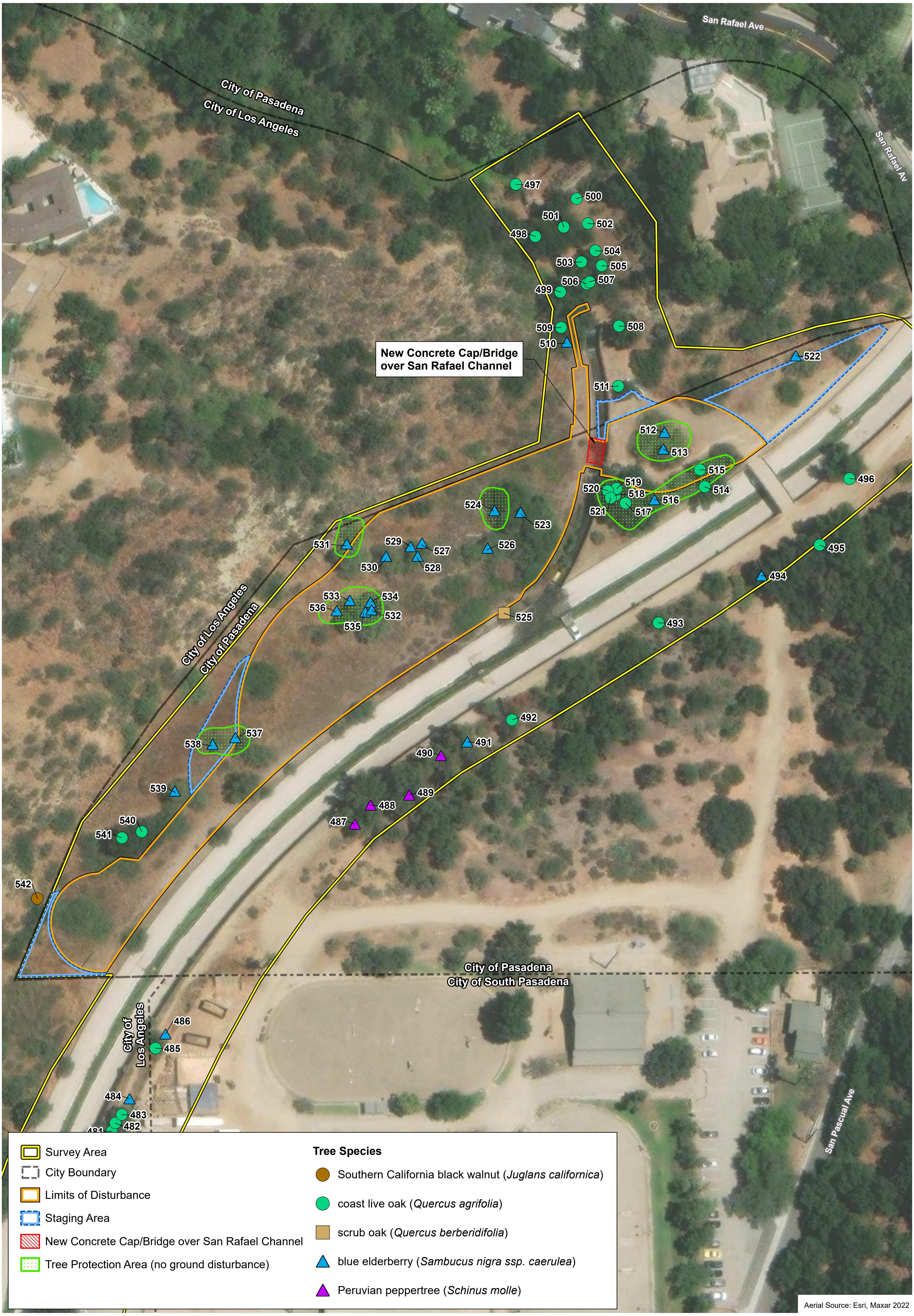
The CDFW's requirement for an applicant to provide replacement trees is based on the size of the trees to be removed. Smaller trees (i.e., less than eight inches) generally require replacement at a 2:1 ratio. The replacement ratio increases for larger trees with a maximum replacement ratio of 20:1 for trees greater than 36 inches dbh. The precise number of replacement trees would be dependent on negotiation with the CDFW during the permit processing period.

4.0 TREE IMPACTS

Impacts to trees with implementation of the Project would result from grading and/or general vegetation clearing to construct treatment wetlands at the San Rafael site and to install water treatment facilities at the San Pascual site. No trees are expected to be removed along the Equestrian Trail area.

All vegetation within the limits of disturbance shown on Exhibits 4a and 4b is expected to be removed, though there are several areas of tree avoidance where trees will be protected in place.

Trees expected to be impacted with implementation of the Project are summarized in Table 6. As shown, a total of 215 protected trees (including native shrubs protected by the South Pasadena Tree Ordinance) are located at the San Rafael and San Pascual sites (the Equestrian Trail area is not shown in Table 6 as no tree removals are proposed in that Project area). Of these, a total of 142 trees would be removed (6 at the San Rafael site and 136 at the San Pascual site). The 142 impacted trees consist of 47 native trees and 95 non-native trees.



Tree Impacts at San Rafael Site

Exhibit 4a

Tree Survey Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

N W E S

80 40 0 80 Feet

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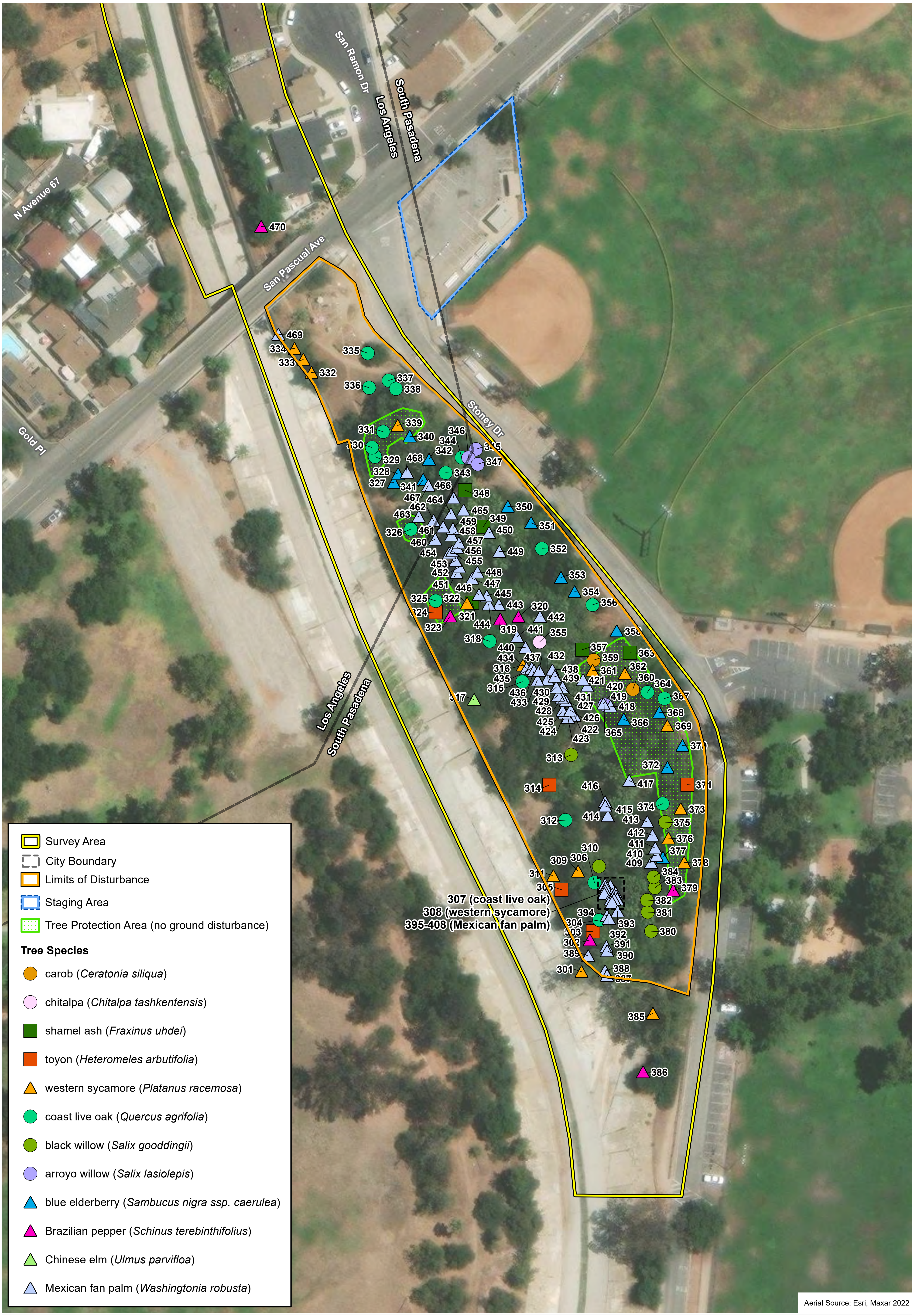

Tree Impacts at San Pascual Channel Area

Exhibit 4b

Arroyo Seco Water Reuse and Natural Stream Restoration Project

80 40 0 80 Feet

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TABLE 6
SUMMARY OF TREE IMPACTS

Tree Species		Total Existing	Proposed for Removal	Applicable Jurisdiction(s)			
Common Name	**Botanical Name**			**Pasadena**	**South Pasadena**	**Los Angeles**	**CDFW**
San Rafael Site							
So. California black walnut	*Juglans californica*	1	0	—	—	—	—
coast live oak	*Quercus agrifolia*	23	0	—	—	—	—
scrub oak	*Quercus berberidifolia*	1	0	—	—	—	—
blue elderberry	*Sambucus nigra ssp. caerulea*	21	6	6	—	—	—
	San Rafael Site Subtotals	**46**	**6**	**6**	**—**	**—**	**—**
San Pasqual Site							
carob	*Ceratonia siliqua*	2	1	—	1	—	—
chitalpa	*Chitalpa tashkentensis*	1	1	—	1	—	—
shamel ash	*Fraxinus uhdei*	5	4	—	3	1[a]	—
toyon	*Heteromeles arbutifolia*	5	2	—	1	—	2[bc]
western sycamore	*Platanus racemosa*	17	6	—	6	—	6
coast live oak	*Quercus agrifolia*	22	11	—	7	4	11
black willow	*Salix gooddingii*	8	8	—	8	—	8
arroyo willow	*Salix lasiolepis*	4	3	—	1	—	3[c]
blue elderberry	*Sambucus nigra ssp. caerulea*	15	11	—	6	5	11[b]
Brazilian pepper	*Schinus terebinthifolia*	6	5	—	5	—	—
Chinese elm	*Ulmus parviflora*	1	1	—	1	—	—
Mexican fan palm	*Washingtonia robusta*	83	83	—	78	5[a]	—
	San Pasqual Site Subtotals	**169**	**136**	**0**	**118**	**15**	**41**
	Project Totals	***215***[d]	***142***	***6***	***118***	***15***	***41***

CDFW: California Department of Fish and Wildlife; —: not applicable

[a] Indicates trees to be removed but are not subject to Los Angeles Tree Ordinance (i.e., considered significant “non-protected” trees)

[b] Toyon and blue elderberry are typically considered large shrubs by the CDFW and may not require compensatory mitigation.

[c] Includes 1 toyon and 2 arroyo willows that are subject to CDFW regulation but are below the minimum size threshold for protection by the City of South Pasadena.

[d] Excludes trees in the Equestrian Trail portion of the survey area as no impacts are proposed in that Project area.

Note: CDFW jurisdiction overlaps with the other jurisdictions so that the totals are not necessarily additive (i.e., there are trees whose removal is regulated by a city and the CDFW).

5.0 TREE REPLACEMENT

This section details expected tree replacement requirements for the Project to compensate for the loss of these tree resources.

5.1 CITY OF PASADENA

As summarized in Table 6, Project activities at the San Rafael site will result in the removal of 6 blue elderberries that meet the minimum size requirement to require replacement according to Chapter 8.52 of the Pasadena Municipal Code.

According to guidelines adopted by the City of Pasadena, tree replacement ratios are determined based on the size of the tree to be removed (i.e., larger trees require a higher replacement ratio) and by the size of the proposed replacement trees (i.e., use of larger tree stock results in the lower number of replacement trees). Pasadena requires tree replacement per the following guidelines:

- For trees from 8.0 to 12.9 inches dbh, trees are to be replaced at a 2:1 ratio (if replaced with 24-inch box trees) or 4:1 ratio (if replaced with 15-gallon containers);
- For trees from 13.0 to 18.9 inches dbh, trees are to be replaced at a 2:1 ratio (if replaced with 36-inch box trees); 4:1 ratio (if replaced with 24-inch box trees); or 8:1 ratio (if replaced with 15-gallon containers);
- For trees from 19.0 to 36.9 inches dbh, trees are to be replaced at a 4:1 ratio (if replaced with 36-inch box trees) or 8:1 ratio (if replaced with 24-inch box trees); and
- For trees at least 37 inches dbh, trees are to be replaced at an 8:1 ratio (if replaced with 36-inch box trees) or 12:1 ratio (if replaced with 24-inch box trees).

The City of Pasadena is expected to provide replacement trees in 36-inch size boxes. Two of the blue elderberries to be removed are in the 13.0-18.9-inch size class, while 4 blue elderberries are in the 19.0-36.9-inch size class. Therefore, the total tree replacement requirement for City of Pasadena trees would be 20 36-inch box trees.

5.2 CITY OF SOUTH PASADENA

Pursuant to Section 34.12-5 of the South Pasadena Municipal Code, tree replacement requirements are based on the size of the trees to be removed. For projects that are considered non-development projects, the removal of “significant” trees (non-native trees with a dbh of at least 12 inches) is to be replaced by providing 1 24-inch box replacement tree for each 10 inches of trunk diameter for the trees to be removed. For “mature” native tree species (at least 4 inches in trunk diameter), 2 24-inch box trees will be provided for each 10 inches of trunk diameter for the trees to be removed. The municipal code does not specify a mitigation requirement for protected shrubs; however, replacement of native shrubs is subject in this analysis to the same replacement requirements as mature native tree species. The South Pasadena Municipal Code does not specify if tree replacement shall be in-kind (i.e., replacement trees to be the same species as the removals).

Trees to be removed that are considered “significant” by the South Pasadena Municipal Code include 1 carob, 1 chitalpa, 3 shamel ash, 5 Brazilian peppers, and 1 Chinese elm. Based on the tree replacement requirements for significant trees, these removals will require a total of 37 24-inch box replacement trees.

Trees that meet the definition of mature native trees or mature native shrubs include: 1 toyon, 6 western sycamores, 7 coast live oaks, 8 black willows, 1 arroyo willow, and 6 blue elderberries. Based the replacement requirements for mature native trees, these removals will require a total of 142 24-inch box replacement trees.

The South Pasadena Municipal Code does not specify if palm trees are held to the same tree replacement standard as other trees. Palm trees do not possess a vascular cambium that increases the size of the trunk each year. Instead, the age of palms is better correlated to their height. If the City of South Pasadena considers that non-native Mexican fan palms meet the definition of a “significant” tree, the replacement requirement associated with the 78 removals would be 186 24-inch box trees.

5.3 CITY OF LOS ANGELES

To offset the removal of protected trees and shrubs, the City of Los Angeles requires that at least 4 replacement trees (minimum 15-gallon container size) are planted for each protected tree removed as described in Section 46.02 of the Los Angeles Municipal Code. Protected tree and shrub species that will be removed for implementation of the Project will include 4 coast live oaks and 5 blue elderberries. The replacement requirement for these removals would consists of 16 trees (use of protected tree species required) and 20 shrubs (use of protected shrub species required).

5.4 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

The CDFW does not have a statutory requirement for the replacement of trees that are within their jurisdictional boundaries. Instead, the replacement requirement for impacted CDFW trees is determined as part of the process to acquire a Lake or Streambed Alteration Agreement. The tree replacement described in this section is expected to provide sufficient mitigation to compensate for the loss of 41 native trees and shrubs, though the final requirement will be determined through the CDFW permit process.

5.5 TREE REPLACEMENT SUMMARY

Based on the tree replacement requirements described in this section, implementation of the Project will require the installation of at least 235 trees and shrubs. If Mexican fan palms are determined by the City of South Pasadena to require replacement as with other significant trees, an additional 186 replacement trees would be required (for a Project total of 421 replacement trees).

A summary of tree replacement requirements is provided in Table 7.

TABLE 7
TREE REPLACEMENT SUMMARY

Tree Species		Total Existing	Proposed for Removal	Tree Replacement Requirements		
Common Name	**Botanical Name**			**Pasadena**	**South Pasadena**	**Los Angeles**
San Rafael Site						
So. California black walnut	*Juglans californica*	1	0	—	—	—
coast live oak	*Quercus agrifolia*	23	0	—	—	—
scrub oak	*Quercus berberidifolia*	1	0	—	—	—
blue elderberry	*Sambucus nigra ssp. caerulea*	21	6	20	—	—
San Pasqual Site						
carob	*Ceratonia siliqua*	2	1	—	2	—
chitalpa	*Chitalpa tashkentensis*	1	1	—	4	—
shamel ash	*Fraxinus uhdei*	5	4	—	11	—
toyon	*Heteromeles arbutifolia*	5	2	—	2	—
western sycamore	*Platanus racemosa*	17	6	—	60	—
coast live oak	*Quercus agrifolia*	22	11	—	26	16
black willow	*Salix gooddingii*	8	8	—	20	—
arroyo willow	*Salix lasiolepis*	4	3	—	6	—
blue elderberry	*Sambucus nigra ssp. caerulea*	15	11	—	28	20
Brazilian pepper	*Schinus terebinthifolia*	6	5	—	16	—
Chinese elm	*Ulmus parviflora*	1	1	—	4	—
Mexican fan palm	*Washingtonia robusta*	83	83	—	186	—
	Project Totals	***215***	***142***	***20[a]***	***365[b]***	***36[c]***
					421	

[a] Assumes replacement trees are 36-inch box specimens.

[b] City of South Pasadena requires replacement trees to be 24-inch box specimens.

[c] City of Los Angeles requires replacement trees to be 15-gallon specimens.

6.0 REFERENCES

California, State of. 2019 (current through January 1). *California Fish and Game Code*. https://codes.findlaw.com/ca/fish-and-game-code/

Los Angeles, City of. 2021 (current through December 31). *Los Angeles Municipal Code*. https://codelibrary.amlegal.com/codes/los_angeles/latest/lamc/0-0-0-107363.

Pasadena, City of. 2021 (updated November 1). *Pasadena Municipal Code*. https://library.municode.com/ca/pasadena/codes/code_of_ordinances.

South Pasadena, City of. 2021 (updated May 5). *South Pasadena City Code*. https://www.codepublishing.com/CA/SouthPasadena/

ATTACHMENT A

TREE SURVEY DATA SUMMARY

TABLE A-1
SUMMARY OF TREE DATA

									Jurisdiction				Project Area			Impact/Disposition	
Tree No.	**Tree Species**	**# Main Trunks**	**DBH (in)**	**Sum of Trunks**	**Height (ft)**	**Canopy Diameter (ft)**	**Health Rating**	**Aesthetic Rating**	**South Pasadena**	**Pasadena**	**Los Angeles**	**CDFW**	**San Rafael Site**	**Equestrian Trail Area**	**San Pascual Site**	**Removal**	**Protect In Place**
301	western sycamore *Platanus racemosa*	2	23.1, 17.1	40.2	35	30	3	3	X			X			X		X
302	Brazilian pepper *Schinus terebinthifolia*	1	15.0	15.0	20	20	3	3	X						X	X	
303	toyon *Heteromeles arbutifolia*	9	3.1, 3.0, 2.0, 2.0, 2.0, 1.5, 1.5, 1.5, 1.0	17.6	10	15	3	3				X			X	X	
304	coast live oak *Quercus agrifolia*	1	19.3	19.3	45	20	4	4	X			X			X	X	
305	toyon *Heteromeles arbutifolia*	2	5.2, 5.0	10.2	12	12	4	3				X			X		X
306	coast live oak *Quercus agrifolia*	1	15.5	15.5	40	20	4	4	X			X			X	X	
307	coast live oak *Quercus agrifolia*	1	8.0	8.0	30	12	3	3	X			X			X	X	
308	western sycamore *Platanus racemosa*	1	5.6	5.6	30	10	3	3	X			X			X	X	
309	western sycamore *Platanus racemosa*	3	22.2, 19.8, 18.5	60.5	60	30	4	4	X			X			X	X	
310	black willow *Salix gooddingii*	1	5.3	5.3	30	10	3	3	X			X			X	X	
311	western sycamore *Platanus racemosa*	1	7.9	7.9	20	15	3	3	X			X			X		X
312	coast live oak *Quercus agrifolia*	2	10.0, 7.2	17.2	30	20	4	3	X			X			X	X	
313	black willow *Salix gooddingii*	1	9.0	9.0	25	10	3	2	X			X			X	X	
314	toyon *Heteromeles arbutifolia*	4	2.5, 2.2, 2.0, 1.5	7.2	18	12	3	3	X			X			X	X	
315	coast live oak *Quercus agrifolia*	1	33.1	33.1	60	40	5	5	X			X			X	X	
316	western sycamore *Platanus racemosa*	5	29.2, 5.4, 4.5, 3.0, 2.0	44.1	40	20	3	2	X			X			X	X	
317	Chinese elm *Ulmus parvifloa*	4	9.6, 8.1, 7.5, 7.0	32.2	30	20	3	3	X						X	X	
318	coast live oak *Quercus agrifolia*	2	2.0, 2.0	4.0	18	8	3	3	X			X			X		X
319	Brazilian pepper *Schinus terebinthifolia*	9	6.0, 6.0, 5.5, 4.0, 3.5, 2.5, 2.0, 2.0, 2.0	33.5	20	15	2	2	X						X	X	
320	Brazilian pepper *Schinus terebinthifolia*	4	12.6, 12.2, 11.0, 9.5	45.3	30	30	3	2	X						X	X	
321	shamel ash *Fraxinus uhdei*	5	16.5, 14.1, 14.0, 11.0, 9.2	64.8	40	30	3	3	X						X	X	
322	western sycamore *Platanus racemosa*	2	36.2, 20.3	56.5	35	30	4	3	X			X			X	X	
323	Brazilian pepper *Schinus terebinthifolia*	2	7.1, 5.1	12.2	25	15	3	2	X						X	X	
324	toyon *Heteromeles arbutifolia*	6	3.7, 3.6, 3.0, 2.0, 1.5, 1.0	14.8	12	12	3	3				X			X		X

TABLE A-1
SUMMARY OF TREE DATA

Tree No.	Tree Species	# Main Trunks	DBH (in)	Sum of Trunks	Height (ft)	Canopy Diameter (ft)	Health Rating	Aesthetic Rating	Jurisdiction				Project Area			Impact/Disposition	
									South Pasadena	Pasadena	Los Angeles	CDFW	San Rafael Site	Equestrian Trail Area	San Pascual Site	Removal	Protect In Place
325	coast live oak *Quercus agrifolia*	1	13.0	13.0	35	12	4	3	X			X			X		X
326	coast live oak *Quercus agrifolia*	1	20.3	20.3	30	30	5	4			X	X			X	X	
327	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	3.0, 1.5	4.5	15	12	4	3			X				X	X	
328	blue elderberry *Sambucus nigra* ssp. *caerulea*	3	5.4, 5.3, 2.3	13.0	15	10	3	3			X				X	X	
329	coast live oak *Quercus agrifolia*	1	26.3	26.3	35	30	5	4			X	X			X		X
330	coast live oak *Quercus agrifolia*	1	29.8	29.8	40	30	5	4			X	X			X		X
331	coast live oak *Quercus agrifolia*	2	12.6, 11.7	24.3	30	20	4	4			X	X			X		X
332	western sycamore *Platanus racemosa*	1	14.3	14.3	45	20	4	4			X	X			X		X
333	western sycamore *Platanus racemosa*	1	7.5	7.5	25	8	2	2			X	X			X		X
334	western sycamore *Platanus racemosa*	2	10.2, 6.1	16.3	30	15	4	4			X	X			X		X
335	coast live oak *Quercus agrifolia*	1	8.2	8.2	18	12	4	4			X	X			X	X	
336	coast live oak *Quercus agrifolia*	1	7.1	7.1	12	10	4	3			X	X			X		X
337	coast live oak *Quercus agrifolia*	1	9.0	9.0	25	12	4	4			X	X			X		X
338	coast live oak *Quercus agrifolia*	1	5.1	5.1	15	8	4	3			X	X			X		X
339	western sycamore *Platanus racemosa*	3	32.8, 21.0, 11.0	64.8	55	50	4	4			X	X			X		X
340	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	13.2	13.2	12	15	3	3			X				X	X	
341	blue elderberry *Sambucus nigra* ssp. *caerulea*	5	4.5, 4.2, 3.0, 2.0, 2.0	15.7	15	10	3	2			X				X	X	
342	blue elderberry *Sambucus nigra* ssp. *caerulea*	9	4.2, 4.2, 3.0, 1.5, 1.5, 1.0, 1.0, 1.0, 1.0	18.4	15	10	3	2			X				X	X	
343	coast live oak *Quercus agrifolia*	1	15.0	15.0	35	18	4	4			X	X			X	X	
344	coast live oak *Quercus agrifolia*	2	4.1, 3.6	7.7	18	10	4	3			X	X			X	X	
345	arroyo willow *Salix lasiolepis*	4	3.7, 3.3, 3.0, 2.0	12.0	15	15	3	2				X			X		X
346	arroyo willow *Salix lasiolepis*	2	3.8, 1.0	4.8	12	10	3	2				X			X	X	
347	arroyo willow *Salix lasiolepis*	4	3.1, 3.0, 3.0, 2.0	11.1	12	10	2	2				X			X	X	
348	shamel ash *Fraxinus uhdei*	1	17.6	17.6	50	25	4	4			X				X	X	

TABLE A-1
SUMMARY OF TREE DATA

									Jurisdiction				Project Area			Impact/Disposition	
Tree No.	**Tree Species**	**# Main Trunks**	**DBH (in)**	**Sum of Trunks**	**Height (ft)**	**Canopy Diameter (ft)**	**Health Rating**	**Aesthetic Rating**	**South Pasadena**	**Pasadena**	**Los Angeles**	**CDFW**	**San Rafael Site**	**Equestrian Trail Area**	**San Pascual Site**	**Removal**	**Protect In Place**
349	shamel ash *Fraxinus uhdei*	1	18.2	18.2	30	20	1	2	X						X	X	
350	blue elderberry *Sambucus nigra* ssp. *caerulea*	11	8.2, 7.3, 6.0, 5.5, 4.5, 4.0, 3.0, 3.0, 2.0, 2.0, 2.0	47.5	25	20	4	3	X						X	X	
351	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	11.1	11.1	10	10	3	3	X						X		X
352	coast live oak *Quercus agrifolia*	1	15.8	15.8	45	20	4	4	X			X			X		X
353	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	17.5, 8.5	26.0	20	15	3	3	X						X	X	
354	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	19.2	19.2	25	15	4	3	X						X	X	
355	chitalpa *Chitalpa tashkentensis*	5	10.1, 7.7, 7.2, 6.0, 4.5	35.5	35	20	3	2	X						X	X	
356	coast live oak *Quercus agrifolia*	2	3.9	6.6	12	8	3	3	X			X			X	X	
357	shamel ash *Fraxinus uhdei*	1	12.2	12.2	45	12	4	4	X						X	X	
358	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	8.5, 3.1	11.6	15	15	3	2	X						X	X	
359	carob *Ceratonia siliqua*	1	13.7	13.7	20	20	4	3	X						X	X	
360	carob *Ceratonia siliqua*	2	8.8, 8.1	16.9	20	20	4	3	X						X		X
361	western sycamore *Platanus racemosa*	2	46.6, 17.1	63.7	50	35	4	4	X			X			X	X	
362	western sycamore *Platanus racemosa*	1	4.2	4.2	25	8	3	3	X			X			X		X
363	shamel ash *Fraxinus uhdei*	1	15.9	15.9	45	15	4	3	X						X		X
364	coast live oak *Quercus agrifolia*	1	14.1	14.1	35	15	4	4	X			X			X		X
365	arroyo willow *Salix lasiolepis*	3	9.5, 7.0, 4.0	20.5	25	15	4	2	X			X			X	X	
366	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	9.1	9.1	18	12	3	3	X						X	X	
367	coast live oak *Quercus agrifolia*	1	7.4	7.4	12	10	4	3	X			X			X		X
368	blue elderberry *Sambucus nigra* ssp. *caerulea*	3	6.8, 4.8, 4.5	16.1	12	12	3	3	X						X		X
369	western sycamore *Platanus racemosa*	4	16.4, 15.9, 8.5, 7.0	47.8	60	35	3	4	X			X			X		X
370	blue elderberry *Sambucus nigra* ssp. *caerulea*	3	8.7, 5.3, 4.5	18.5	20	25	3	3	X						X		X
371	toyon *Heteromeles arbutifolia*	5	7.0, 3.5, 3.0, 2.5, 2.0	18.0	20	15	3	3	X			X			X		X
372	blue elderberry *Sambucus nigra* ssp. *caerulea*	3	5.4, 5.3, 3.5	14.2	20	15	3	3	X						X		X

TABLE A-1
SUMMARY OF TREE DATA

									Jurisdiction				Project Area			Impact/Disposition	
Tree No.	**Tree Species**	**# Main Trunks**	**DBH (in)**	**Sum of Trunks**	**Height (ft)**	**Canopy Diameter (ft)**	**Health Rating**	**Aesthetic Rating**	**South Pasadena**	**Pasadena**	**Los Angeles**	**CDFW**	**San Rafael Site**	**Equestrian Trail Area**	**San Pascual Site**	**Removal**	**Protect In Place**
373	western sycamore *Platanus racemosa*	4	20.2, 17.1, 16.0, 13.5	66.8	45	30	4	4	X			X			X		X
374	coast live oak *Quercus agrifolia*	1	5.1	5.1	20	8	4	3	X			X			X	X	
375	black willow *Salix gooddingii*	2	7.0, 6.0	13.0	20	18	3	2	X			X			X	X	
376	western sycamore *Platanus racemosa*	2	18.3, 12.4	30.7	40	25	3	3	X			X			X	X	
377	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	6.5	6.5	20	10	3	2	X						X	X	
378	western sycamore *Platanus racemosa*	6	34.8, 15.8, 13.1, 9.0, 7.5, 5.0	85.2	60	30	4	4	X			X			X		X
379	Brazilian pepper *Schinus terebinthifolia*	1	23.2	23.2	15	20	4	2	X						X	X	
380	black willow *Salix gooddingii*	1	15.0	15.0	35	15	4	3	X			X			X	X	
381	black willow *Salix gooddingii*	1	4.5	4.5	25	15	4	3	X			X			X	X	
382	black willow *Salix gooddingii*	1	5.0	5.0	25	15	4	3	X			X			X	X	
383	black willow *Salix gooddingii*	2	4.5, 3.5	8.0	30	20	4	3	X			X			X	X	
384	black willow *Salix gooddingii*	1	4.0	4.0	25	12	4	3	X			X			X	X	
385	western sycamore *Platanus racemosa*	2	29.5, 27.9	57.4	50	40	4	4	X			X			X		X
386	Brazilian pepper *Schinus terebinthifolia*	5	14.5, 14.0, 12.0, 10.5, 7.0	58.0	15	25	3	3	X						X		X
387	Mexican fan palm *Washingtonia robusta*	1	16.0	16.0	40	10	4	3	X						X	X	
388	Mexican fan palm *Washingtonia robusta*	1	18.0	18.0	50	10	4	3	X						X	X	
389	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
390	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
391	Mexican fan palm *Washingtonia robusta*	1	22.0	22.0	50	10	4	3	X						X	X	
392	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
393	Mexican fan palm *Washingtonia robusta*	1	18.0	18.0	45	10	4	3	X						X	X	
394	Mexican fan palm *Washingtonia robusta*	1	28.0	28.0	55	12	4	3	X						X	X	
395	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
396	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	

TABLE A-1
SUMMARY OF TREE DATA

									Jurisdiction				Project Area			Impact/Disposition	
Tree No.	Tree Species	# Main Trunks	DBH (in)	Sum of Trunks	Height (ft)	Canopy Diameter (ft)	Health Rating	Aesthetic Rating	South Pasadena	Pasadena	Los Angeles	CDFW	San Rafael Site	Equestrian Trail Area	San Pascual Site	Removal	Protect In Place
397	Mexican fan palm *Washingtonia robusta*	1	22.0	22.0	50	10	4	3	X						X	X	
398	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
399	Mexican fan palm *Washingtonia robusta*	1	12.0	12.0	35	10	4	3	X						X	X	
400	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
401	Mexican fan palm *Washingtonia robusta*	1	12.0	12.0	40	10	4	3	X						X	X	
402	Mexican fan palm *Washingtonia robusta*	1	18.0	18.0	50	10	4	3	X						X	X	
403	Mexican fan palm *Washingtonia robusta*	1	18.0	18.0	50	10	4	3	X						X	X	
404	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
405	Mexican fan palm*Washingtonia robusta*	1	18.0	18.0	50	10	4	3	X						X	X	
406	Mexican fan palm *Washingtonia robusta*	1	8.0	8.0	30	10	4	3	X						X	X	
407	Mexican fan palm *Washingtonia robusta*	1	12.0	12.0	40	10	4	3	X						X	X	
408	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
409	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
410	Mexican fan palm *Washingtonia robusta*	1	15.0	15.0	40	10	4	3	X						X	X	
411	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
412	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
413	Mexican fan palm *Washingtonia robusta*	1	18.0	18.0	50	10	4	3	X						X	X	
414	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
415	Mexican fan palm *Washingtonia robusta*	1	18.0	18.0	50	10	4	3	X						X	X	
416	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	60	10	4	3	X						X	X	
417	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
418	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
419	Mexican fan palm *Washingtonia robusta*	1	10.0	10.0	35	10	4	3	X						X	X	
420	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	60	10	4	3	X						X	X	

TABLE A-1
SUMMARY OF TREE DATA

Tree No.	Tree Species	# Main Trunks	DBH (in)	Sum of Trunks	Height (ft)	Canopy Diameter (ft)	Health Rating	Aesthetic Rating	Jurisdiction				Project Area			Impact/Disposition	
									South Pasadena	Pasadena	Los Angeles	CDFW	San Rafael Site	Equestrian Trail Area	San Pascual Site	Removal	Protect In Place
421	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
422	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
423	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
424	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
425	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
426	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
427	Mexican fan palm *Washingtonia robusta*	1	15.0	15.0	40	10	4	3	X						X	X	
428	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
429	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
430	Mexican fan palm *Washingtonia robusta*	1	20.0	20.0	50	10	4	3	X						X	X	
431	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	60	10	4	3	X						X	X	
432	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
433	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
434	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
435	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
436	Mexican fan palm *Washingtonia robusta*	1	18.0	18.0	50	10	4	3	X						X	X	
437	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
438	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
439	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
440	Mexican fan palm *Washingtonia robusta*	1	12.0	12.0	50	10	4	3	X						X	X	
441	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
442	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
443	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
444	Mexican fan palm *Washingtonia robusta*	1	8.0	8.0	30	10	4	3	X						X	X	

TABLE A-1
SUMMARY OF TREE DATA

									Jurisdiction				Project Area			Impact/Disposition	
Tree No.	Tree Species	# Main Trunks	DBH (in)	Sum of Trunks	Height (ft)	Canopy Diameter (ft)	Health Rating	Aesthetic Rating	South Pasadena	Pasadena	Los Angeles	CDFW	San Rafael Site	Equestrian Trail Area	San Pascual Site	Removal	Protect In Place
445	Mexican fan palm *Washingtonia robusta*	1	8.0	8.0	30	10	4	3	X						X	X	
446	Mexican fan palm *Washingtonia robusta*	1	10.0	10.0	30	10	4	3	X						X	X	
447	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	60	10	4	3	X						X	X	
448	Mexican fan palm *Washingtonia robusta*	1	36.0	36.0	60	12	4	3	X						X	X	
449	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	60	10	4	3	X						X	X	
450	Mexican fan palm *Washingtonia robusta*	1	18.0	18.0	50	10	4	3	X						X	X	
451	Mexican fan palm *Washingtonia robusta*	1	15.0	15.0	40	10	4	3	X						X	X	
452	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
453	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
454	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
455	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
456	Mexican fan palm *Washingtonia robusta*	1	12.0	12.0	40	10	4	3	X						X	X	
457	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
458	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
459	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
460	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
461	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
462	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3			X				X	X	
463	Mexican fan palm *Washingtonia robusta*	1	12.0	12.0	40	10	4	3			X				X	X	
464	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	12	4	3	X						X	X	
465	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
466	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3	X						X	X	
467	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3			X				X	X	
468	Mexican fan palm *Washingtonia robusta*	1	24.0	24.0	50	10	4	3			X				X	X	

TABLE A-1
SUMMARY OF TREE DATA

Tree No.	Tree Species	# Main Trunks	DBH (in)	Sum of Trunks	Height (ft)	Canopy Diameter (ft)	Health Rating	Aesthetic Rating	Jurisdiction				Project Area			Impact/Disposition	
									South Pasadena	Pasadena	Los Angeles	CDFW	San Rafael Site	Equestrian Trail Area	San Pascual Site	Removal	Protect In Place
469	Mexican fan palm *Washingtonia robusta*	1	18.0	18.0	50	10	4	3			X				X	X	
470	Brazilian pepper *Schinus terebinthifolia*	14	25.6, 19.5, 16.0, 9.0, 6.0, 6.0, 5.0, 5.0, 4.0, 4.0, 4.0	104.1	25	20	3	2			X			X			X
471	coast live oak *Quercus agrifolia*	1	14.5	14.5	20	10	2	2			X	X		X			X
472	coast live oak *Quercus agrifolia*	1	11.5	11.5	30	12	4	3			X			X			X
473	coast live oak *Quercus agrifolia*	1	8.1	8.1	35	12	4	4			X			X			X
474	blue elderberry *Sambucus nigra* ssp. *caerulea*	3	23.4, 18.5, 4.0	45.9	25	20	4	3			X			X			X
475	blue elderberry *Sambucus nigra* ssp. *caerulea*	3	17.3, 6.5, 3.5	27.3	20	15	3	2			X			X			X
476	valley oak *Quercus lobata*	1	18.0	18.0	40	15	3	3			X			X			X
477	coast live oak *Quercus agrifolia*	1	13.0	13.0	50	15	4	4			X			X			X
478	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	15.5	15.5	25	15	2	2			X			X			X
479	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	9.5	9.5	20	15	3	2			X			X			X
480	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	20.8	20.8	35	15	4	3			X			X			X
481	coast live oak *Quercus agrifolia*	1	6.5	6.5	30	20	4	3			X			X			X
482	coast live oak *Quercus agrifolia*	1	8.0	8.0	30	20	4	4			X			X			X
483	coast live oak *Quercus agrifolia*	1	7.0	7.0	30	20	4	3			X			X			X
484	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	17.8, 12.3	30.1	20	20	3	2			X			X			X
485	coast live oak *Quercus agrifolia*	2	5.5, 4.4	9.9	20	15	4	3	X					X			X
486	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	9.7, 8.7	18.4	15	12	3	2	X					X			X
487	Peruvian peppertree *Schinus molle*	2	20.4, 20.0	40.4	40	25	4	2		X				X			X
488	Peruvian peppertree *Schinus molle*	2	21.1, 19.1	40.2	25	20	3	2		X				X			X
489	Peruvian peppertree *Schinus molle*	2	42.3, 31.1	73.4	45	40	5	4		X				X			X
490	Peruvian peppertree *Schinus molle*	2	17.1, 16.2	33.3	40	25	4	3		X				X			X
491	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	15.5	15.5	30	18	2	2		X				X			X
492	coast live oak *Quercus agrifolia*	2	7.0, 5.4	12.4	20	15	3	3		X				X			X

TABLE A-1
SUMMARY OF TREE DATA

									Jurisdiction				Project Area			Impact/Disposition	
Tree No.	**Tree Species**	**# Main Trunks**	**DBH (in)**	**Sum of Trunks**	**Height (ft)**	**Canopy Diameter (ft)**	**Health Rating**	**Aesthetic Rating**	**South Pasadena**	**Pasadena**	**Los Angeles**	**CDFW**	**San Rafael Site**	**Equestrian Trail Area**	**San Pascual Site**	**Removal**	**Protect In Place**
493	coast live oak *Quercus agrifolia*	4	8.7, 4.9, 4.0, 3.0	20.6	25	15	3	3		X				X			X
494	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	17.1, 7.6	24.7	18	25	2	2		X				X			X
495	coast live oak *Quercus agrifolia*	1	47.3	47.3	60	40	5	5		X				X			X
496	coast live oak *Quercus agrifolia*	1	22.7	22.7	40	20	3	3		X		X		X			X
497	coast live oak *Quercus agrifolia*	1	6.6	6.6	15	12	4	4			X	X	X				X
498	coast live oak *Quercus agrifolia*	1	17.5	17.5	35	25	3	3			X	X	X				X
499	coast live oak *Quercus agrifolia*	4	19.6, 18.1, 13.2, 12.2	63.1	50	40	3	4			X	X	X				X
500	coast live oak *Quercus agrifolia*	1	9.0	9.0	30	18	4	4			X	X	X				X
501	coast live oak *Quercus agrifolia*	1	14.5	14.5	25	20	4	4			X	X	X				X
502	coast live oak *Quercus agrifolia*	1	8.5	8.5	20	12	4	4			X	X	X				X
503	coast live oak *Quercus agrifolia*	1	11.0	11.0	25	20	4	3			X	X	X				X
504	coast live oak *Quercus agrifolia*	1	6.3	6.3	20	12	4	3			X	X	X				X
505	coast live oak *Quercus agrifolia*	1	9.2	9.2	25	15	4	4			X	X	X				X
506	coast live oak *Quercus agrifolia*	2	8.6, 8.5	17.1	25	20	4	3			X	X	X				X
507	coast live oak *Quercus agrifolia*	1	8.9	8.9	20	15	4	4			X	X	X				X
508	coast live oak *Quercus agrifolia*	2	17.7, 8.9	26.6	25	20	3	2			X	X	X				X
509	coast live oak *Quercus agrifolia*	1	19.9	19.9	35	30	4	4			X	X	X				X
510	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	11.1	11.1	20	12	4	4			X		X				X
511	coast live oak *Quercus agrifolia*	1	8.7	8.7	15	15	3	3			X		X				X
512	blue elderberry *Sambucus nigra* ssp. *caerulea*	10	11.6, 8.9, 8.0, 6.5, 6.0, 5.0, 4.0, 4.0, 4.0, 4.0	62.0	18	30	3	2		X			X				X
513	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	12.4, 10.6	23.0	20	20	3	3		X			X				X
514	coast live oak *Quercus agrifolia*	1	18.4	18.4	30	20	4	4		X		X	X				X
515	coast live oak *Quercus agrifolia*	2	4.8, 4.3	9.1	20	10	3	3		X			X				X
516	blue elderberry *Sambucus nigra* ssp. *caerulea*	9	14.4, 6.2, 6.0, 4.5, 4.0, 4.0, 4.0, 3.0, 3.0	49.1	20	25	3	2		X			X				X

TABLE A-1
SUMMARY OF TREE DATA

Tree No.	Tree Species	# Main Trunks	DBH (in)	Sum of Trunks	Height (ft)	Canopy Diameter (ft)	Health Rating	Aesthetic Rating	Jurisdiction				Project Area			Impact/Disposition	
									South Pasadena	Pasadena	Los Angeles	CDFW	San Rafael Site	Equestrian Trail Area	San Pascual Site	Removal	Protect In Place
517	coast live oak *Quercus agrifolia*	5	14.4, 12.6, 12.4, 11.8, 8.3	59.5	30	25	4	4		X			X				X
518	coast live oak *Quercus agrifolia*	2	17.9, 15.8	33.7	40	30	4	4		X			X				X
519	coast live oak *Quercus agrifolia*	2	10.6, 4.1	14.7	15	15	3	2		X			X				X
520	coast live oak *Quercus agrifolia*	1	14.4	14.4	35	20	3	3		X			X				X
521	coast live oak *Quercus agrifolia*	1	12.2	12.2	35	20	4	3		X			X				X
522	blue elderberry *Sambucus nigra* ssp. *caerulea*	3	11.8, 10.5, 7.1	29.4	15	20	3	3			X		X				X
523	blue elderberry *Sambucus nigra* ssp. *caerulea*	3	12.4, 5.5, 5.1	23.0	40	30	3	3		X			X			X	
524	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	13.8, 5.6	19.4	40	35	3	3		X			X				X
525	scrub oak *Quercus berberidifolia*	1	2.3	2.3	9	12	4	4		X		X	X				X
526	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	9.6, 5.7	15.3	10	25	3	3		X			X			X	
527	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	21.1	21.1	25	30	3	3		X			X			X	
528	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	15.1	15.1	30	20	3	3		X			X			X	
529	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	13.9, 6.2	20.1	30	25	3	3		X			X			X	
530	blue elderberry *Sambucus nigra* ssp. *caerulea*	3	12.4, 12.2, 6.8	31.4	30	30	3	3		X			X			X	
531	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	15.8	15.8	30	25	3	3		X			X				X
532	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	15.0	15.0	20	25	1	1		X			X				X
533	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	16.8	16.8	25	30	3	3		X			X				X
534	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	13.9, 7.1	21.0	30	25	3	3		X			X				X
535	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	14.8, 9.8	24.6	25	45	3	3		X			X				X
536	blue elderberry *Sambucus nigra* ssp. *caerulea*	2	12.5, 10.0	22.5	15	30	3	3		X			X				X
537	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	18.5	18.5	25	30	2	2		X			X				X
538	blue elderberry *Sambucus nigra* ssp. *caerulea*	1	22.8	22.8	15	25	1	1		X			X				X
539	blue elderberry *Sambucus nigra* ssp. *caerulea*	4	19.5, 15.1, 14.4, 4.5	53.5	30	30	2	2		X			X				X
540	coast live oak *Quercus agrifolia*	1	14.6	14.6	35	30	4	4		X			X				X

TABLE A-1
SUMMARY OF TREE DATA

Tree No.	Tree Species	# Main Trunks	DBH (in)	Sum of Trunks	Height (ft)	Canopy Diameter (ft)	Health Rating	Aesthetic Rating	Jurisdiction				Project Area			Impact/Disposition	
									South Pasadena	Pasadena	Los Angeles	CDFW	San Rafael Site	Equestrian Trail Area	San Pascual Site	Removal	Protect In Place
541	coast live oak *Quercus agrifolia*	1	15.7	15.7	35	40	4	4		X			X				X
542	Southern California black walnut *Juglans californica*	2	5.8, 2.2	8.0	20	25	4	4		X			X				X

Aesthetics/Health Rating: 1=Very Poor, 2=Poor, 3=Fair, 4=Good, and 5=Excellent
DBH: diameter at breast height; in: inches; ft: feet; CDFW: California Department of Fish and Wildlife

ATTACHMENT B

JURISDICTIONAL DELINEATION REPORT

Jurisdictional Delineation Report

Arroyo Seco Water Reuse Project
Cities of Pasadena, South Pasadena, and Los Angeles, California

Prepared for

City of Pasadena
Department of Public Works
100 North Garfield Avenue
Pasadena, California 91101
Contact: Brent Maue, Assistant City Engineer

Prepared by

Psomas
225 South Lake Avenue, Suite 1000
Pasadena, California 91101
Contact: David T. Hughes, Senior Project Manager
T: (626) 204-6530

November 16, 2023

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<u>Attachment</u>

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B Site Photographs
C Literature Review Details
D Wetland Determination Data Forms
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EXECUTIVE SUMMARY

The purpose of this Jurisdictional Delineation Report is to provide baseline data concerning the type and extent of jurisdictional resources in the vicinity of the Arroyo Seco Water Reuse and Natural Stream Restoration Project (hereafter referred to as the Project) and to determine the amount of these resources that would be affected by the Project. The Project is located in the cities of Pasadena, South Pasadena, and Los Angeles, California. Jurisdictional resources considered for this report include wetlands and non-wetland “waters of the United States” (WOTUS) regulated by the U.S. Army Corps of Engineers (USACE); “waters of the State” regulated by the Regional Water Quality Control Board (RWQCB); and the bed, bank, and channel of all lakes, rivers, and/or streams (and associated riparian vegetation), as regulated by the California Department of Fish and Wildlife (CDFW).

The limits of non-wetland WOTUS and “waters of the State” were identified by the presence of an ordinary high water mark (OHWM) and by the width of concrete-lined storm drain channels. Wetland features were identified based on the USACE’s three-parameter approach in which wetlands are defined by the presence of hydrophytic vegetation, hydric soils, and presence of wetland hydrology indicators.

The jurisdictional delineation work was performed by Psomas Regulatory Specialist David Hughes and Biologist Trevor Bristle on February 10, 2022. Three separate areas were assessed for the presence of jurisdictional waters: San Rafael Creek, Arroyo Seco Channel, and San Pascual Basin. Based on the results of the jurisdictional delineation field work, it was determined that the total amount of jurisdictional resources on the survey area is as follows:

- **USACE Jurisdictional “waters of the U.S.”:**
  San Rafael Creek: 0.098 acre of non-wetlands
  Arroyo Seco Channel: 2.604 acre of non-wetlands
  San Pascual Basin: 0.283 acre (0.219 acre of non-wetlands, 0.064 acre of wetlands)
- **RWQCB Jurisdictional “waters of the State”:**
  San Rafael Creek: 0.098 acre of non-wetlands
  Arroyo Seco Channel: 2.604 acre of non-wetlands
  San Pascual Basin: 0.285 acre (0.221 acre of non-wetlands, 0.064 acre of wetlands)
- **CDFW Jurisdictional Streambeds:**
  San Rafael Creek: 0.098 acre
  Arroyo Seco Channel: 3.018 acre
  San Pascual Basin: 1.798 acre

1.0 INTRODUCTION

This Jurisdictional Delineation Report has been prepared for the Pasadena Department of Public Works to provide baseline data concerning the type and extent of resources under the jurisdiction of the U.S. Army Corps of Engineers (USACE), Los Angeles Regional Water Quality Control Board (RWQCB), and California Department of Fish and Wildlife (CDFW) that would be affected by the implementation of the Arroyo Seco Water Reuse and Natural Stream Restoration Project (hereafter referred to as the Project) located in the cities of Pasadena, South Pasadena, and Los Angeles, California.

1.1 PROJECT LOCATION

The survey area for this report is generally centered along a portion of the Arroyo Seco Channel that begins just south of the San Rafael Avenue bridge in the City of Pasadena and extends approximately ½-mile south (downstream), near the 110 freeway overpass in the City of South Pasadena (Exhibit 1). The survey area encompasses the two discrete Project sites, construction staging areas, and adjacent areas. In addition to Pasadena and South Pasadena, the Project site also passes through a portion of the City of Los Angeles. The survey area is located on the U.S. Geological Survey's (USGS') Pasadena and Los Angeles 7.5-minute quadrangles of the San Bernardino Meridian at Township 1 North, Range 12 West, Section 32 and Township 1 South, Range 12 West, Section 5.

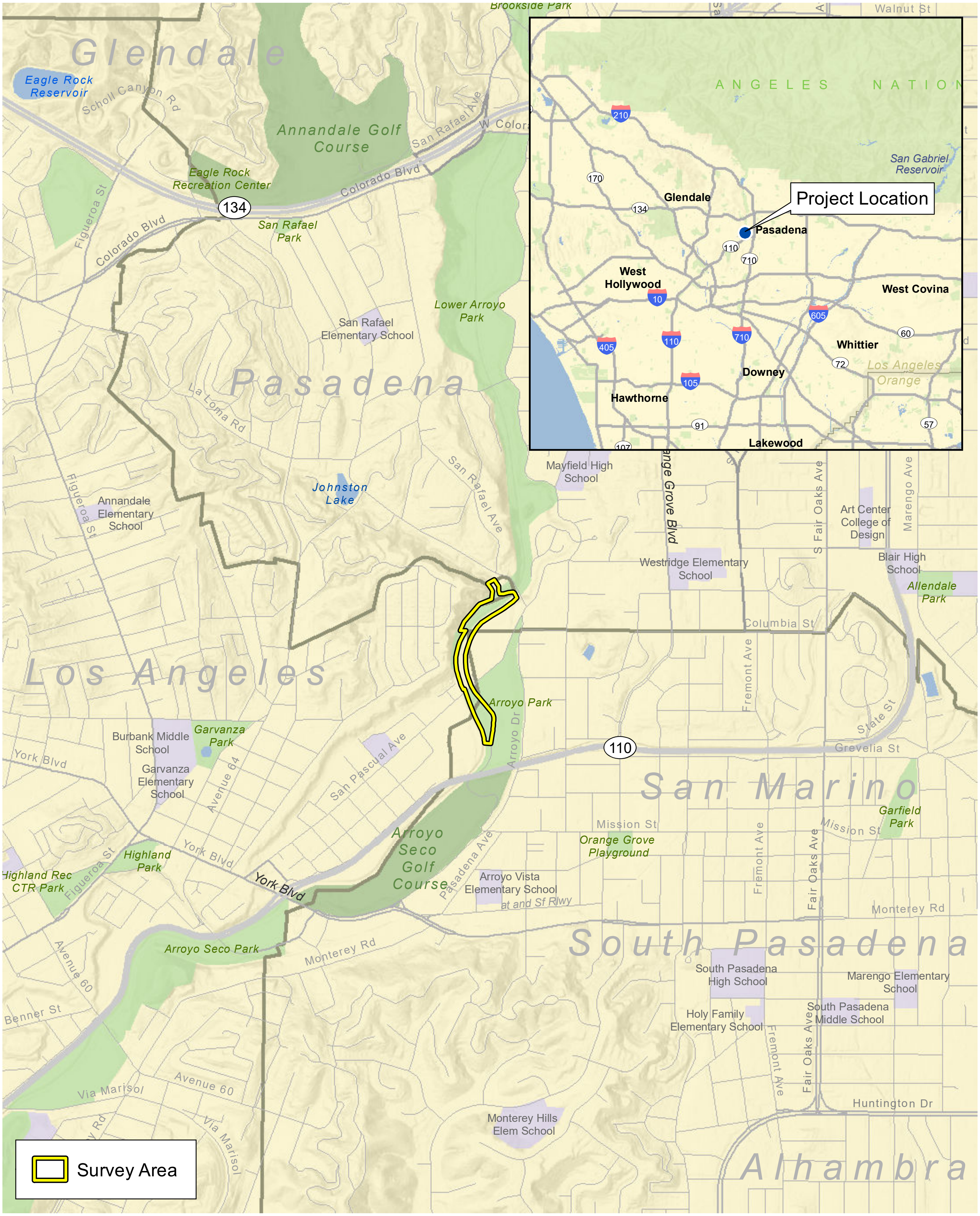
1.2 EXISTING CONDITIONS

The survey area is divided into three general sub-areas for ease of reference. These include: (1) the San Rafael Creek area at the northern end of the survey area (near the San Pasqual Stables equestrian center), which consists of a concrete-lined drain that conveys water from the Johnston Lake area and adjacent residential areas that are located northwest of the survey area and drains into the Arroyo Seco; (2) the Arroyo Seco Channel, along which a dirt equestrian trail runs along its easterly bank adjacent to the San Pascual Stables; and (3) the San Pascual Basin area, a densely vegetated basin that accepts flows diverted from the Arroyo Seco and is located at the northern end of Arroyo Park in the City of South Pasadena. These project sub-areas are shown in Exhibit 2.

1.3 PROJECT DESCRIPTION

The proposed Project involves the diversion of stormwater runoff from San Rafael Creek into treatment wetlands that would be created in an adjacent upland area. These treatment wetlands would improve water quality and allow for soil infiltration before discharging this treated water into the Arroyo Seco. Further downstream, water would be diverted from the Arroyo Seco to water treatment facilities and infiltration basins constructed in the approximate 2.5-acre San Pascual Basin site. A portion of the Arroyo Seco Channel that is located between the San Rafael Creek and San Pascual Basin areas was included in the survey to assess jurisdictional waters between the two Project areas that may be affected by Project implementation.

To provide access for construction vehicles to the San Rafael Creek area, a temporary concrete bridge will be built to span the Arroyo Seco Channel from the northwest corner of the San Pasqual Stables to the southern portion of the San Rafael Creek area. This temporary bridge is necessary to provide an access point that would accommodate the weight of all anticipated construction vehicles.



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Local Vicinity

Exhibit 1

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

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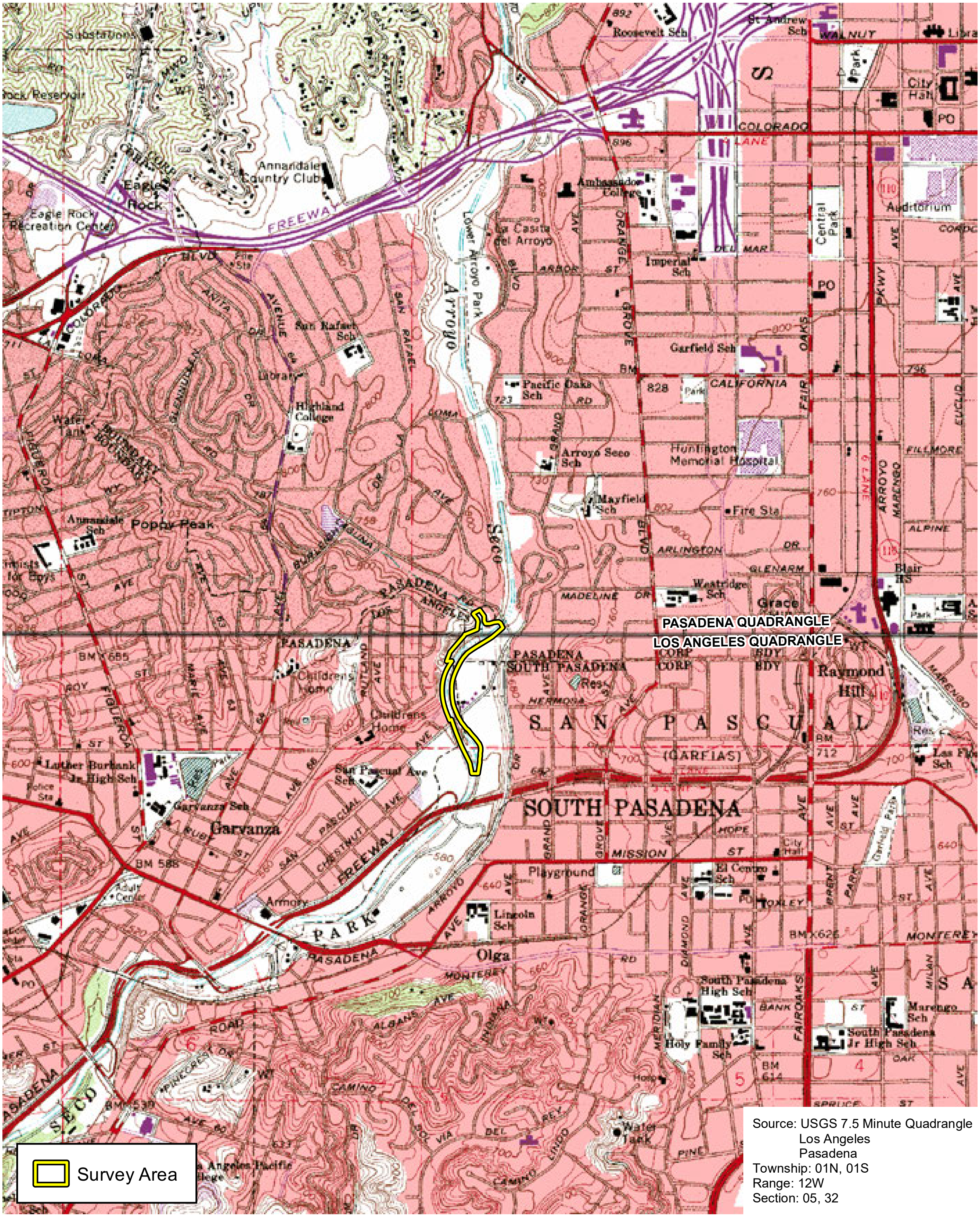

U.S. Geological Survey 7.5-Minute Quadrangle

Exhibit 2

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

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Project Site

Exhibit 3

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

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1.4 REGULATORY AUTHORITY

This section summarizes the federal and State agencies' regulatory jurisdiction over activities that have a potential to impact jurisdictional resources. A detailed explanation of each agency's regulatory authority is provided in Attachment A.

1.4.1 U.S. Army Corps of Engineers

The USACE Regulatory Branch regulates activities that discharge dredged or fill materials into "waters of the United States" (WOTUS) under Section 404 of the Federal Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act. Its authority applies to all WOTUS where the material (1) replaces any portion of a WOTUS with dry land or (2) changes the bottom elevation of any portion of any WOTUS. Activities that result in fill or dredge of WOTUS require a permit from the USACE.

Recently, the definition of WOTUS has been the subject of shifting regulations. Recent federal revisions to regulations that address the extent of USACE jurisdiction and the definition of WOTUS have been issued by the Obama Administration in 2015 and the Trump Administration in 2020. On January 18, 2023, the United States Environmental Protection Agency (USEPA) published a final Water Rule in the Federal Register that took effect on March 20, 2023. To conform to the May 25, 2023 ruling by the U.S. Supreme Court (*Sackett v. EPA*), the USEPA issued a revised definition of WOTUS that was published in the Code of Federal Regulations (CFR) on September 8, 2023. The updated definition of WOTUS is provided in Title 40 §120.2(a) of the CFR and identifies federal jurisdiction under the CWA as:

1. Traditional Navigable Waters (TNWs), the territorial seas, and interstate non-wetland waters ("paragraph (a)(1) waters");
2. Impoundments of "waters of the United States" ("paragraph (a)(2) impoundments");
3. Tributaries to paragraph (a)(1) waters or (a)(2) impoundments when the tributaries are relatively permanent, standing or continuously flowing bodies of waters ("jurisdictional tributaries");
4. Wetlands that have a continuous surface connection to paragraph (a)(1) waters, or relatively permanent, standing or continuously flowing jurisdictional tributaries that have a continuous surface connection to paragraph (a)(1) waters; and
5. Intrastate lakes and ponds not identified in paragraphs (a)(1) through (4) that are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to paragraph (a)(1) waters or jurisdictional tributaries.

1.4.2 Regional Water Quality Control Board

The State Water Resources Control Board (SWRCB), in conjunction with the nine RWQCBs, is the primary agency responsible for protecting water quality in California through the regulation of discharges to surface waters under the CWA and the California Porter-Cologne Water Quality Control Act (Porter-Cologne Act). The SWRCB's and RWQCBs' jurisdictions extend to all "waters of the State" and to all WOTUS, including wetlands (isolated and non-isolated).

The Porter-Cologne Act broadly defines "waters of the State" as any surface water or groundwater, including saline waters, within the boundaries of the State." On August 28, 2019, the Office of Administrative Law approved the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to "waters of the State", which went into effect on May 28, 2020. Under these new regulations, the SWRCB and its nine RWQCBs will assert jurisdiction over all existing WOTUS, and all waters that have been considered WOTUS under any historical definition.

Impacts to WOTUS are authorized by the RWQCBs through a Water Quality Certification per Section 401 of the CWA. Impacts to "waters of the State" that are not considered WOTUS would be authorized by Waste Discharge Requirements issued by the RWQCB, pursuant to California's Porter-Cologne Water Quality Control Act.

On April 6, 2022, the U.S. Supreme Court issued a stay of the October 2021 order by the U.S. District Court for the Northern District of California that vacated EPA's 2020 Clean Water Act Section 401 Certification Rule (2020). The stay of the vacatur applies nationwide. Therefore, the CWA section 401 certification process is once again governed by the CWA section 401 certification regulations promulgated by USEPA in 2020, codified at 40 CFR 121. This 2020 rule requires all project proponents to request a pre-filing meeting with the RWQCB at least 30 days prior to filing a 401 "Certification Request". The filing procedure has been simplified to require the filing of a "Certification Request", rather than the acceptance of a "complete application".

There is a mandatory 30-day wait period between a pre-filing meeting request and the filing of a Certification Request. A Certification Request must be filed with the RWQCB and the USACE concurrently. USACE reviews the Certification Request for the nine required components. The USACE has 15 days to review the Certification Request. The USACE then notifies the RWQCB that request is complete. And concurrently notifies the RWQCB of the reasonable time period to act on the Certification Request. The reasonable time period is not to exceed 1 year. Within 15 days of receipt of the Certification Request the RWQCB must provide the applicant with the following: 1) date of receipt; 2) applicable reasonable period of time to act on the Certification Request; and 3) date upon which waiver will occur if the certifying authority fails or refuses to act on the Certification Request. It should be noted that the RWQCB may require that the findings of the Jurisdictional Delineation Report be certified by the USACE prior to issuing a Section 401 Water Quality Certification.

Once the RWQCB issues the 401 Certification, the USACE has 5 days to notify the USEPA that the 401 Certification has been issued. The USEPA then has 30 days to notify neighboring jurisdictions of the 401 Certification. Neighboring jurisdictions have 60 days to respond. If there are no objections to the 401 Certification, then the USACE issues the 404 permit. It should be noted that the RWQCB may require that the findings of the Jurisdictional Delineation Report be certified by the USACE prior to issuing a Section 401 Water Quality Certification.

1.4.3 California Department of Fish and Wildlife

The CDFW regulates activities that may affect rivers, streams, and lakes pursuant to the *California Fish and Game Code* (§§1600–1616). According to Section 1602 of the *California Fish and Game Code,* the CDFW has jurisdictional authority over any work that will (1) substantially divert or obstruct the natural flow of any river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

2.0 METHODS

2.1 FIELD SURVEY

The analysis contained in this report uses the results of a field survey conducted by Psomas Regulatory Specialist David Hughes and Biologist Trevor Bristle on February 10, 2022. Jurisdictional features were delineated using a 1 inch equals 100 feet (1″ = 100′) scale aerial photograph. Jurisdictional drainage features were mapped as a line and the width of the agency jurisdiction was noted; other waterbodies (basins) were mapped as polygons.

Photographs that show conditions within the survey area are provided in Attachment B.

2.2 JURISDICTIONAL DELINEATION

2.2.1 Non-Wetlands

Non-wetland WOTUS are delineated based on the limits of the Ordinary High Water Mark (OHWM), which can be determined by a number of factors, including the presence of a clear, natural line impressed on the bank; shelving; changes in the character of the soil; destruction of terrestrial vegetation; and the presence of litter and debris. The OHWM limits (i.e., active floodplain) occurring in the survey area as based on methods contained in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*, *A Delineation Manual* (Lichvar and McColley 2008) and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010).

It should be noted that the RWQCB shares USACE jurisdiction unless a feature does not convey relatively permanent flows or if a feature is isolated and does not have a surface connection to a downstream TNW. If these conditions occur, the RWQCB takes jurisdiction using the USACE's definition of the OHWM and/or the three-parameter wetlands method pursuant to the 1987 Wetlands Manual. The CDFW's jurisdiction is defined as the top of the bank on either side of a stream, channel, or basin or to the outer limit of riparian vegetation located within or immediately adjacent to the river, stream, creek, pond, lake, or other impoundment.

For hardened channels such as the Arroyo Seco and San Rafael Creek, the width of the OHWM is determined by the extent of the flat bottom section of the channel. The CDFW will assert jurisdiction to the top of the banks of these channels, which is equal to the OHWM width for channels with vertical sidewalls.

2.2.2 Wetlands

The three-parameter approach is used to identify USACE wetlands based on the procedure described by the USACE in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008). The presence of wetlands is determined by the presence of indicators that provide evidence of the presence of (1) wetland hydrology, (2) hydrophytic vegetation, and (3) hydric soils. These criteria are described in more detailed in this section.

Vegetation

Hydrophytic vegetation (or hydrophytes) is defined as any macrophytic plant that "grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; plants typically found in wet habitats" (Environmental Laboratory 1987). Specifically, these plant species have specialized morphological, physiological, or other adaptations for surviving in permanently saturated to periodically saturated soils where oxygen levels are very low or the soils are anaerobic. Lichvar and Gillrich (2011) provide the following technical definitions of wetland plant indicator status categories:

- **Obligate Wetland (OBL):** These wetland-dependent plants (herbaceous or woody) require standing water or seasonally saturated soils (14 or more consecutive days) near the surface to assure adequate growth, development, and reproduction and to maintain healthy populations.
- **Facultative Wetlands (FACW):** These plants depend on and predominantly occur with hydric soils, standing water, or seasonally high water tables in wet habitats for assuring optimal growth, development, and reproduction and for maintaining healthy populations. These plants often grow in geomorphic locations where water saturates soils or floods the soil surface at least seasonally.
- **Facultative (FAC):** These plants can occur in wetlands or non-wetlands. They can grow in hydric, mesic, or xeric habitats. The occurrence of these plants in different habitats represents responses to a variety of environmental variables other than just hydrology (e.g., shade tolerance, soil hydrogen potential [pH], and elevation) and they have a wide tolerance of soil moisture conditions.
- **Facultative Upland (FACU):** These plants are not wetland dependent. They can grow on hydric and seasonally saturated soils, but they develop optimal growth and healthy populations on predominantly drier or more mesic sites. Unlike FAC plants, these plants are non-wetland plants by habitat preference.
- **Upland (UPL):** These plants occupy mesic to xeric non-wetland habitats. They almost never occur in standing water or saturated soils. Typical growth forms include herbaceous, shrubs, woody vines, and trees.

The USACE—as part of an interagency effort with the U.S. Environmental Protection Agency (USEPA), the U.S. Fish and Wildlife Service (USFWS), and the U.S. Department of Agriculture's Natural Resources Conservation Service (USDA NRCS)—has approved a National Wetland Plant List (NWPL) that provides the current indicator status for plant species. The NWPL is used to determine whether the hydrophytic vegetation parameter is met when conducting wetland determinations under the CWA. The NWPL is also intended to be used for wetland restoration, establishment, and enhancement projects. This report utilized the indicator statuses for the Arid West Supplement portion of the NWPL.

The following are three procedures for determining hydrophytic vegetation: Indicator 1, "Dominance Test", using the "50/20 Rule"; Indicator 2, "Prevalence Index"; or Indicator 3, "Morphological Adaptation", as identified in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008). Hydrophytic vegetation is present if any indicator is satisfied. If none of the indicators are satisfied, then hydrophytic vegetation is absent unless (1) indicators of hydric soil and wetland hydrology are present and (2) the site meets the requirements for a problematic wetland situation.

Dominance Test: Vegetative cover is estimated and is ranked according to its dominance. Dominant species are the most abundant species for each stratum of the community (i.e., tree, sapling/shrub, herb, or woody vine) that individually or collectively amount to 50 percent of the total coverage of vegetation plus any other species that, by itself, accounts for 20 percent of the total vegetation cover (also known as the "50/20 Rule"). These species are recorded on the "Wetland Determination Data Form – Arid West Region". The wetlands indicator status of each species is also recorded on the data forms based on the *National List of Plant Species that Occur* *in Wetlands* (Reed 1988). If greater than 50 percent of the dominant species across all strata are OBL, FACW, or FAC species, the criterion for wetland vegetation is considered to be met.

Prevalence Index: The prevalence index considers all plant species in a community, not just the dominant ones. The prevalence index is the average of the wetland indicator status of all plant species in a sampling plot. Each indicator status category is given a numeric code (OBL = 1, FACW = 2, FAC = 3, FACU = 4, and UPL = 5) and is weighted by the species' abundance (percent cover). Hydrophytic vegetation is present if the prevalence index is 3.0 or less.

Morphological Adaptation: Morphological adaptations, such as adventitious roots (i.e., roots that take advantage of the wet conditions) and shallow root systems must be observed on more than 50 percent of the individuals of a FACU species for the hydrophytic vegetation wetland criterion to be met.

Soils

The National Technical Committee for Hydric Soils (NTCHS) defines a hydric soil as a soil that is formed under conditions of saturation, flooding, or ponding that occurs long enough during the growing season to develop anaerobic conditions (or conditions of limited oxygen) at or near the soil surface and that favor the establishment of hydrophytic vegetation (USDA NRCS 2017a). It should be noted that hydric soils created under artificial conditions of flooding and inundation sufficient for the establishment of hydrophytic vegetation would also meet this hydric soil indicator.

The soil conditions are verified by digging test pits along each transect to a typical depth of at least 20 inches (except where a restrictive layer occurs in areas containing hard pan, cobble, or solid rock). Soil test pit locations are usually dug within the drainage invert or at the edge of a drainage course in vegetated areas. Soil extracted from each soil test pit is then examined for texture and color using the standard plates within the Munsell Soil Color Chart (1994) and recorded on the Data Form. The Munsell Soil Color Chart aids in designating soils by color labels based on gradations of three simple variables: hue, value, and chroma. Any indicators of hydric soils such as redoximorphic features (i.e., areas where iron is reduced under anaerobic conditions and oxidized following a return to aerobic conditions); buried organic matter; organic streaking; reduced soil conditions; gleyed (i.e., soils having a characteristic bluish-gray or greenish-gray in color) or low-chroma soils; or sulfuric odor are also recorded on the Data Form. If hydric soils are found, progressive pits are dug along the transect moving laterally away from the active channel area until hydric soil features are no longer present within the top 20 inches of the soil.

Hydrology

Wetlands hydrology is represented by either (1) all of the hydrological elements or characteristics of areas permanently or periodically inundated or (2) areas containing soils that are saturated for a sufficient duration of time to create hydric soils suitable for the establishment of plant species that are typically adapted to anaerobic soil conditions. The presence of wetland hydrology is evaluated at each intersect by recording the extent of observed surface flows, the depth of inundation, the depth to saturated soils, and the depth to free water in soil test pits. In instances where stream flow is divided into multiple channels with intervening sandbars, the entire area between the channels is considered within the OHWM. Therefore, an area containing these features would meet the indicator requirements for wetland hydrology.

3.0 LITERATURE REVIEW

This section provides a summary of literature that was reviewed prior to the field survey and during report preparation that have helped inform the analysis provided in this report. Prior to conducting the delineation and during the course of report preparation, Psomas reviewed the following documents to identify areas that may fall under agency jurisdiction: the USGS' Pasadena and Los Angeles 7.5-minute topographic quadrangle maps; color aerial photography provided by Google Earth; soil data provided by the U.S. Department of Agriculture's Natural Resources Conservation Service (USDA NRCS 2022a); the National Hydric Soils List (USDA NRCS 2022b); the National Wetlands Inventory's Wetland Mapper (USFWS 2022); and the Water Quality Control Plan for the Los Angeles Region (Los Angeles RWQCB 1994). The results of this literature review are provided below.

3.1 USGS TOPOGRAPHIC QUADRANGLE

The USGS topographic quadrangle maps show geological formations and their characteristics; they describe the physical settings of an area through topographic contour lines and other major surface features. These features include lakes, streams, rivers, buildings, roadways, landmarks, and other features that may fall under the jurisdiction of one or more regulatory agencies. In addition, the USGS maps provide topographic information that is useful in determining elevations, latitude and longitude, and Universal Transverse Mercator (UTM) Grid coordinates.

The survey area occurs on the USGS' Pasadena and Los Angeles 7.5-minute topographic quadrangle map. The Arroyo Seco appears as a blueline stream, but no other drainage features that occur within the Project boundary are shown on the quadrangle map. Elevation in the Project boundary ranges from approximately 600 to 650 feet above mean sea level.

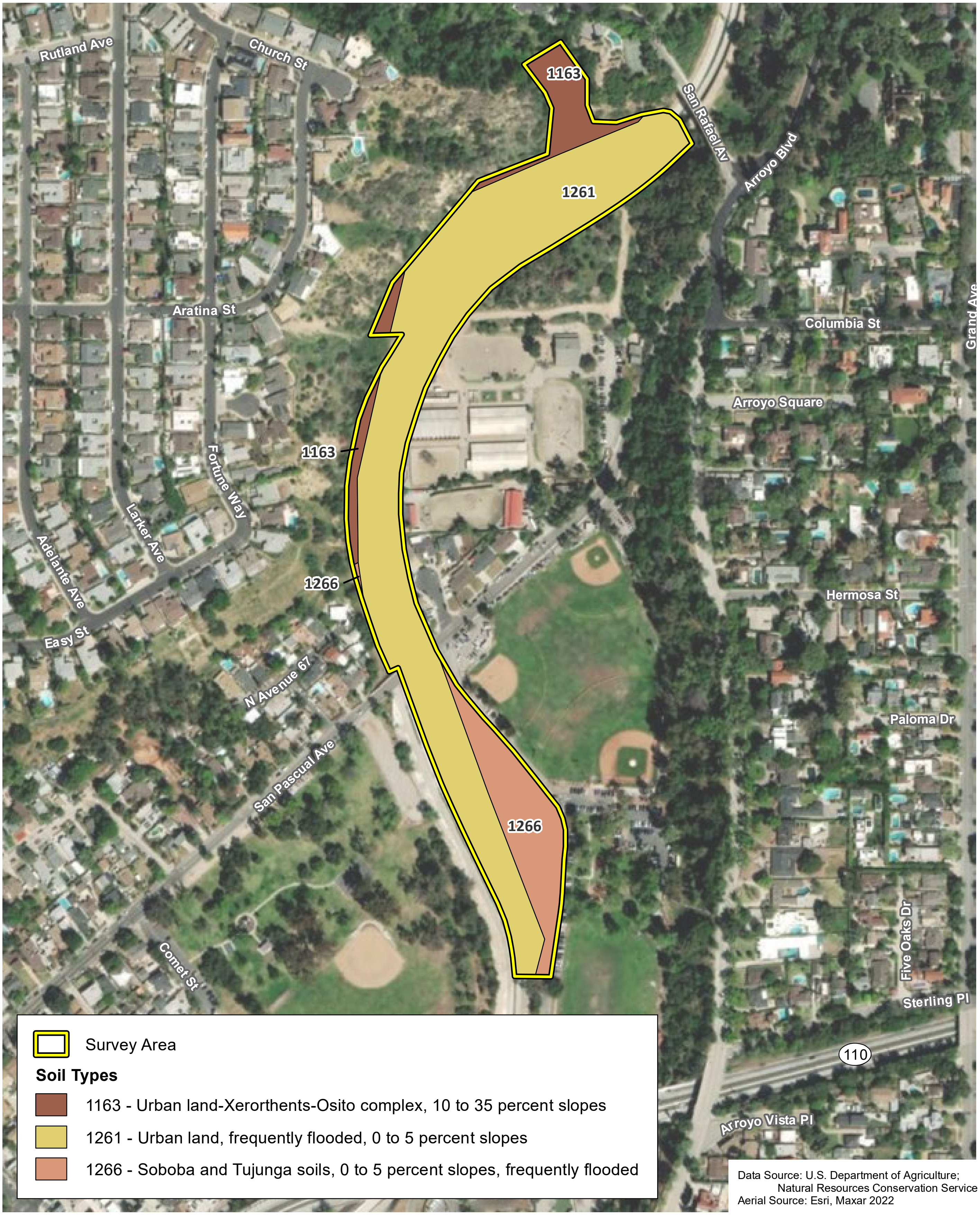
3.2 SOIL SURVEY

The presence of hydric soils is one of the chief indicators of jurisdictional wetlands. Psomas reviewed the USDA's soil data for areas within the Project boundary (Exhibit 4). The Project boundary contains the following soil types: Urban land-Xerorthents-Osito complex, 10 to 35 percent slopes, Urban land, frequently flooded, 0 to 5 percent slopes, and Soboba and Tujunga soils, 0 to 5 percent slopes, frequently flooded.

The National Hydric Soils List identifies a soil map unit as "hydric" if it contains either a major or minor component that is at least in part hydric (USDA NRCS 2022c). The survey area occurs in the Los Angeles County, Southeastern Soil Survey Area. None of the soil types listed above that occur in the Project boundary are listed on the National Hydric Soils List. A brief description of these soils is provided in Attachment C of this report.

3.3 NATIONAL WETLANDS INVENTORY

The U.S. Fish and Wildlife Service's Wetland Mapper (USFWS 2022) shows wetland resources available from the Wetlands Spatial Data Layer of the National Spatial Data Infrastructure. This resource provides the classification of known wetlands following the Classification of Wetlands and Deepwater Habitats of the United States (FGDC 2013). This classification system is arranged in a hierarchy of (1) Systems that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors (i.e., Marine Estuarine, Riverine, Lacustrine, and Palustrine); (2) Subsystems (i.e., Subtidal and Intertidal; Tidal, Lower Perennial, Upper Perennial, and Intermittent; or Littoral and Limnetic); (3) Classes, which are based on substrate material and flooding regime or on vegetative life forms; (4) Subclasses; and (5) Dominance Types, which are named for the dominant plant or wildlife forms. In addition, there are modifying terms applied to Classes or Subclasses.



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Soil Map

Exhibit 4

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

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Three jurisdictional features occur in the Project boundary, including the Arroyo Seco; San Rafael Creek which drains into the Arroyo Seco; and the San Pascual Basin at the downstream end of the Project area (Exhibit 5). The Arroyo Seco Channel is shown as R4SBAx (Riverine, Intermittent Streambed, Seasonally Flooded, Excavated). San Rafael Creek is shown as PSSA (Palustrine, Scrub-Shrub, Temporary Flooded). San Pascual Basin contains two descriptions: PFOCh (Palustrine, Forested, Seasonally Flooded, Impounded) and Rp1FO (Riparian, Lotic, Forested).

A complete description of the wetland classifications that describe these resources is provided in Attachment C.

3.4 REGIONAL WATER QUALITY CONTROL PLAN

There are nine Regional Water Quality Control Boards in California. The survey area is located within Regional Water Quality Control Board Region 4, the Los Angeles Region. The SWRCB and the Los Angeles RWQCB have adopted a Water Quality Control Plan (or “Basin Plan”) for the Los Angeles Region. The Basin Plan contains goals and policies, descriptions of conditions, and proposed solutions to surface and groundwater issues. The Basin Plan also establishes water quality standards for surface and groundwater resources and includes beneficial uses and levels of water quality that must be met and maintained to protect these uses. These water quality standards are implemented through various regulatory permits pursuant to CWA Section 401 for Water Quality Certifications and Section 402 for Report of Waste Discharge permits.

The portion of the Arroyo Seco that passes through the project site is identified by the RWQCB in the Basin Plan as Arroyo Seco Reach 1 (Watershed Boundary Dataset [WBD] 180701050209) (Los Angeles RWQCB 1994). San Rafael Creek and the San Pascual Basin are associated with Arroyo Seco Reach 1 and the Beneficial Uses identified for the Arroyo Seco would apply to these other features in the survey area as well.

Potential Beneficial Uses for Arroyo Seco Reach 1 are summarized in Table 1 and include: Municipal Water Supply (MUN); Warm Freshwater Habitat (WARM); and Wildlife Habitat (WILD). Intermittent Beneficial Uses include Limited Water Contact Recreation (REC1); and Non-Contact Water Recreation (REC2).

TABLE 1
SUMMARY OF BENEFICIAL USES

WBD	Beneficial Uses				
	MUN	WARM	WILD	REC1	REC2
180701050209 Arroyo Seco Reach 1	P	P	P	P	I

WBD: Watershed Boundary Dataset; I: Intermittent Beneficial Use; P: Potential Beneficial Use

MUN: Municipal Water Supply; WARM: Warm Freshwater Habitat; WILD: Wildlife Habitat; REC1: Limited Water Contact Recreation; REC2: Non-Contact Water Recreation

Source: Los Angeles RWQCB 1994.

Descriptions of the various Beneficial Uses are provided in Attachment C.

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National Wetland Inventory

Exhibit 5

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

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4.0 JURISDICTIONAL ANALYSIS

The survey area contains three distinct but connected jurisdictional features: (1) San Rafael Creek; (2) Arroyo Seco Channel; and (3) the San Pascual Basin. As described previously in this report, San Rafael Creek is a concrete-lined drainage that conveys water from Johnston Lake area (which lies approximately ½-mile northwest of the survey area) as well as runoff from surrounding residential areas. This channel drains directly into the Arroyo Seco at the northern end of the survey area. The Arroyo Seco is a wider, concrete-lined channel with vertical walls that flows from north to south through the survey area. Midway through the survey area, a weir diverts water from the low-flow portion of the Arroyo Seco into the San Pascual Basin via an underground culvert. Water is confined at the southern end of the basin, though water can overflow the wall that defines the lower end of the basin and drain back to the Arroyo Seco.

A summary of jurisdictional resources in the survey area is provided in Table 2 and photographs are provided in Attachment B that illustrate the general conditions in the survey area.

TABLE 2
SUMMARY OF JURISDICTIONAL RESOURCES IN THE SURVEY AREA

Survey Area	Latitude/Longitude (decimal degrees)		Feature Length (linear feet)	OHWM Width Range (feet)	USACE Jurisdiction (acres)		RWQCB Jurisdiction (acres)		CDFW Jurisdiction (acres)
	Upstream End	Downstream End			Wetland	Non-wetland	Wetland	Non-Wetland	
San Rafael Creek	34.125844°, -118.166938°	34.124887°, -118.166877°	405	6–10	0.000	0.098	0.00	0.098	0.098
Arroyo Seco Channel	34.125528°, -118.166729°	34.119197°, -118.167141°	2,730	40–50	0.000	2.604	0.00	2.604	3.018
San Pascual Basin	34.121016°, -118.167599°	34.119819°, -118.167001°	580	5–36	0.064	0.219	0.064	0.221	1.798
Total					**0.064**	**2.921**	**0.064**	**2.923**	**4.914**
OHWM: Ordinary High Water Mark; USACE: U.S. Army Corps of Engineers; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife									

4.1 "WATERS OF THE UNITED STATES" DETERMINATION

As discussed in Section 1.4, the federal government recently put forth a final Water Rule that contains an updated definition of WOTUS. This WOTUS definition covers features that have been consistently regulated by the Clean Water Act such as TNWs, the territorial seas, interstate waters, and any impoundments of these waters. Pertinent to this analysis, WOTUS also consist of "jurisdictional tributaries", which are drainage features that meet either the relatively permanent standard or the significant nexus standard.

4.1.1 Significant Nexus Standard

San Rafael Creek drains directly into the Arroyo Seco which conveys water from north to south through the Project boundary and travels approximately five miles before draining into the Los Angeles River, a Traditional Navigable Waterway (TNW)[1]. The San Pascual Basin receives water via an underground culvert directly from Arroyo Seco and is designed to discharge water back to

1 Traditional Navigable Waters are "all waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide" (33 CFR 328.3).

the Arroyo Seco. Due to the direct connection that these areas have to a TNW, they are all determined to meet the Significant Nexus Standard.

4.1.2 Relatively Permanent Standard

Given the presence of surface water during the field visit and multiple seasons of aerial imagery showing surface water, the Arroyo Seco Channel, San Rafael Creek, and the San Pascual Basin are considered to have relatively permanent flow. As a result, these areas are determined to meet the Relatively Permanent Standard.

4.1.3 Limits of "Waters of the U.S."

The USACE asserts jurisdiction over non-navigable tributaries of TNWs that have relatively permanent flows and/or have a direct hydrological connection to a TNW. Therefore, the Arroyo Seco Channel, San Rafael Creek, and San Pascual Basin would be under the regulatory authority of the USACE.

In San Rafael Creek and the Arroyo Seco, the limits of non-wetland WOTUS were defined by the width of the flat bottom of the concrete channels. Within the San Pascual Basin, the limits of WOTUS were based on the presence of a well-established bed and bank. The basin is fed by a diversion structure that provides a steady supply of water to the area but is not subject to seasonal high flows that would scour the streambed as would occur in a natural stream. Approximately 2.921 acres of non-wetland "waters of the U.S." under the regulatory authority of the USACE occur within the survey area (Table 2; Exhibit 6).

4.1.4 Wetlands Determination

Three sampling points were assessed for the presence of hydrophytic vegetation, hydric soils, and wetland hydrology. Sampling points were located within the San Pascual Basin as it was the only portion of the survey area that contained an earthen-bottom drainage feature (Table 3). Wetland determination data forms that document conditions at each sampling point are provided in Attachment D, while a summary of observations is provided below.

TABLE 3
SUMMARY OF SAMPLING POINT DATA

Sampling Point	Vegetated	Dominance Test Result*	Prevalence Index Result	Hydrophytic Vegetation Present	Hydric Soil Indicators	Wetland Hydrology Indicators	Wetland?
1	Yes	20%	4.5	No	None	A1	No
2	Yes	33%	3.9	No	None	A1	No
3	Yes	100%	2.1	Yes	A9	A1	Yes

* Percent of dominant species that are OBL, FACW, or FAC.

Hydric Soil Indicators		**Wetland Hydrology Indicators**	
A9	1cm muck	A1	Surface Water

Vegetation

Vegetation was assessed in representative areas at or below the OHWM. Areas with less than five percent vegetation were considered unvegetated and so did not meet the hydrophytic vegetation criterion. Sampling Points 1 and 2 were dominated by UPL and FAC tree species such as coast live oak (*Quercus agrifolia*), western sycamore (*Platanus racemosa*), and shamel ash (*Fraxinus uhdei*) with a generally sparse understory except for dense patches of California blackberry (*Rubus ursinus*). Vegetation conditions were different at Sampling Point 3 near the downstream end of survey area. In this area, water ponds due to the concrete wall that separates the basin from the Arroyo Seco Channel. Due to this perennial source of water, the vegetation is dominated by OBL and FACW species such as cattails (*Typha* sp.), tall umbrella plant (*Cyperus eragrostis*), and black willow (*Salix gooddingii*). Therefore, the hydrophytic vegetation criterion was met only at Sampling Point 3.

Soils

Soil test pits were dug in representative areas containing at least five percent vegetation at or below the OHWM. Soils in the channel were generally sandy, though the percentage of partially decomposed organic matter in the soil increased toward the southern end of the site. sandy. Sampling Point 3 contained a thin layer of muck that was more than one centimeter thick. As a result, the hydric soil criterion was met only at Sampling Point 3.

Hydrology

As described above, the San Pascual Basin is fed by a diversion structure in the Arroyo Seco Channel that provides an ongoing (possibly perennial) source of water. Surface water was present at all three sampling points. Therefore, the wetland hydrology criterion was met at all three sampling points.

Results

Only Sampling Point 3, at the downstream end of the San Pascual Basin, exhibited all three criteria for wetland “waters of the U.S.”. The extent of similar soil and vegetation conditions in the downstream end of the basin was determined and mapped as a wetland feature. This wetland area measures 0.064 acre.

4.2 REGIONAL WATER QUALITY CONTROL BOARD JURISDICTION

All of features described in this report that are subject to USACE jurisdiction are also considered “waters of the State” under the jurisdiction of the RWQCB. There is one small feature in the San Pascual Basin that is “waters of the State” but is not considered WOTUS. This feature is a narrow drainage at the outlet of an apparent storm drain that is draining water from the upland park area and streets that are east of the basin. This feature is not considered WOTUS because it is directing water from upland areas and is not the result of converting a natural streambed. The definition of “waters of the State” is broader than WOTUS, so that this feature is considered jurisdictional by the RWQCB.

Therefore, the survey area contains 0.064 acre of wetlands and 2.923 acres of non-wetland “waters of the State” (Table 2; Exhibit 6). Waters within San Pascual Basin would be considered vegetated “waters of the State”, while those within San Rafael Creek and the Arroyo Seco Channel would be considered unvegetated waters.

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Jurisdictional Resources

Exhibit 6

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

N W E S

300 150 0 300 Feet

PSOMAS

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4.3 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE JURISDICTION

The CDFW's jurisdictional limits for the vertical-wall concrete channels (San Rafael Creek and Arroyo Seco Channel) are generally the same as the other resource agencies. The only difference is that two coast live oaks that overhang the Arroyo Seco along its eastern side would also fall under the CDFW's jurisdiction.

The CDFW's jurisdiction in the San Pascual Basin extends to the top of the bank which would encompass the entire basin. All native trees within the basin would also be subject to CDFW jurisdiction. In all, the total amount of CDFW's jurisdiction in the survey area is 4.914 acres (Table 2; Exhibit 6).

5.0 IMPACT ANALYSIS

As described in Section 1.3, impacts from implementation of the Project would result from modifying the side wall and channel bottom of San Rafael Creek to divert water into water treatment wetlands in areas that are currently uplands. Most Project-related impacts will occur in San Pascual Basin, which would be regraded to accommodate proposed facilities to treat water diverted from the Arroyo Seco Channel for subsequent re-use. The anticipated Project impacts to jurisdictional resources are discussed below in terms of each regulatory agency's requirements and are shown on Exhibits 7a and 7b.

5.1 U.S. ARMY CORPS OF ENGINEERS

Impacts to USACE WOTUS would result from creating a diversion structure within San Rafael Creek. This would be a permanent impact to WOTUS, though it would not affect flows to downstream waters other than to improve the quality of the water flowing into the Arroyo Seco. Permanent impacts to WOTUS would occur in San Pascual Basin from grading activities and vegetation removal to accommodate the proposed water treatment facilities in the basin.

No impacts to WOTUS would occur from construction of the temporary construction bridge at the San Rafael Creek area as the bridge will be built to completely span the Arroyo Seco without affecting the channel bottom or sidewalls.

A summary of Project impacts related to WOTUS is provided in Table 4.

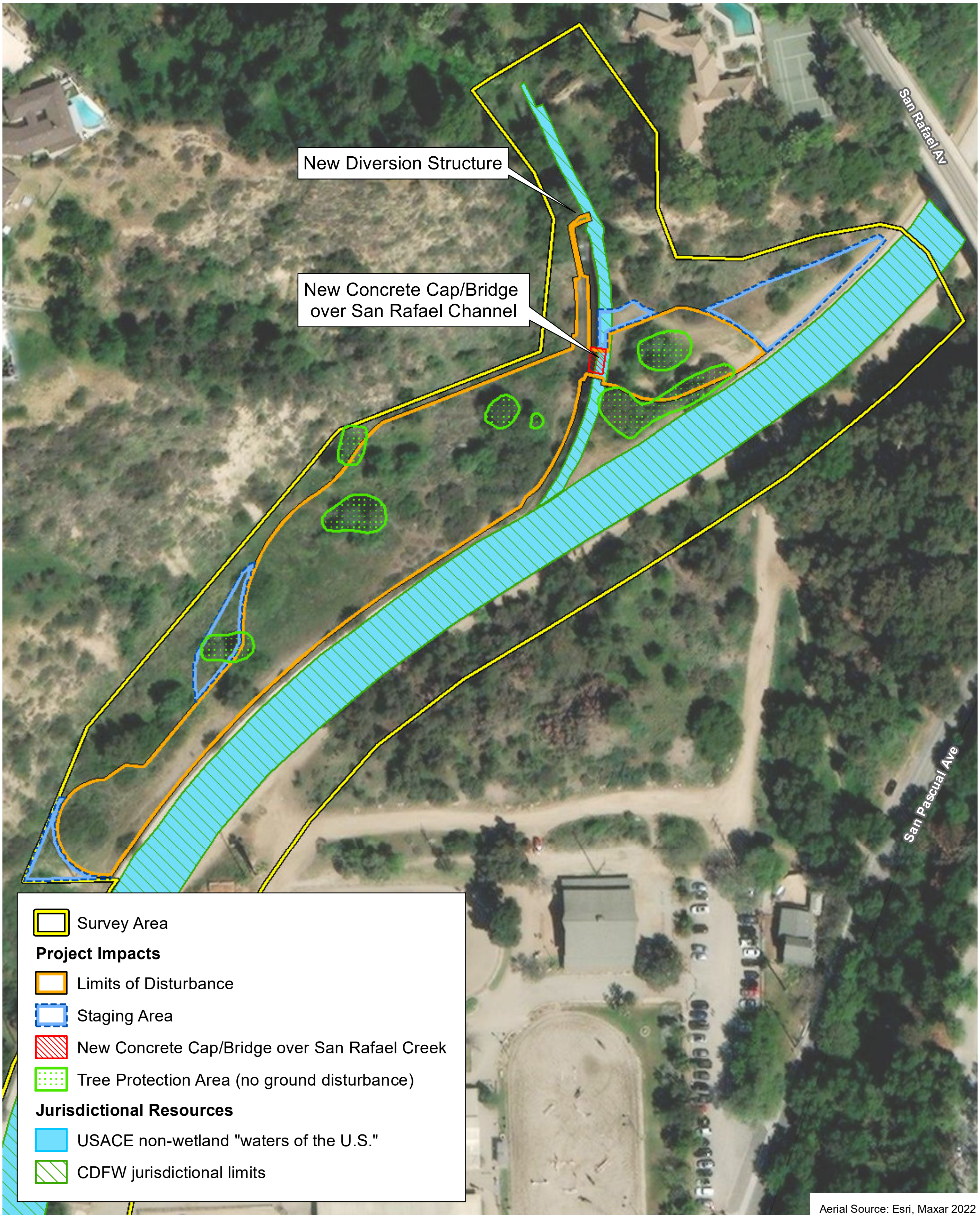
TABLE 4
SUMMARY OF PROPOSED IMPACTS TO "WATERS OF THE U.S."

Agency	Impact Type	Impacts (acres) San Rafael Creek	Arroyo Seco Channel	San Pascual Basin	Total
Wetlands					
USACE	Existing	0.000	0.000	0.064	**0.064**
	Permanent	0.000	0.000	0.064	**0.064**
	Temporary	0.000	0.000	0.000	**0.000**
Non-wetland waters					
USACE	Existing	0.098	2.604	0.219	**2.921**
	Permanent	0.001	0.000	0.219	**0.220**
	Temporary	0.000	0.000	0.000	**0.000**
USACE: U.S. Army Corps of Engineers					

5.2 REGIONAL WATER QUALITY CONTROL BOARD

Impacts to RWQCB "waters of the State" largely mirror those of WOTUS. The construction of a diversion structure is considered a permanent impact to the unvegetated concrete-lined San Rafael Creek (0.001 acre). The Project proposes a concrete cap or bridge over San Rafael Creek. While the USACE regulates only discharges to jurisdictional waterways, the RWQCB may consider the installation of structures that cover channels (such as a concrete bridge) to be a permanent (though indirect) impact because it may have an impact on water quality. This aspect of the Project would result in an impact of 0.007 acre.

The construction of a free span access bridge across the Arroyo Seco to the San Rafael Creek area is not considered herein to be an impact on "waters of the State" due to the temporary nature



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Impacts to Jurisdictional Waters - San Rafael Creek Area

Exhibit 7a

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

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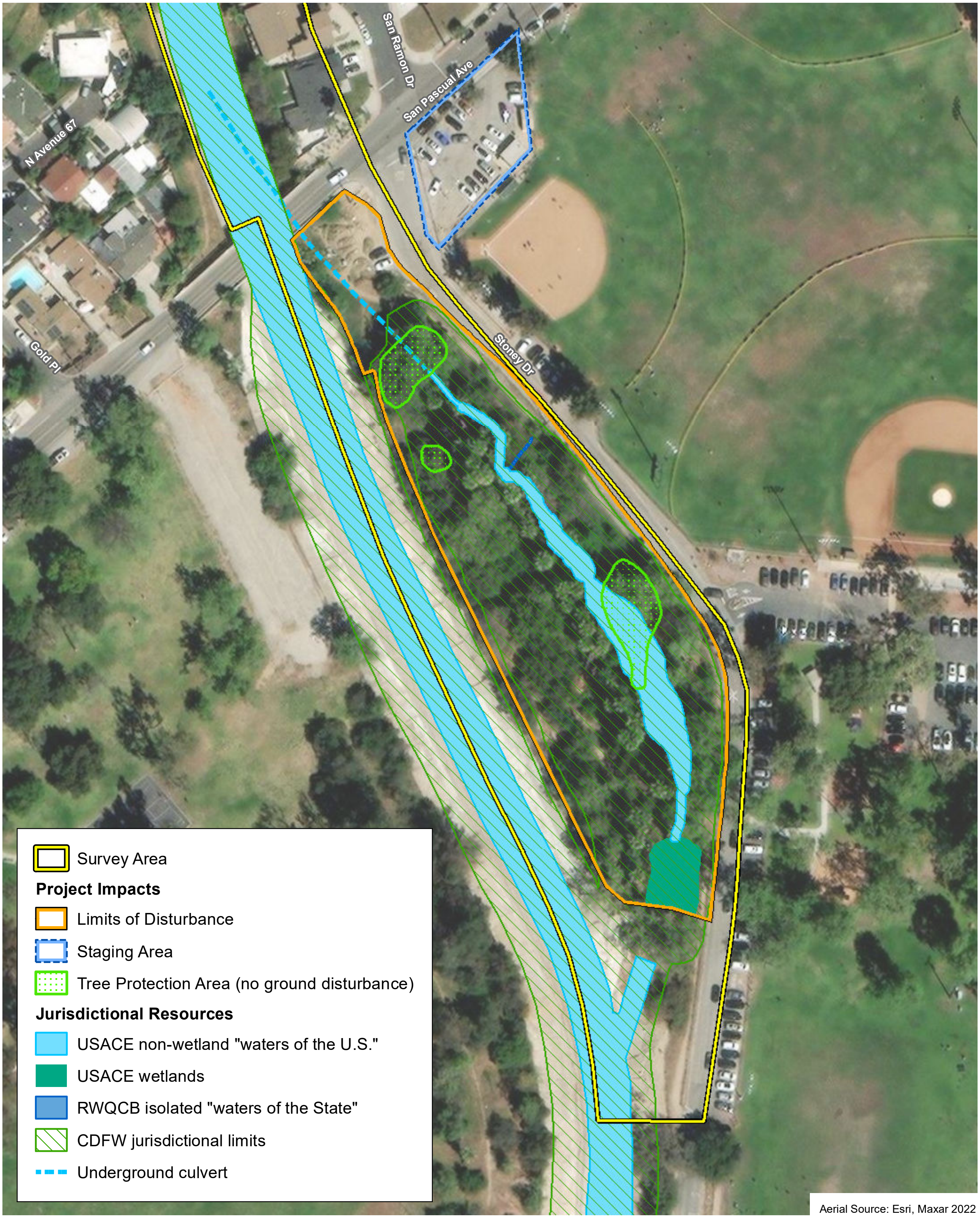

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Impacts to Jurisdictional Waters – San Pascual Basin Area

Exhibit 7b

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

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(Rev: 4-06-2023 JMC) R:\Projects\PAS_Pasaden\3PAS010750\Graphics\JD_Report\ex_JD_Impacts_SanPascual.pdf of the access bridge (the bridge will be in place for approximately nine months) and because the bridge will be built to completely span the Arroyo Seco without affecting the channel bottom or sidewalls.

Impacts to jurisdictional "waters of the State" slightly exceed those of WOTUS in the San Pascual Basin because the basin includes a side channel that drains adjacent upland areas. This side channel is not considered WOTUS but still falls under the jurisdiction of the Los Angeles RWQCB as an isolated feature. A summary of Project impacts related to "waters of the State" under the jurisdiction of the Los Angeles RWQCB is provided in Table 5.

TABLE 5
SUMMARY OF PROPOSED IMPACTS TO
LOS ANGELES RWQCB "WATERS OF THE STATE"

Agency	Impact Type	Impacts (acres) San Rafael Creek	Arroyo Seco Channel	San Pascual Basin	Total
Wetlands					
RWQCB	Existing	0.000	0.000	0.064	**0.064**
	Permanent	0.000	0.000	0.064	**0.064**
	Temporary	0.000	0.000	0.000	**0.000**
Non-wetland Waters					
RWQCB	Existing	0.098	2.604	0.221	**2.923**
	Permanent	0.008	0.000	0.221	**0.229**
	Temporary	0.000	0.000	0.000	**0.000**
RWQCB: Regional Water Quality Control Board					

5.3 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Impacts to CDFW jurisdictional waters would result from modifications to San Rafael Creek for the creation of the diversion structure to allow water to reach the proposed treatment wetlands. The proposed construction of the concrete cap/bridge over San Rafael Creek would likely not be considered as an impact by the CDFW because there is no aquatic habitat in the concrete channel to be affected.

Similarly, the proposed installation of a temporary concrete bridge spanning the Arroyo Seco Channel during the approximate nine-month construction period is not expected to be considered an impact to CDFW jurisdictional streambed due to the lack of aquatic habitat in the concrete channel that would potentially be shaded by the bridge.

Grading in the San Pascual Basin area would result in an impact to 1.617 acres of CDFW jurisdictional area. Furthermore, this grading would result in the removal of 41 trees, including 12 western sycamores (*Platanus racemosa*), 18 coast live oaks (*Quercus agrifolia*), 8 black willows (*Salix gooddingii*), and 3 arroyo willows (*Salix lasiolepis*). Additional removals would include5 toyons (*Heteromeles arbutifolia*), and 15 blue elderberries (*Sambucus nigra* ssp. *caerulea*), though the CDFW may not assert jurisdiction over these species which are typically considered large shrubs rather than trees. A summary of Project impacts to CDFW jurisdictional areas is provided in Table 6.

TABLE 6
SUMMARY OF PROPOSED IMPACTS TO
CDFW JURISDICTIONAL WATERS

Agency	Impact Type	Impacts per Project Area (acres)			Total
		San Rafael Creek	Arroyo Seco	San Pascual Basin	
CDFW	Existing	0.098	3.018	1.798	**4.914**
	Permanent	0.001	0.000	1.617	**1.618**
	Temporary	0.000	0.000	0.000	**0.000**
CDFW: California Department of Fish and Wildlife					

6.0 REGULATORY APPROVAL PROCESS

This section summarizes the various permits, agreements, and certifications that may be required prior to initiation of the Project construction activities that involve impacts to jurisdictional waters, including:

- USACE Section 404 Permit;
- RWQCB Section 401 Water Quality Certification; and
- CDFW Section 1602 Notification of Lake or Streambed Alteration.

It should be noted that all regulatory permit applications can be processed concurrently.

6.1 U.S. ARMY CORPS OF ENGINEERS

Prior to construction in WOTUS, a Section 404 permit from the USACE is required. Regulatory authorization in the form of a Nationwide Permit (NWP) or regional permit is provided for certain categories of activities. If the NWP conditions cannot be met, an Individual Permit (IP) is required.

The proposed Project would likely fall under NWP 59 (Water Reclamation and Reuse Facilities), which authorizes discharges into non-tidal WOTUS for the construction and maintenance of water reclamation and reuse facilities including vegetation areas and constructed wetlands to improve water quality.

Issuance of the USACE Section 404 permit would be contingent upon the approval of a Section 401 Water Quality Certification from the Los Angeles RWQCB, which is discussed below.

6.2 REGIONAL WATER QUALITY CONTROL BOARD

As noted above, issuance of the USACE Section 404 permit would be contingent upon the approval of a Section 401 Water Quality Certification from the Los Angeles RWQCB. The RWQCB requires the Applicant to address urban storm water runoff during and after construction in the form of Best Management Practices (BMPs). These BMPs are intended to address the treatment of pollutants carried by storm water runoff and are required in all complete applications. The notification/application for a CWA Section 401 Water Quality Certification must also address compliance with the Basin Plan. Please note that the application would also require the payment of an application fee, which would be based on Project impacts.

The RWQCB requires certification of the proposed project's California Environmental Quality Act (CEQA) documentation before it will approve the Section 401 Water Quality Certification. The RWQCB, as a responsible agency, would use the proposed Project's CEQA document to satisfy its own CEQA-compliance requirements.

6.3 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Prior to construction, Notification of a Lake or Streambed Alteration (LSA) must be submitted to the CDFW that describes any proposed streambed alteration contemplated by the proposed Project. If an LSA Agreement is required, the CDFW may want to conduct an on-site inspection.

In addition to the formal application materials and the fee, a copy of the appropriate environmental document (in this case, an Initial Study/Mitigated Negative Declaration) must be included in the submittal, consistent with CEQA requirements. The CDFW will not deem the application to be complete until the application fees have been paid and the agency is provided with a certified

CEQA document and a signed copy of the receipt of County Clerk filing fees for the Notice of Determination (NOD).

6.4 RECOMMENDATIONS

Based on the conclusions of this Jurisdictional Delineation Report, the following recommendations are identified:

1. A pre-application meeting should be scheduled with USACE, CDFW, and RWQCB staff to discuss site conditions; the proposed Project; biological and jurisdictional resources and impacts to these resources resulting from the proposed Project; proposed minimization measures and the mitigation program to offset these impacts; and the regulatory permit process.
2. The following should be prepared and processed: a USACE Section 404 Permit; an RWQCB Section 401 Water Quality Certification; a CDFW Section 1602 Notification of LSA; and the appropriate jurisdictional determination form approved by the USACE.

7.0 REFERENCES

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ATTACHMENT A

SUMMARY OF REGULATORY AUTHORITY

REGULATORY AUTHORITY

This attachment summarizes the regulatory authority of the U.S. Army Corps of Engineers (USACE), the Regional Water Quality Control Board (RWQCB), and the California Department of Fish and Wildlife (CDFW) over activities that have potential to impact jurisdictional resources.

U.S. Army Corps of Engineers

The USACE Regulatory Branch regulates activities that discharge dredged or fill materials into "waters of the United States" (WOTUS) under Section 404 of the Federal Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act. This permitting authority applies to all WOTUS where the material (1) replaces any portion of WOTUS with dry land or (2) changes the bottom elevation of any portion of any WOTUS. These fill materials would include sand, rock, clay, construction debris, wood chips, and materials used to create any structure or infrastructure in these waters.

Waters of the United States

Regulations surrounding WOTUS have undergone several revisions over the past several years, including new Water Rules put forth by the Obama Administration in 2015 and the Trump Administration in 2020, which was vacated by the U.S. District Court for the District of Arizona in August 2021. Most recently, the United States Environmental Protection Agency (USEPA) and the USACE published a new Water Rule in the *Federal Register* on January 18, 2023 which became effective on March 20, 2023.

On May 25, 2023, the U.S. Supreme Court overruled the USEPA's interpretation of the CWA pursuant to the definition of WOTUS in the case of *Sackett v. U.S. Environmental Protection Agency*. To conform to the Supreme Court decision, the USEPA issued a revised definition of WOTUS that was published in the Code of Federal Regulations on September 8, 2023.

The current definition of WOTUS includes:

1. Waters which are:
   (i) Currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
   (ii) The territorial seas; or
   (iii) Interstate waters
2. Impoundments of waters otherwise defined as waters of the United States under this definition, other than impoundments of waters identified under paragraph 5 of this section;
3. Tributaries of waters identified in paragraphs 1 or 2 that are relatively permanent, standing or continuously flowing bodies of water;
4. Wetlands adjacent to the following waters:
   (i) Waters identified in paragraph 1; or
   (ii) Relatively permanent, standing or continuously flowing bodies of water identified in paragraph 2 or 3 and with a continuous surface connection to those waters.
5. Intrastate lakes and ponds not identified in paragraphs 1 through 4
   (i) That are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to the waters identified in paragraphs 1 or 3.

The regulatory text for this rule specifically identifies several features that are non-jurisdictional by definition. These include:

- waste treatment systems, including treatment ponds or lagoons, designed to meet the requirements of the Clean Water Act;
- prior converted cropland designated by the Secretary of Agriculture;
- ditches (including roadside ditches) excavated wholly in and draining only dry land and that do not carry a relatively permanent flow of water;
- artificially irrigated areas that would revert to dry land if the irrigation ceased;
- artificial lakes or ponds created by excavating or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing;
- artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating or diking dry land to retain water for primarily aesthetic reasons;
- waterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of WOTUS; and
- swales and erosional features (e.g., gullies, small washes) characterized by low volume, infrequent, or short duration flow.

Ordinary High Water Mark

The landward limit of tidal "waters of the U.S." is the high-tide line. In non-tidal waters where adjacent wetlands are absent, the lateral limits of USACE jurisdiction extend to the ordinary high water mark (OHWM).[1] The OHWM is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas".[2] When wetlands are present, the lateral limits of USACE jurisdiction extend beyond the OHWM to the limits of the adjacent wetlands.[3]

Wetlands

A wetland is a subset of jurisdictional waters and is defined by the USACE and the USEPA as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions".[4] Wetlands generally include swamps, marshes, bogs, and areas containing similar features.

The definition and methods for identifying wetland resources can be found in the USACE's *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region*,[5]

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1 U.S. Army Corps of Engineers (USACE). 2005 (December 7). Regulatory Guidance Letter. Ordinary High Water Mark Identification. Washington, D.C.: USACE.
2 *Code of Federal Regulations* (CFR), Title 33, §328.3(e)
3 USACE 2005
4 33 CFR §328.3(b)
5 USACE. 2008a. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)*. (J.S. Wakeley, R.W. Lichvar, and C.V. Noble, Eds.). Vicksburg, MS: U.S. Army Engineer Research and Development Center.

a supplement to the 1987 *Corps of Engineers Wetlands Delineation Manual*.[6] Both the 1987 Wetlands Manual and the 2008 Arid West Supplement to the manual provide technical methods and guidelines for determining the presence of wetland "waters of the U.S.". Pursuant to these manuals, a three-parameter approach is used to identify wetlands and requires evidence of wetland hydrology, hydrophytic vegetation, and hydric soils. In order to be considered a wetland, an area must exhibit one or more indicators of all three of these parameters. However, problem areas may periodically or permanently lack certain indicators for reasons such as seasonal or annual variability of rainfall, vegetation, and other factors. Atypical wetlands lack certain indicators due to recent human activities or natural events. Guidance for determining the presence of wetlands in these situations is presented in the regional supplement.

Section 404 Permit

Except as specified in Section 323.4 of the CFR, impacts to "waters of the U.S." require a Section 404 Permit. Permit authorization may be in the form of (1) a "general permit" authorizing a category of activities in a specific geographical region or nationwide or (2) an "individual permit" (IP) following a review of an individual application form (to be obtained from the district office having jurisdiction over the waters in which the activity is proposed to be located).

Regulatory authorization in the form of a Nationwide Permit (NWP) is provided for certain categories of activities such as repair, rehabilitation, or replacement of a structure or fill which was previously authorized; utility line placement; or bank stabilization. NWPs authorize only those activities with minimal adverse effects on the aquatic environment and are valid only if the conditions applicable to the permits are met or waivers to these conditions are provided in writing from the USACE. Please note that waivers may require consultation with affected federal and State agencies, which can be a lengthy process with no mandated processing time frames. Certain activities do not require submission of an application form but may require a separate notification. If the NWP conditions cannot be met, an IP would be required. "Waters of the U.S." temporarily filled, flooded, excavated, or drained but restored to pre-construction contours and elevations after construction are not included in the measurement of loss of "waters of the U.S.". The appropriate permit authorization would be based on the amount of impacts to "waters of the U.S.", as determined by the USACE. There is no filing fee for the Section 404 Permit.

Approximately three or four months are typically required to process a routine permit application; large or complex activities may take longer to process. When a permit application is received, it would be assigned an identification number and reviewed for completeness by the District Engineer. If an application is incomplete, additional information will be requested within 15 days of receipt of the application. If an application is complete, the District Engineer will issue a public notice within 15 days unless specifically exempted by provisions of the CFR. Public comments will be accepted no more than 30 days but not less than 15 days from the date of public notice; these will become part of the administrative record of the application. Generally, the District Engineer will decide on the application no later than 60 days after receipt of the completed application. Additional permit situations may increase the permit processing time (e.g., projects involving a Section 401 Water Quality Certification, a coastal zone management consistency analysis, historic properties, a federal agency, and/or Endangered species). The Project Applicant will be given time, not to exceed 30 days, to respond to requests of the District Engineer.

On January 31, 2007, the USACE published a memorandum clarifying the Interim Guidance for Amendments to the National Historic Preservation Act and the Advisory Council on Historic

6 Environmental Laboratory. 1987. Cor*ps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1)*. Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.

Preservation (ACHP) implementing regulations.[7] The Interim Guidance applies to all Department of the Army requests for authorization/verification, including Individual Permits (IPs, i.e., standard permits and letters of permission) and all Regional General Permits (RGPs) and Nationwide Permits (NWPs). The State or Tribal Historic Preservation Officer (SHPO/THPO) has 30 days to respond to a determination that a proposed activity, which otherwise qualifies for an NWP or an RGP, has no effect or no adverse effect on a historic property. If the SHPO/THPO does not respond within 30 days of notification, the Los Angeles District may proceed with verification. If the SHPO/THPO disagrees with the District's determination, the District may work with the SHPO/THPO to resolve the disagreement or request an opinion from the ACHP. The USACE will submit the Draft Jurisdictional Delineation Report to the SHPO/THPO for review prior to initiating the actual regulatory process.

Please note that, if the USACE determines that the drainages/waterbodies are jurisdictional and would be impacted by project implementation, the Applicant will be required to obtain a CWA Section 401 Water Quality Certification from the RWQCB before the USACE will issue the Section 404 Permit. If the USACE determines that the impacted drainage/waterbody is not jurisdictional, the Applicant will be required to obtain RWQCB authorization under the provisions of a Report of Waste Discharge (ROWD).

<u>Jurisdictional Determinations</u>

Pursuant to USACE Regulatory Guidance Letter (RGL) 08-02 (dated June 26, 2008), the USACE can issue two types of jurisdictional determinations to implement Section 404 of the CWA: Approved Jurisdictional Determinations and Preliminary Jurisdictional Determinations.[8] An Approved Jurisdictional Determination is an official USACE determination that jurisdictional "waters of the U.S.", "Navigable Waters of the U.S.", or both are either present or absent on a site. An Approved Jurisdictional Determination also identifies the precise limits of jurisdictional waters on a project site.

The USACE will provide an Approved Jurisdictional Determination when (1) an Applicant requests an official jurisdictional determination; (2) an Applicant contests jurisdiction over a particular water body or wetland; or (3) when the USACE determines that jurisdiction does not exist over a particular water body or wetland. The Approved Jurisdictional Determination then becomes the USACE's official determination that can then be relied upon over a five-year period to request regulatory authorization as part of the permit application.

In addition, an Applicant may decline to request an Approved Jurisdictional Determination and instead obtain a USACE IP or General Permit Authorization based on a Preliminary Jurisdictional Determination or, in certain circumstances (e.g., authorizations by non-reporting nationwide general permits), with no Jurisdictional Determination.

Preliminary Jurisdictional Determinations are non-binding, advisory in nature, and may not be appealed. They indicate that there may be "waters of the U.S." on a project site. An Applicant may elect to use a Preliminary Jurisdictional Determination to voluntarily waive or set aside questions regarding CWA jurisdiction over a site, usually in the interest of expediting the permitting process. The USACE will determine what form of Jurisdictional Determination is appropriate for a particular project site.

The USACE Regulatory Branch Offices will coordinate with the USEPA Regional Office and USACE Headquarters (HQ), as outlined in its January 28, 2008, memorandum entitled "Process

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7 USACE. 2007 (January 31). Memorandum: Interim Guidance for Amendments to the National Historic Preservation Act and the Advisory Council on Historic Preservation (ACHP) Implementing Regulations. Washington, D.C.: USACE.

8 USACE. 2008b (June 26). Regulatory Guidance Letter. Jurisdictional Determinations. Washington, D.C.: USACE.

for Coordinating Jurisdictional Determinations Conducted Pursuant to Section 404 of the Clean Water Act in Light of the *Rapanos* and *SWANCC* Supreme Court Decisions".[9] The guidance provided in this memorandum is quoted as follows:

1. Effective immediately, unless and until paragraph 5(b) of the June 5, 2007, Rapanos guidance coordination memorandum is modified by a joint memorandum from Army and EPA, we will follow these procedures:
    a. For jurisdictional determinations involving significant nexus determinations, USACE districts will send copies of draft jurisdictional delineations via e-mail to appropriate EPA regional offices. The EPA regional office will have 15 calendar days to decide whether to take the draft jurisdictional delineation as a special case under the January 19, 1989, "Memorandum of Agreement Between the Department of the Army and the USEPA Concerning the Determination of the Section 404 Program and the Application of the Exceptions under Section 404(f) of the Clean Water Act." If the EPA regional office does not respond to the district within 15 days, the district will finalize the jurisdictional determination.
    b. For jurisdictional determinations involving isolated waters determinations, the agencies will continue to follow the procedure in paragraph 5(b) of June 5, 2007, coordination memorandum, until a new coordination memorandum is signed by USACE and EPA. (In accordance with paragraph 6 of the June 5, 2007, coordination memorandum, this is a 21-day timeline that can only be changed through a joint memorandum between agencies).
2. Approved JDs are not required for non-reporting NWPs, unless the project proponent specifically requests an approved JD. For proposed activities that may qualify for authorization under a State Programmatic General Permit (SPGP) or RGP, an approved JD is not required unless requested by the project proponent.
3. The USACE will continue to work with EPA to resolve the JDs involving significant nexus and isolated waters determinations that are currently in the elevation process.
4. USACE districts will continue posting completed Approved JD Forms on their web pages.

Regional Water Quality Control Board

The RWQCB is the primary agency responsible for protecting water quality in California through the regulation of discharges to surface waters under the CWA and the California Porter-Cologne Water Quality Control Act (Porter-Cologne Act). The RWQCB's jurisdiction extends to all "waters of the State" and to all "waters of the U.S.", including wetlands (isolated and non-isolated).

Section 401 of the CWA provides the RWQCB with the authority to regulate, through a Water Quality Certification, any proposed, federally permitted activity that may affect water quality. Among such activities are discharges of dredged or fill material permitted by the USACE pursuant to Section 404 of the CWA. Section 401 requires the RWQCB to provide certification that there is reasonable assurance that an activity which may result in discharge to navigable waters will not violate water quality standards. Water Quality Certification must be based on a finding that the

[9] USACE. 2008c (January 28). *Memorandum for Commander, Major Subordinate Commands and District Commands. Process for Coordinating Jurisdictional Determinations Conducted Pursuant to Section 404 of the Clean Water Act in Light of the Rapanos and SWANCC Supreme Court Decisions.* Washington, D.C.: USACE.

proposed discharge will comply with water quality standards, which contain numeric and narrative objectives that can be found in each of the nine RWQCBs' Basin Plans.

The Porter-Cologne Act provides the State with very broad authority to regulate "waters of the State" (which are defined as any surface water or groundwater, including saline waters). The Porter-Cologne Act has become an important tool in the post-SWANCC (Solid Waste Agency of Northern Cook Counties vs. Unites States Army Corps of Engineers) and Rapanos era with respect to the State's authority over isolated waters. Generally, any person proposing to discharge waste into a water body that could affect its water quality must file an ROWD when there is no federal nexus, such as under Section 404(b)(1) of the CWA. Although "waste" is partially defined as any waste substance associated with human habitation, the RWQCB interprets this to include fill discharge into water bodies.

Section 401 Water Quality Certification

Issuance of the USACE Section 404 Permit would be contingent upon the approval of a Section 401 Water Quality Certification from the RWQCB. Also, the RWQCB requires certification of the project's California Environmental Quality Act (CEQA) documentation before it will approve the Section 401 Water Quality Certification or ROWD. The RWQCB, as a responsible agency, will use the project's CEQA document to satisfy its own CEQA-compliance requirements.

On June 1, 2020, the USEPA finalized the "Clean Water Act Section 401 Certification Rule" to implement the water quality certification process consistent with the text and structure of the Clean Water Act (CWA). The final rule establishes procedures that promote consistent implementation of CWA section 401 and regulatory certainty in the federal licensing and permitting process. The new regulation includes reviews and approvals by the USACE prior to the RWQCB issuing a 401 Certification and reviews and approvals by the EPA prior to the USACE issuing a 404. The new 401 rule went into effect on September 11, 2020.

The new certification rule defines a discharge subject to 401 Certification as a discharge from a point source into a water of the United States. The new rule also states that States with additional water quality regulations cannot use these to expand the certification request.

The new rule requires all project proponents to request a pre-filing meeting with the RWQCB at least 30 days prior to filing a 401 "Certification Request". The filing procedure has been simplified to require the filing of a "Certification Request", rather than the acceptance of a "complete application". The certification request has nine mandatory components:

1. identify the project proponent(s) and a point of contact;
2. identify the proposed project;
3. identify the applicable federal license or permit;
4. identify the location and nature of any potential discharge that may result from the proposed project and the location of receiving waters;
5. include a description of any methods and means proposed to monitor the discharge and the equipment or measures planned to treat, control, or manage the discharge;
6. include a list of all other federal, interstate, tribal, state, territorial, or local agency authorizations required for the proposed project, including all approvals or denials already received;
7. include documentation that a pre-filing meeting request was submitted to the certifying authority at least 30 days prior to submitting the certification request;

8. contain the following statement: 'The project proponent hereby certifies that all information contained herein is true, accurate, and complete, to the best of my knowledge and belief; and
9. contain the following statement: 'The project proponent hereby requests that the certifying authority review and take action on this CWA 401 certification request within the applicable reasonable period of time.'

There is a mandatory 30 day wait period between a pre-filing meeting request and the filing of a Certification Request. A Certification Request must be filed with the RWQCB and the USACE concurrently. USACE reviews the Certification Request for the nine required components. The USACE has 15 days to review the Certification Request. The USACE then notifies the RWQCB that request is complete. And concurrently notifies the RWQCB of the reasonable time period to act on the Certification Request. The reasonable time period is not to exceed 1 year. Within 15 days of receipt of the Certification Request, the RWQCB must provide the applicant with the following: 1) date of receipt; 2) applicable reasonable period of time to act on the Certification Request; and 3) date upon which waiver will occur if the certifying authority fails or refuses to act on the Certification Request.

Once the RWQCB issues the 401 Certification, the USACE has 5 days to notify the USEPA that the 401 Certification has been issued. The USEPA then has 30 days to notify neighboring jurisdictions of the 401 Certification. Neighboring jurisdictions have 60 days to respond. If there are no objections to the 401 Certification, then the USACE would issue the 404 permit.

On June 2, 2021, the USEPA published a notice of intention to reconsider and revise the Clean Water Act Section 401 Certification Rule. At this time, they are currently accepting public comment. Until a new rule goes into effect, the current 401 Certification Rule stands.

The RWQCB is required under the *California Code of Regulations* (CCR) to have a "minimum 21-day public comment period" before any action can be taken on the Section 401 application.[10] This period closes when the RWQCB acts on the application. Since projects often change or are revised during the Section 401 permit process, the comment period can remain open. The public comment period starts as soon as an application has been received. Generally, the RWQCB Section 401, USACE Section 404, and CDFW Section 1602 permit applications are submitted at the same time.

The RWQCB requires the Applicant to address urban storm water runoff during and after construction in the form of Best Management Practices (BMPs). These BMPs are intended to address the treatment of pollutants carried by storm water runoff and are required in all complete applications. The notification/application for a CWA Section 401 Water Quality Certification must also address compliance with the Basin Plan. Please note that filing an application would also require the payment of an application fee which would be based on project impacts. The fee schedule calculator is available at https://www.waterboards.ca.gov/resources/fees/water_quality/docs/dredgefillcalculator.xlsm.

<u>California Department of Fish and Wildlife</u>

The CDFW has jurisdictional authority over wetland resources associated with rivers, streams, and lakes pursuant to the *California Fish and Game Code*.[11] Activities of State and local agencies as well as public utilities that are project proponents are regulated by the CDFW under Section 1602 of the *California Fish and Game Code.* This section regulates any work that will (1) substantially divert or obstruct the natural flow of any river, stream, or lake; (2) substantially change or use any

10 23 CCR §3858(a)
11 See §§1600–1616.

material from the bed, channel, or bank of any river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. Section 1602 of the *California Fish and Game Code* applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the State.

The CDFW jurisdictional limits are not as clearly defined by regulation as those of the USACE. While they closely resemble the limits described by USACE regulations, they include riparian habitat supported by a river, stream, or lake regardless of the presence or absence of hydric and saturated soils conditions. In general, the CDFW takes jurisdiction from the top of a stream bank or to the outer limits of the adjacent riparian vegetation (outer drip line), whichever is greater. Notification is generally required for any project that will take place within or in the vicinity of a river, stream, lake or within or in the vicinity of tributaries to a river, stream, or lake. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish and other aquatic plant and/or wildlife species. It also includes watercourses that have a surface or subsurface flow that support or have supported riparian vegetation.

Section 1602 Lake or Streambed Alteration Agreement

The CDFW enters into a Lake or Streambed Alteration (LSA) Agreement with a project proponent to ensure protection of wildlife and habitat values and acreages.

Prior to construction, a Notification of an LSA must be submitted to the CDFW that describes any proposed lake or streambed alteration that would occur with implementation of a project. The Notification of an LSA must address the initial construction and long-term operation and maintenance of any structures (such as a culvert or a desilting basin) included in the project design that are located within any river, stream, or lake and that may require periodic maintenance. In addition to the formal application materials and the fee, a copy of the appropriate environmental document (e.g., a Mitigated Negative Declaration) should be included in the submittal, consistent with CEQA requirements. The complete notification package must be completed on CDFW's Environmental Permit Information Management System (EPIMS). This notification will serve as the basis for the CDFW's issuance of a Section 1602 LSA Agreement. Note that notification is not required before beginning emergency work, but the CDFW must be notified in writing within 14 days after beginning the work.

After receiving Notification of an LSA Agreement, the CDFW will determine whether an LSA Agreement will be required for the proposed activity. An LSA Agreement will be required if the activity could substantially adversely affect an existing fish and wildlife resource. If an LSA Agreement is required, the CDFW may want to conduct an on-site inspection.

If the CDFW does not respond in writing concerning the completeness of the Notification within 30 days of its submittal, the Notification automatically becomes complete. If the CDFW does not submit a draft LSA Agreement to the Applicant within 60 days of the determination of a completed Notification package, the CDFW will issue a letter that either (1) identifies the final date to transmit a draft LSA Agreement or (2) indicates that an LSA Agreement was not required. The CDFW will also indicate that it was unable to meet this mandated compliance date and that, by law, the Applicant is authorized to complete the project without an LSA Agreement as long as the Applicant constructs the project as proposed and complies with all avoidance, minimization, and mitigation measures described in the submitted Notification package. Please note that, if the project requires revisions to the design or project construction, the CDFW may require submittal of a new Notification/application with an additional 90-day permit process.

If determined to be necessary, the CDFW will prepare a draft LSA Agreement, which will include standard measures to protect fish and wildlife resources during project construction and during ongoing operation and maintenance of any project element that occurs within a CDFW jurisdictional area. The draft Agreement must be transmitted to the Applicant within 60 calendar days of the CDFW's determination that the notification is complete. It should be noted that the 60-day timeframe might not apply to long-range agreements.

Following receipt of a draft LSA Agreement from the CDFW, the Applicant has 30 calendar days to notify the CDFW concerning the acceptability of the proposed terms, conditions, and measures. If the Applicant agrees with these terms, conditions and measures, the Agreement must be signed and returned to the CDFW. The Agreement becomes final once the CDFW executes it and an LSA Agreement is issued. Please note that all application fees must be paid and the final certified CEQA documentation must be provided prior to the CDFW's execution of the Agreement.

ATTACHMENT B

SITE PHOTOGRAPHS

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Photo Locations

Exhibit B-1

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

N W E S

300 150 0 300 Feet

PSOMAS

(Rev: 2-16-2023 JVR) R:\Projects\PAS_Pasaden\3PAS010750\Graphics\JD_Report\ex_Photo_Locations.pdf

Photo Location 1, facing upstream. February 10, 2022. View of San Rafael Creek.

Photo Location 1, facing downstream. February 10, 2022. View of San Rafael Creek.

D:\Projects\3PAS\010750\GRAPHICS\JD\Att_SP1_20220215.ai

Site Photos

Exhibit B-2

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

PSOMAS

(04/06/2023 JMC) R:\Projects\PAS_Pasaden\3PAS010750\Graphics\JD_Report\Att_SP.pdf

Photo Location 2, facing upstream. February 10, 2022. View of San Rafael Creek.

Photo Location 3. February 10, 2022. View of diversion structure in the mainstem Arroyo Seco channel.

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Site Photos

Exhibit B-3

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

PSOMAS

(04/06/2023 JMC) R:\Projects\PAS_Pasaden\3PAS010750\Graphics\JD_Report\Att_SP.pdf

Photo Location 4, facing upstream. February 10, 2022. View of channel conditions in San Pascual Basin area.

Photo Location 4, facing downstream. February 10, 2022. View of channel conditions in San Pascual Basin area.

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Site Photos

Exhibit B-4

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

PSOMAS

(04/06/2023 JMC) R:\Projects\PAS_Pasaden\3PAS010750\Graphics\JD_Report\Att_SP.pdf

Photo Location 5, facing upstream. February 10, 2022. View of channel conditions in San Pascual Basin area.

Photo Location 5, facing downstream. February 10, 2022. View of channel conditions in San Pascual Basin area.

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Site Photos

Exhibit B-5

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

PSOMAS

(04/06/2023 JMC) R:\Projects\PAS_Pasaden\3PAS010750\Graphics\JD_Report\Att_SP.pdf

Photo Location 6, facing downstream. February 10, 2022. View of wetland area in downstream end of San Pascual Basin area.

February 10, 2022. View of wetland sampling point 1, near outlet structure at upstream end of San Pascual Basin area. Note that the outlet structure in background is nearly completed filled with sediment.

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Site Photos

Exhibit B-6

Jurisdictional Delineation Report for the Arroyo Seco Water Reuse and Natural Stream Restoration Project

PSOMAS

(04/06/2023 JMC) R:\Projects\PAS_Pasaden\3PAS010750\Graphics\JD_Report\Att_SP.pdf

February 10, 2022. View of wetland sampling point 2 near the midpoint of the San Pascual Basin area.

February 10, 2022. View of wetland sampling point 3 near the upstream end of the wetland area in the San Pascual Basin area.

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ATTACHMENT C

LITERATURE REVIEW DETAILS

DESCRIPTIONS OF SOILS IN SURVEY AREA

LOS ANGELES COUNTY, SOUTHEASTERN, SOIL SURVEY AREA, CALIFORNIA

Urban land-Xerorthents-Osito complex, 10 to 35 percent slopes

Map Unit Setting
- *National map unit symbol:* 2sx6h
- *Elevation:* 420 to 1,140 feet
- *Mean annual precipitation:* 18 to 21 inches
- *Mean annual air temperature:* 64 to 67 degrees F
- *Frost-free period:* 350 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition
- *Urban land:* 35 percent
- *Xerorthents, shallow, and similar soils:* 30 percent
- *Osito and similar soils:* 25 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Urban Land

Setting
- *Landform:* Hillslopes

Properties and qualities
- *Slope:* 0 to 5 percent
- *Depth to restrictive feature:* 0 inches to manufactured layer
- *Runoff class:* Very low

Interpretive groups
- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 8
- *Hydric soil rating:* No

Description of Xerorthents, Shallow

Setting
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope, riser, tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Human-transported material

Typical profile
- *A - 0 to 3 inches:* loam
- *Cu - 3 to 9 inches:* sandy loam
- *C - 9 to 13 inches:* loamy sand
- *R - 13 to 23 inches:* bedrock

Properties and qualities

- *Slope:* 10 to 35 percent
- *Depth to restrictive feature:* 10 to 59 inches to lithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* Medium
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to low (0.00 to 0.01 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Maximum salinity:* Nonsaline (0.0 to 1.0 mmhos/cm)
- *Available water supply, 0 to 60 inches:* Very low (about 1.6 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 6e
- *Hydrologic Soil Group:* D
- *Hydric soil rating:* No

Description of Osito

Setting

- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Summit, shoulder, backslope
- *Landform position (three-dimensional):* Side slope, crest
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Colluvium and/or residuum weathered from sandstone

Typical profile

- *A - 0 to 4 inches:* sandy loam
- *Bw1 - 4 to 15 inches:* sandy loam
- *Bw2 - 15 to 21 inches:* sandy loam
- *Cr - 21 to 31 inches:* bedrock

Properties and qualities

- *Slope:* 10 to 35 percent
- *Depth to restrictive feature:* 10 to 22 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* Low
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Maximum salinity:* Nonsaline (0.0 to 1.0 mmhos/cm)
- *Available water supply, 0 to 60 inches:* Very low (about 2.4 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* B

- *Hydric soil rating:* No

Minor Components

Typic haploxeralfs, moderately deep

- *Percent of map unit:* 8 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Summit, backslope
- *Landform position (three-dimensional):* Crest, side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Chumash

- *Percent of map unit:* 2 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Urban land, frequently flooded, 0 to 5 percent slopes

Map Unit Setting

- *National map unit symbol:* 2myv7
- *Elevation:* 0 to 1,190 feet
- *Mean annual precipitation:* 12 to 24 inches
- *Mean annual air temperature:* 63 to 66 degrees F
- *Frost-free period:* 320 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Urban land, frequently flooded:* 95 percent
- *Minor components:* 5 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Urban Land, Frequently Flooded

Setting

- *Landform:* Channels
- Properties and qualities
- *Slope:* 0 to 5 percent
- *Depth to restrictive feature:* 0 inches to manufactured layer
- *Runoff class:* Very high
- *Frequency of flooding:* Frequent, None

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 8
- *Hydrologic Soil Group:* B
- *Hydric soil rating:* No

Minor Components

Water

- *Percent of map unit:* 5 percent

<u>Soboba and Tujunga soils, 0 to 5 percent slopes, frequently flooded</u>

Map Unit Setting

- *National map unit symbol:* 2rshk
- *Elevation:* 400 to 2,350 feet
- *Mean annual precipitation:* 17 to 29 inches
- *Mean annual air temperature:* 64 to 66 degrees F
- *Frost-free period:* 300 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Soboba and similar soils:* 60 percent
- *Tujunga and similar soils:* 25 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Soboba

<u>Setting</u>

- *Landform:* Washes, debris flows, stream terraces
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Alluvium derived from granite

<u>Typical profile</u>

- *A - 0 to 3 inches:* very gravelly sand
- *C1 - 3 to 15 inches:* very gravelly sand
- *C2 - 15 to 61 inches:* extremely gravelly sand
- *C3 - 61 to 79 inches:* extremely cobbly sand

<u>Properties and qualities</u>

- *Slope:* 0 to 2 percent
- *Surface area covered with cobbles, stones or boulders:* 0.8 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Excessively drained
- *Runoff class:* Negligible
- *Capacity of the most limiting layer to transmit water (Ksat):* Very high (19.98 to 59.94 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* Frequent, None
- *Frequency of ponding:* None
- *Available water supply, 0 to 60 inches:* Very low (about 1.9 inches)

<u>Interpretive groups</u>

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 6s
- *Hydrologic Soil Group:* A
- *Ecological site:* R019XG905CA - Riparian
- *Hydric soil rating:* No

Description of Tujunga

Setting

- *Landform:* Stream terraces, inset fans, washes
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Alluvium derived from granite

Typical profile

- *A - 0 to 9 inches:* loam
- *2C1 - 9 to 14 inches:* sand
- *2C2 - 14 to 17 inches:* gravelly sand
- *2C3 - 17 to 79 inches:* stratified sand

Properties and qualities

- *Slope:* 0 to 2 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Somewhat excessively drained
- *Runoff class:* Low
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* Frequent, None
- *Frequency of ponding:* None
- *Maximum salinity:* Nonsaline (0.0 to 1.0 mmhos/cm)
- *Available water supply, 0 to 60 inches:* Low (about 4.2 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* B
- *Ecological site:* R019XG909CA - Terrace
- *Hydric soil rating:* No

Minor Components

Aquic xerofluvents

- *Percent of map unit:* 5 percent
- *Landform:* Stream terraces
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Hydric soil rating:* No

Typic psammaquents

- *Percent of map unit:* 5 percent
- *Landform:* Washes, flood plains
- *Landform position (three-dimensional):* Rise
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear

- *Hydric soil rating:* No

Dam

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Urban land

- *Percent of map unit:* 2 percent
- *Landform:* Washes
- *Hydric soil rating:* No

DESCRIPTION OF WETLAND RESOURCES CLASSIFICATIONS

The following is a complete description of the wetland codes from the National Wetland Inventory provided in Section 3.3.

<u>Arroyo Seco Channel (R4SBCx)</u>

- **R: System RIVERINE.** The Riverine System includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts of 0.5 ppt or greater. A channel is an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water.
    - **4: Subsystem INTERMITTENT.** This Subsystem includes channels that contain flowing water only part of the year. When the water is not flowing, it may remain in isolated pools or surface water may be absent.
        - **SB: Class STREAMBED.** Includes all wetlands contained within the Intermittent Subsystem of the Riverine System and all channels of the Estuarine System or of the Tidal Subsystem of the Riverine System that are completely dewatered at low tide.
            - **C: Water Regime Modifier SEASONALLY FLOODED.** This modifier refers to areas in which surface water is present for extended periods especially early in the growing season but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.
                - x**: Special Modifier EXCAVATED.** This modifier is used to identify wetland basins or channels that were excavated by humans.

<u>San Rafael Creek (PSSA)</u>

- **P: System PALUSTRINE.** The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 part per trillion (ppt). Wetlands lacking (such vegetation) are also included if they exhibit all of the following characteristics: (1) are less than 8 hectares (20 acres); (2) do not have an active wave-formed or bedrock shoreline feature; (3) have at low water a depth of less than 6.6 feet in the deepest part of the basin; and (4) have salinity due to ocean-derived salts of less than 0.5 ppt.
    - **SS: Class SCRUB-SHRUB.** Includes areas dominated by woody vegetation less than 6 m (20 feet) tall. The species include true shrubs, young trees (saplings), and trees or shrubs that are small or stunted because of environmental conditions.
        - **A: Water Regime Modifier TEMPORARILY FLOODED.** This modifier refers to areas in which surface water is present for brief periods during growing season, but the water table usually lies well below the soil surface for most of the growing season. Plants that grow both in uplands and wetlands may be characteristic of this water regime.

San Pascual Basin (PFOCh and Rp1FO)

- **P: System PALUSTRINE.** The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 part per trillion (ppt). Wetlands lacking (such vegetation) are also included if they exhibit all of the following characteristics: (1) are less than 8 hectares (20 acres); (2) do not have an active wave-formed or bedrock shoreline feature; (3) have at low water a depth of less than 6.6 feet in the deepest part of the basin; and (4) have salinity due to ocean-derived salts of less than 0.5 ppt.
    - **FO: Class FORESTED.** This Class is characterized by woody vegetation that is 6 meters (20 feet) tall or taller.
        - **C: Water Regime Modifier SEASONALLY FLOODED.** This modifier refers to areas in which surface water is present for extended periods especially early in the growing season but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.
            - **h: Special Water Regime Modifier DIKED/IMPOUNDED.** This special modifier refers to areas that have been created or modified by a man-made barrier or dam which obstructs the inflow or outflow of water.

- **Rp: System RIPARIAN.** Plant communities contiguous to and affected by surface and subsurface hydrologic features of perennial or intermittent lotic and lentic water bodies (rivers, streams, lakes, or drainage ways). Riparian areas have one or both of the following characteristics: (1) distinctively different vegetative species than adjacent areas, and (2) species similar to adjacent areas but exhibiting more vigorous or robust growth forms. Riparian areas are usually transitional between wetland and upland.
    - **1: Subsystem LOTIC.** This subsystem relates to freshwater habitats with fast moving water.
        - **FO: Class FORESTED.** This Class is characterized by woody vegetation that is 6 meters (20 feet) tall or taller.

BASIN PLAN BENEFICIAL USES

The *Water Quality Control Plan: Los Angeles Region* (Basin Plan) identifies a number of beneficial uses, some or all of which may apply to a specific hydrologic subarea (HSA), including: Municipal and Domestic Water Supply (MUN) waters; Agricultural Supply (AGR) waters; Industrial Process Supply (PROC) waters; Industrial Service Supply waters (IND); Groundwater Recharge (GWR) waters; Freshwater Replenishment (FRSH); Navigation (NAV) waters; Hydropower Generation (POW) waters; Water Contact Recreation (REC1) waters; Non-Contact Water Recreation (REC2) waters; Commercial and Sport Fishing (COMM) waters; Aquaculture (AQUA) waters; Warm Fresh Water Habitat (WARM) waters; Cold Fresh Water Habitat (COLD) waters; Inland Saline Water Habitat (SAL) waters; Estuarine Habitat (EST) waters; Wetland Habitat (WET) waters; Marine Habitat (MAR) waters; Wildlife Habitat (WILD) waters; Preservation of Biological Habitats of Special Significance (BIOL) waters; Rare, Threatened or Endangered Species (RARE) waters; Migration of Aquatic Organisms (MIGR) waters; Spawning, Reproduction and Development (SPWN) waters; and Shellfish Harvesting (SHELL) waters.

Beneficial Uses associated with East Canyon Channel and Los Angeles River Reach 3, into which the Project site drains, are described below; beneficial uses not described below do not apply to these areas.

- MUN waters support community, military, or individual water supply systems including, but not limited to, drinking water supply.
- IND waters are used for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
- GWR waters are used for natural or artificial recharge of groundwater for purposes that may include, but are not limited to, future extraction, maintaining water quality, or halting saltwater intrusion into freshwater aquifers.
- WARM waters support warm water ecosystems that may include, but are not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, and wildlife (including invertebrates).
- COLD waters support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- WET waters support wetland ecosystems, including, but not limited to, preservation or enhancement of wetland habitats, vegetation, fish, shellfish, or wildlife, and other unique wetland functions which enhance water quality, such as providing flood and erosion control, stream bank stabilization, and filtration and purification of naturally occurring contaminants.
- REC-1 waters are used for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
- REC-2 waters are used for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

ATTACHMENT D

WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Arroyo Seco Water Reuse City/County: South Pasadena / Los Angeles Sampling Date: Feb 10, 2022

Applicant/Owner: City of South Pasadena State: CA Sampling Point: 1

Investigator(s): David Hughes, Trevor Bristle Section, Township, Range: Section 29, Township 1N, Range 12W

Landform (hillslope, terrace, etc.): basin Local relief (concave, convex, none): concave Slope (%): 3

Subregion (LRR): Mediterranean California Lat: 34.121071° Long: -118.167636° Datum: NAD 83

Soil Map Unit Name: Soboba and Tujunga Soils NWI classification: PFOCh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		✓
Hydric Soil Present?		✓
Wetland Hydrology Present?	✓	

Is the Sampled Area within a Wetland? Yes ___ No ✓

Remarks:

Sampling point is located near inflow point of water flowing into basin from diversion weir

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus agrifolia	70	Y	UPL
2. Platanus racemosa	20	Y	FAC
3.			
4.			
	90 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5')			
1. Sambucus nigra ssp. caerulina	20	Y	FACU
2.			
3.			
4.			
5.			
	20 = Total Cover		
Herb Stratum (Plot size: 5')			
1. Bromus sp.	5	Y	UPL
2. Oxalis pes-capre	2	Y	UPL
3.			
4.			
5.			
6.			
7.			
8.			
	7 = Total Cover		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 20 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	20	x 3 = 60
FACU species	20	x 4 = 80
UPL species	77	x 5 = 385
Column Totals:	117 (A)	525 (B)

Prevalence Index = B/A = 4.49

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-24	10 YR 3/1	100					sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: none

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ______ Depth (inches): 6

Water Table Present? Yes ✓ No ______ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Arroyo Seco Water Reuse City/County: South Pasadena / Los Angeles Sampling Date: Feb 10, 2022

Applicant/Owner: City of South Pasadena State: CA Sampling Point: 2

Investigator(s): David Hughes, Trevor Bristle Section, Township, Range: Section 29, Township 1N, Range 12W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): concave Slope (%): 3

Subregion (LRR): Mediterranean California Lat: 34.120643° Long: -118.167209° Datum: NAD 83

Soil Map Unit Name: Soboba and Tujunga Soils NWI classification: PFOCh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		✓
Hydric Soil Present?		✓
Wetland Hydrology Present?	✓	
Is the Sampled Area within a Wetland?		✓

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus uhdei	40	Y	UPL
2. Chitalpa tashkentensis	20	Y	UPL
3. Washingtonia robusta	10	N	FACW
4.			
	70	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	0	= Total Cover	
Woody Vine Stratum (Plot size: 30')			
1. Rubus ursinus	50	Y	FAC
2.			
	50	= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	10	x 2 = 20
FAC species	50	x 3 = 150
FACU species	0	x 4 = 0
UPL species	60	x 5 = 300
Column Totals:	120 (A)	470 (B)

Prevalence Index = B/A = 3.92

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10 YR 2/2	100					sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: none

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

soil consists of partially decomposed organic material in top 2+ inches of soil which is generally sandy

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ______ Depth (inches): 2

Water Table Present? Yes ✓ No ______ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

channel is wider at this point of survey area than sampling point 1 so that the surface water depth is less

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Arroyo Seco Water Reuse City/County: South Pasadena / Los Angeles Sampling Date: Feb 10, 2022

Applicant/Owner: City of South Pasadena State: CA Sampling Point: 3

Investigator(s): David Hughes, Trevor Bristle Section, Township, Range: Section 29, Township 1N, Range 12W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): concave Slope (%): 3

Subregion (LRR): Mediterranean California Lat: 34.120643° Long: -118.167209° Datum: NAD 83

Soil Map Unit Name: Soboba and Tujunga Soils NWI classification: PFOCh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No
Hydric Soil Present?	Yes ✓	No
Wetland Hydrology Present?	Yes ✓	No

Is the Sampled Area within a Wetland? Yes ✓ No

Remarks:

sampling point is near downstream end of basin where Typha begins to dominate

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30')			
1. Washingtonia robusta	50	Y	FACW
2. Salix gooddingii	20	Y	FACW
3. Schinus terebinthifolius	5	N	FAC
4.			
= Total Cover	75		
Sapling/Shrub Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
= Total Cover	0		
Herb Stratum (Plot size: 5')			
1. Typha sp.	5	Y	OBL
2. Cyperus eragrostis	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover	10		
Woody Vine Stratum (Plot size: 30')			
1. Rubus ursinus	5	Y	FAC
2.			
= Total Cover	5		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	75	x 2 =	150
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90 (A)		185 (B)

Prevalence Index = B/A = 2.06

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No

Remarks:

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10 YR 2/1	100					sandy loa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ✓ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: hard packed soil

Depth (inches): 12

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ______ Depth (inches): 3

Water Table Present? Yes ✓ No ______ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

ATTACHMENT E

NATIONWIDE PERMIT SUMMARY

NATIONWIDE PERMIT 59: WATER RECLAMATION AND REUSE FACILITIES

Discharges of dredged or fill material into non-tidal waters of the United States for the construction, expansion, and maintenance of water reclamation and reuse facilities, including vegetated areas enhanced to improve water infiltration and constructed wetlands to improve water quality. The discharge must not cause the loss of greater than 1⁄2-acre of waters of the United States. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters.

This NWP also authorizes temporary fills, including the use of temporary mats, necessary to construct the water reuse project and attendant features. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows.

After construction, temporary fills must be removed in their entirety and the affected areas returned to preconstruction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 31.) (Authority: Sections 10 and 404)

GENERAL CONDITION 31: PRE-CONSTRUCTION NOTIFICATION

a. Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

    1. He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

    2. 45 calendar days have passed from the district engineer’s receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is “no effect” on listed species or “no potential to cause effects” on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee

may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

b. Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

1. Name, address and telephone numbers of the prospective permittee;

2. Location of the proposed project;

3. A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

4. The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

5. If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

6. If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

7. For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the

historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

c. Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

d. Agency Coordination:

1. The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

2. For all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments.

   The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

3. In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

4. Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

Appendix C

Cultural Resources Records

South Central Coastal Information Center
California State University, Fullerton
Department of Anthropology MH-426
800 North State College Boulevard
Fullerton, CA 92834-6846
657.278.5395 / FAX 657.278.5542
sccic@fullerton.edu
California Historical Resources Information System
Orange, Los Angeles, and Ventura Counties

1/18/2022 Records Search File No.: 23096.9237

Charles Cisneros
Psomas
625 South Lake Avenue
Pasadena CA 91101

Re: Records Search Results for the 3PAS010750_SF Project

The South Central Coastal Information Center received your records search request for the project area referenced above, located on the Pasadena and Los Angeles, CA USGS 7.5' quadrangles. Due to the COVID-19 emergency, we have temporarily implemented new records search protocols. With the exception of some reports that have not yet been scanned, we are operationally digital for Los Angeles, Orange, and Ventura Counties. See attached document for your reference on what data is available in this format. The following reflects the results of the records search for the project area and a ½-mile radius:

As indicated on the data request form, the locations of archaeological resources and reports are provided in the following format: ☐ custom GIS maps ☒ shape files ☐ hand drawn maps

Archaeological resources within project area: 0	None
Archaeological resources within ½-mile radius: 1	SEE ATTACHED LIST
Non-archaeological resources within project area: 3	19-186859, 19-189325, 19-190590
Reports within project area: 7	LA-06334, LA-06385, LA-08252, LA-08928, LA-10541, LA-11231, LA-11529
Reports within ½-mile radius: 22	SEE ATTACHED LIST

Resource Database Printout (list):	☐ enclosed	☒ not requested	☐ nothing listed
Resource Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Resource Digital Database (spreadsheet):	☒ enclosed	☐ not requested	☐ nothing listed
Report Database Printout (list):	☐ enclosed	☒ not requested	☐ nothing listed
Report Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Report Digital Database (spreadsheet):	☒ enclosed	☐ not requested	☐ nothing listed
Resource Record Copies:	☒ enclosed	☐ not requested	☐ nothing listed
Report Copies:	☒ enclosed	☐ not requested	☐ nothing listed

OHP Built Environment Resources Directory (BERD) 2019:	☒ available online; please go to https://ohp.parks.ca.gov/?page_id=30338
Archaeo Determinations of Eligibility 2012:	☐ enclosed ☐ not requested ☒ nothing listed
Los Angeles Historic-Cultural Monuments	☐ enclosed ☒ not requested ☐ nothing listed
Historical Maps:	☐ enclosed ☒ not requested ☐ nothing listed
Ethnographic Information:	☒ not available at SCCIC
Historical Literature:	☒ not available at SCCIC
GLO and/or Rancho Plat Maps:	☒ not available at SCCIC
Caltrans Bridge Survey:	☒ not available at SCCIC; please go to http://www.dot.ca.gov/hq/structur/strmaint/historic.htm
Shipwreck Inventory:	☒ not available at SCCIC; please go to http://shipwrecks.slc.ca.gov/ShipwrecksDatabase/Shipwrecks_Database.asp
Soil Survey Maps: (see below)	☒ not available at SCCIC; please go to http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

Thank you for using the California Historical Resources Information System,

Michelle Galaz
Assistant Coordinator

Enclosures:

(X) Emergency Protocols for LA, Orange, and Ventura County BULK Processing Standards – 2 pages

(X) GIS Shapefiles – 30 shapes

(X) Resource Digital Database (spreadsheet) – 1 line

(X) Report Digital Database (spreadsheet) – 29 lines

(X) Resource Record Copies – (archaeological and non-archaeological resources within project area) – 266 pages

(X) Report Copies – (within project area) – 441 pages

(X) Invoice #23096.9237

Emergency Protocols for LA, Orange, and Ventura County BULK or SINGLE PROJECT Records Searches IF YOU HAVE A GIS PERSON ON STAFF ONLY!!

These instructions are for qualified consultants with a valid Access and Use Agreement.
WE ARE ONLY PROVIDING DATA THAT IS ALREADY DIGITAL AT THIS TIME. SAN BERNARDINO COUNTY IS NOT DIGITAL AND THESE INSTRUCTIONS DO NOT APPLY.

Some of you have a fully digital operation and have GIS staff on board who can process a fully digital deliverable from the Information Center. IF you can accept shape file data and do not require a custom map made for you by the SCCIC, and you are willing to sort the data we provide to you then these instructions are for you. Read further to be sure. You may have only one project at this time or some of you have a lot of different search locations that can be processed all at once. This may save you a lot of time getting results back and if we process your jobs in bulk, and you may enjoy significant cost savings as well. If you need individual invoice or summaries for each search location, then bulk processing is not for you and you need to submit a data request form for each search location.

Bulk processing will work for you if you have a GIS person on staff who can sort bulk data for you and make you any necessary project maps. This type of job can have as many job locations as you want but the point is that we will do them in bulk – at the same time - not one at a time. We send all the bulk data back to you and you sort it. This will work if you need searches in LA, Orange, or Ventura AND if they all have the same search radius and if all the other search criteria is the same– no exceptions. This will not work for San Bernardino County because we are not fully digital for San Bernardino County. You must submit all your shape files for each location at the same time and this will count as one search. If you have some that need a different radius, or different search criteria, then you should submit that job separately with its own set of instructions.

INSTRUCTIONS FOR BULK PROCESSING:

Please send in your requests via email using the data request form along with the associated shape files and pdf maps of the project area(s) at 1-24k scale. PDFs must be able to be printed out on 8.5X 11 paper. We check your shape file data against the pdf maps. This is where we find discrepancies between your shape files and your maps. This is required.

Please use this data request form and make sure you fill it out properly.
http://web.sonoma.edu/nwic/docs/CHRISDataRequestForm.pdf

DELIVERABLES:

1. A copy of the Built Environment Resources Directory or BERD for Los Angeles, Orange, Ventura, or San Bernardino County can now be found at the OHP Website for you to do your own research. This replaces the old Historic Properties Directory or HPD. We will not be searching this for you at this time but you can search it while you are waiting for our results to save time.

   You will only get shapefiles back, which means that you will have to make your own maps for each project location. WARNING! If you don't request the shape files, you won't be able to tell which reports are in the project area or the search radius. Please note that you are charged for each map feature even if you opt out of receiving shape files. You cannot get secondary products such as bibliographies or pdfs of records in the project area or search radius if you don't pay for the primary products (shape files) as this is the scaffolding upon which the secondary products are derived. If you do not understand the digital fee structure, ask before we process your request and send you data. You can find the digital fee structure on the OHP website under the CHRIS tab. In order to keep costs down, you must be willing to make adjustments to the search radius or what you are expecting to receive as part of the search. Remember that some areas are loaded with data and others are sparse – our fees will reflect that.

2. You will get a bulk processed bibliographies for resources and reports as selected; you will not get individual bibliographies for each project location.

3. You will get pdfs of resources and reports if you request them, provided that they are in digital formats. We will not be scanning records or reports at this time.

4. You will get one invoice for the bulk data processing. We can't bill this as individual jobs on separate invoices for you. If there are multiple project names, we are willing to reference all the job names on the invoice if needed. If there a lot of job id's we may ask you to send them in an email so that we can copy and paste it into the invoice details. If you need to bill your clients for the data, you can refer to our fee schedule on the OHP website under the CHRIS tab and apply the fees accordingly.

5. We will be billing you at the staff rate of $150 per hour and you will be charged for all resources and report locations according to the CHRIS Fee Structure. ($12 per GIS shape file; 0.15 per pdf page, or 0.25 per excel line; quad fees will apply if your research includes more than 2 quads). Discounts offered early on in our Covid-19 response will no longer be offered on any records searched submitted after October 5th, 2020.

6. Your packet will be sent to you electronically via Dropbox. We use 7-zip to password protect the files so you will need both on your computers. We email you the password. If you can't use Dropbox for some reason, then you will need to provide us with your Fed ex account number and we will ship you a disc with the results. As a last resort, we will ship on a disc via the USPS. You may be billed for our shipping and handling costs.

I may not have been able to cover every possible contingency in this set of instructions and will update it if necessary. You can email me with questions at sccic@fullerton.edu

Thank you,

Stacy St. James
South Central Coastal Information Center

Los Angeles, Orange, Ventura, and San Bernardino Counties

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

Research & Collections

e-mail: paleorecords@nhm.org

November 24, 2021

Psomas

Attn: Charles Cisneros

re: Paleontological resources for Project 3PAS010750

Dear Charles:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for proposed development at the 3PAS010750 project area as outlined on the portion of the Los Angeles and Pasadena USGS topographic quadrangle map that you sent to me via e-mail on November 23, 2021. We do not have any fossil localities that lie directly within the proposed project area, but we do have fossil localities nearby from the same sedimentary deposits that occur in the proposed project area, either at the surface or at depth.

The following table shows the closest known localities in the collection of the Natural History Museum of Los Angeles County.

Locality Number	Location	Formation	Taxa	Depth
LACM VP CIT424	Near intersection of Burleigh Rd and Avenue 64	Topanga Formation	Herring (*Ganolytes*), perch-like fish (*Thyrsocles*), ray-finned fish (*Etringus*), and other unspecified fish	Unknown
LACM IP 2542	838 Lyndon Street; South Pasadena	Topanga Formation	Mantis shrimp (Squillidae)	Surface
LACM VP CIT342	Sparkletts property near 45th & Lincoln in Highland Park	Unrecorded (Pleistocene)	Mammoth (*Mammuthus*), Bison (*Bison*)	14 feet bgs
LACM VP 1023, 2032	Workman & Alhambra Sts	Unknown Formation (Pleistocene)	sabertooth cat (*Smilodon*), horse (*Equus*), deer (*Odocoileus*), Turkey (*Meleagris*), mastodon (*Mammut*)	Unknown (excavations for storm drains)
LACM VP 3250	Madison & Middlebury Streets	Unrecorded (Pleistocene)	Mammoth (*Mammuthus*)	8 feet bgs
LACM VP 3363	W of Monterey Pass Road in Coyote Pass; E of the Long	Unknown Formation (Pleistocene; sand and silt)	Horse (*Equus*)	Unknown

	Beach Freeway & S of the N boundary of Section 32; Monterey Park

VP, Vertebrate Paleontology; IP, Invertebrate Paleontology; bgs, below ground surface

This records search covers only the records of the Natural History Museum of Los Angeles County (“NHMLA”). It is not intended as a paleontological assessment of the project area for the purposes of CEQA or NEPA. Potentially fossil-bearing units are present in the project area, either at the surface or in the subsurface. As such, NHMLA recommends that a full paleontological assessment of the project area be conducted by a paleontologist meeting Bureau of Land Management or Society of Vertebrate Paleontology standards.

Sincerely,

Alyssa Bell, Ph.D.
Natural History Museum of Los Angeles County

enclosure: invoice

ReportNum	DocAddlCitLetter	Status	OtherIDs	Xrefs	Authors	CitYear	CitMonth	CitTitle	CitPublisher	CitPages
LA-00112					D'Altroy, Terence N.	1974		Impact on Archaeological Resources of Proposed Upgrading Ramps on the Pasadena Freeway	University of California, Los Angeles Archaeological Survey	4
LA-00115					Clewlow, William C. Jr.	1974		Evaluation of the Archaeological Resources and Potential Impact of Proposed Extension of the Long Beach Freeway (rt. 7) North From Valley Blvd. to Rt. 210 (colorado Freeway)	University of California, Los Angeles Archaeological Survey	
LA-03497					Anonymous	1994		Draft Supplemental Environmental Impact Report Pasadena-Los Angeles Light Rail Transit Project	Tetra Tech, Inc.	25
LA-03498					Anonymous	1994		Final Supplemental Environmental Impact Report Pasadena-Los Angeles Light Rail Transit Project	Tetra Tech, Inc.	216
LA-03498	A				Saurenman, Hugh			Evaluation of Change in Noise Impacts, Proposed Blue Line Wayside Horn System	Harris Miller Miller & Hanson Inc	24
LA-04216					Holmes, William Henry	1900		Report of the US National Museum Under the Direction of the Smithsonian Institute for the Year Ending June 30, 1900	The Smithsonian Institute	
LA-04386					Anonymous	1993		Cultural Resources Overview Los Angeles County Metropolitan Transportation Authority's Interstate Commerce Commission Abandonment Exemption Pasadena-Los Angeles Light Rail Transit Project	Caltrans	28
LA-04890					Storey, Noelle	2000		Negative Archaeological Survey Report, Highway Project Description	Caltrans District 7	
LA-04909					Atchley, Sara M.	2000		Cultural Resources Investigation for the Nextlink Fiber Optic Project, Los Angeles and Orange Counties, California	Jones & Stokes	
LA-06334					Kinkella, Andrew	2002		Below the Basketball Court: Burial Recovery at Arroyo Seco Park	Greenwood and Associates	
LA-06362					Borg, Roger	1994		Finding of Effect on Historic Properties Arroyo Seco Parkway and Four Level Interchange	Caltrans District 7	35
LA-06385					McAvoy, Christy J.	2001		Section 106 Review for 5568 Via Marison Avenue Arroyo Seco Park Historic District Los Angeles, Ca	Historic Resources Group	3
LA-06835					Harper, Caprice D.	2003		Cultural Resource Assessment Cingular Wreless Facility No. Vy311-01 South Pasadena, Los Angeles County, California	LSA Associates, Inc.	
LA-06839					Hale, Alice E.	2003		Burial Data Summary Arroyo Seco/san Pascual Park Los Angeles, California	Greenwood and Associates	
LA-07542					Wlodarski, Robert J.	2006		Bechtel Corporation Wireless Telecommunications Site Lsanca0335-c (avenue 64 & La Loma Road) Located at 940 Avenue 64, Pasadena, Los Angeles County, California 90042	Cellular, Archaeological Resource, Evaluations	
LA-07553					Fulton, Terri	2004		Cultural Resource Assessment Cingular Wireless Facility No. Vy 311-01 South Pasadena, Los Angeles County, California	LSA Associates, Inc.	
LA-08252					Snyder, John W., Mikesell, Stephen, and Pierzinski	1986		Request for Determination of Eligibility for Inclusion in the National Register of Historic Places/Historic Bridges in California: Concrete Arch, Suspension, Steel Girder and Steel Arch	Caltrans	
LA-08634					Anonymous	2007		Cultural Resources Study of the Arroyo Seco Park Project, Royal Street Communications Site No. La0108b, Stoney Drive, South Pasadena, Los Angeles County, California 91030	Historic Resource Associates	
LA-08928					McKenna, Jeanette A.	2007		A Phase I (ceqa) and Class Iii (nepa) Cultural Resources Investigation for the Lower Arroyo Seco Trail and Trailhead Improvements Project Area in the City of Pasadena, Los Angeles County, California	McKenna et al.	75
LA-09098					Bonner, Wayne H.	2006		Extended Phase I Testing for Cingular Wireless Facility Candidate 950-014-198e/lsanca0336 (arroyo Park) Arroyo Seco Park, South Pasadena, Los Angeles County, California	Michael Brandman Associates	

ReportNum	DocAddlCitLetter	Status	OtherIDs	Xrefs	Authors	CitYear	CitMonth	CitTitle	CitPublisher	CitPages
LA-09099					Bonner, Wayne H.	2005		Cultural Resources Records Search Results and Site Visit for Cingular Wireless Site 950-014-198e (city Park) Arroyo Park, Near Intersection of Comet Street and Pasqual Avenue, South Pasadena, Los Angeles County, California	Michael Brandman Associates	
LA-09489					Lee, Portia	2003		Arroyo Seco Parkway Historic District	California Archives	51
LA-09601					Bonner, Wayne H.	2008		Cultural Resources Records Search and Site Visit Results for AT&T Candidate SV0061-01 (OG Park), 820 El Centro Street, South Pasadena, Los Angeles County, California.	Michael Brandman Associates	18
LA-10541			OHP PRN - FHWA040514A		Dolan, Christy and Monica Strauss	2005		Finding of Effect for the Proposed Arroyo Seco Bike Path, Los Angeles County, California	EDAW, Inc.	169
LA-10541	A				Monica Strauss and Christy Dolan	2003	Dec	Historic Property Survey Report Proposed Arroyo Seco Bike Path County Of Los Angeles, California	EDAW	15
LA-10541	B				Monica Strauss and Christy Dolan	2003	Dec	Arroyo Seco Bike Path Historic Resources Evaluation Report HRER - Appendix 1	EDAW	185
LA-10541	C				OHP - Steve Mikesell acting SHPO	2004	Jun	HPSR / Determinations of Eligibility for Arroyo Seco Bike Path Project	Caltrans	4
LA-10713					Bonner, Wayne	2010		Cultural Resources Records Search and Site Visit Results for T-Mobile USA Candidate IE05381C (R.O.W. Pole #10123PBM), 1098 South Arroyo Boulevard, Pasadena, Los Angeles County, California	Michael Brandman Associates	25
LA-10866					Supernowicz, Dana	2007		Cultural Resources Study of the Arroyo Seco Park Project Royal Street Communications Site No. LA0108B, Stoney Drive, South Pasadena, Los Angeles County, California 91030	Historic Resource Associates	68
LA-11231					Meiser, M.K.	2009		Historic American Engineering Record Arroyo Seco Flood Control Channel, Los Angeles County, California	EDAW, Inc.	42
LA-11529					Castanon, David	2008		Arroyo Seco Channel Project in the cities of Los Angeles and Pasadena, Los Angeles County, California	Department of the Army	39
LA-12422					Tibbit, Casey and Goodwin, Riordan	2013		Cultural Resources Assessment Arroyo Seco Pedestrian and Bicycle Path Project Cities of South Pasadena and Los Angeles Los Angeles County, California	Lsa	35
LA-13148					Comeau, Brad	2013		Initial Study/Mitigated Negative Declaration Sewer Rehabilitation and Replacement Project	DUDEK	43

ReportNum	CitMaps	ReportType	InventorySize	InventoryDisclosure	InventoryCollections	InventoryNotes	Resources	ResourceCount	HasInformals	Counties	Maps	Address
LA-00112		Archaeological, Field study	3 li mi					0	No	Los Angeles	LOS ANGELES	
LA-00115		Archaeological, Field study						0	No	Los Angeles	LOS ANGELES	
LA-03497		Management/planning	unknown	Not for publication	No	Mapped to LA-4386 and railroad tracks marked on USGS quad maps.		0	No	Los Angeles	LOS ANGELES, MT WILSON, PASADENA	
LA-03498		Management/planning	unknown	Not for publication	No	Mapped to LA-4386 and railroad tracks marked on USGS quad maps.		0	No	Los Angeles	LOS ANGELES, MT WILSON, PASADENA	
LA-03498		Other research			No							
LA-04216		Other research				Map to Buena Vista Street		0	No	Los Angeles	LOS ANGELES	
LA-04386		Architectural/historical	Unknown	Unrestricted	No			0	No	Los Angeles	LOS ANGELES	
LA-04890		Literature search	~ 1.25 miles					0	No	Los Angeles	LOS ANGELES	
LA-04909		Archaeological, Field study	5.5 li mi					0	No	Los Angeles	ANAHEIM, BURBANK, HOLLYWOOD, LOS ANGELES, NEWPORT BEACH, PASADENA, TUSTIN	
LA-06334		Monitoring	0					0	No	Los Angeles	LOS ANGELES	
LA-06362		Other research	6 li mi					0	No	Los Angeles	HOLLYWOOD, LOS ANGELES	
LA-06385		Architectural/historical, Evaluation	Unknown				19-189325, 19-189326	2	No	Los Angeles	LOS ANGELES	
LA-06835		Archaeological, Field study	.25 ac					0	No	Los Angeles	LOS ANGELES	
LA-06839		Archaeological, Other research	Unknown			19-000224,19-000026,19-001575H,56-000058,56-000003,56-000110 mentioned in report as near	19-003057	1	No	Los Angeles	LOS ANGELES	
LA-07542		Archaeological, Field study	<.25 ac					0	No	Los Angeles	LOS ANGELES	
LA-07553		Archaeological, Field study	~.25 ac			19-003057 is within 1/2 mile		0	No	Los Angeles	LOS ANGELES	
LA-08252		Architectural/historical, Evaluation, Other research						0	No	Los Angeles	HOLLYWOOD, LOS ANGELES, PASADENA	
LA-08634		Other research	< 1 ac				19-003057	1	No	Los Angeles	LOS ANGELES	
LA-08928		Archaeological, Field study	< 2.5 ac				19-003057, 19-180037	2	No	Los Angeles	PASADENA	
LA-09098		Excavation	< 1 ac				19-003057	1	No	Los Angeles	LOS ANGELES	

ReportNum	CitMaps	ReportType	InventorySize	InventoryDisclosure	InventoryCollections	InventoryNotes	Resources	ResourceCount	HasInformals	Counties	Maps	Address
LA-09099		Archaeological, Field study	< 1 ac				19-003057	1	No	Los Angeles	LOS ANGELES	
LA-09489		Architectural/historical, Evaluation					19-179645	1	No	Los Angeles	LOS ANGELES	
LA-09601		Archaeological, Field study					19-003057	1	No	Los Angeles	LOS ANGELES	820 El Centro Street South Pasadena
LA-10541		Archaeological, Field study		Not for publication	No		19-003100, 19-003101, 19-003102, 19-186110, 19-186721, 19-186858, 19-186859	7	No	Los Angeles	LOS ANGELES, PASADENA	
LA-10541		Architectural/Historical, Field study										
LA-10541		Architectural/Historical, Field study										
LA-10541		Evaluation										
LA-10713		Archaeological, Field study		Not for publication	No		19-150107, 19-150368, 19-150369, 19-150370, 19-150371, 19-150372, 19-150373, 19-150374, 19-150375, 19-150376, 19-150377, 19-150378, 19-150379, 19-184979, 19-186859	15	No	Los Angeles	PASADENA	1098 South Arroyo Boulevard Pasadena
LA-10866		Archaeological, Field study		Not for publication	No		19-003057, 19-179332, 19-179484, 19-179645, 19-186859	5	No	Los Angeles	LOS ANGELES	South Pasadena
LA-11231		Architectural/historical, Evaluation		Not for publication	No		19-186859	1	No	Los Angeles	LOS ANGELES, PASADENA	
LA-11529		Architectural/historical, Evaluation					19-186859	1	No	Los Angeles	LOS ANGELES	
LA-12422		Archaeological, Field study					19-190613	1	No	Los Angeles	LOS ANGELES	
LA-13148		Archaeological, Architectural/Historical, Field study		Not for publication	No			0	No	Los Angeles	LOS ANGELES	

PrimaryString	TrinomialString	ResourceName	Status	OtherIDs	Xrefs	ResType	Age	InfoBase	Attribs
P-19-003057	CA-LAN-003057	Arroyo Seco / San Pascual Site		Resource Name - Arroyo Seco / San Pascual Site		Site	Prehistoric	Other	AP02; AP09

PrimaryString	ResourceDisclosure	ResourceCollections	AccessionNo	CollectionsFacility	ResourceNotes	RecordingEvents	Reports	CountyName	Maps
P-19-003057	Not for publication	Yes				2002 (John M. Foster, Greenwood & Associates)	LA-06839, LA-08634, LA-08928, LA-09098, LA-09099, LA-09601, LA-10866	Los Angeles	LOS ANGELES

PrimaryString	Address	PLSS	UTM
P-19-003057	Los Angeles		

Appendix D

Energy Data

Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category	Num Days	Year	Fuel Consumption Rate (gal/hour)	Fuel Type	Total Fuel Consumption (gal/construction period)
San Rafael Demolition	Excavators	Diesel	Average	1	8	36	0.38	175	22	2024	2.9	Diesel	193
San Rafael Demolition	Skid Steer Loaders	Diesel	Average	1	8	71	0.37	50	22	2024	0.9	Diesel	60
San Rafael Demolition	Tractors/Loaders/Backhoes	Diesel	Average	1	8	84	0.37	100	22	2024	1.6	Diesel	104
San Rafael Demolition	Crawler Tractors	Diesel	Average	1	8	87	0.43	175	22	2024	3.3	Diesel	251
San Pascual Demolition	Excavators	Diesel	Average	1	8	36	0.38	175	22	2024	2.9	Diesel	193
San Pascual Demolition	Skid Steer Loaders	Diesel	Average	1	8	71	0.37	50	22	2024	0.9	Diesel	60
San Pascual Demolition	Tractors/Loaders/Backhoes	Diesel	Average	1	8	84	0.37	100	22	2024	1.6	Diesel	104
San Pascual Demolition	Crawler Tractors	Diesel	Average	1	8	87	0.43	175	22	2024	3.3	Diesel	251
San Rafael Site Preparation	Excavators	Diesel	Average	1	8	36	0.38	175	23	2024	2.9	Diesel	202
San Rafael Site Preparation	Skid Steer Loaders	Diesel	Average	1	8	71	0.37	50	23	2024	0.9	Diesel	63
San Rafael Site Preparation	Crawler Tractors	Diesel	Average	1	8	87	0.43	175	23	2024	3.3	Diesel	262
San Pascual Site Preparation	Excavators	Diesel	Average	1	8	36	0.38	175	45	2024	2.9	Diesel	395
San Pascual Site Preparation	Skid Steer Loaders	Diesel	Average	1	8	71	0.37	50	45	2024	0.9	Diesel	123
San Pascual Site Preparation	Crawler Tractors	Diesel	Average	1	8	87	0.43	175	45	2024	3.3	Diesel	513
San Rafael Grading	Excavators	Diesel	Average	1	8	36	0.38	175	44	2024	2.9	Diesel	386
San Rafael Grading	Skid Steer Loaders	Diesel	Average	1	8	71	0.37	50	44	2024	0.9	Diesel	121
San Rafael Grading	Crawler Tractors	Diesel	Average	1	8	87	0.43	175	44	2024	3.3	Diesel	501
San Pascual Grading	Excavators	Diesel	Average	2	8	36	0.38	175	66	2024	2.9	Diesel	1,158
San Pascual Grading	Skid Steer Loaders	Diesel	Average	2	8	71	0.37	50	66	2024	0.9	Diesel	362
San Pascual Grading	Crawler Tractors	Diesel	Average	2	8	87	0.43	175	66	2024	3.3	Diesel	1,504
San Rafael Building Construction	Cranes	Diesel	Average	1	7	367	0.29	300	88	2024	3.3	Diesel	584
San Rafael Building Construction	Excavators	Diesel	Average	1	8	36	0.38	175	88	2024	2.9	Diesel	772
San Rafael Building Construction	Skid Steer Loaders	Diesel	Average	1	8	71	0.37	50	88	2024	0.9	Diesel	241
San Rafael Building Construction	Pumps	Diesel	Average	1	8	11	0.74	100	88	2024	1.3	Diesel	698
San Pascual Building Constructior	Cranes	Diesel	Average	1	7	367	0.29	300	130	2024	3.3	Diesel	863
San Pascual Building Constructior	Excavators	Diesel	Average	1	8	36	0.38	175	130	2024	2.9	Diesel	1,141
San Pascual Building Constructior	Skid Steer Loaders	Diesel	Average	1	8	71	0.37	50	130	2024	0.9	Diesel	357
San Pascual Building Constructior	Pumps	Diesel	Average	1	8	11	0.74	100	130	2024	1.3	Diesel	1,032
San Rafael Paving	Pavers	Diesel	Average	1	8	81	0.42	100	23	2024	1.7	Diesel	134
San Rafael Paving	Rollers	Diesel	Average	1	6	36	0.38	100	23	2024	1.7	Diesel	89
San Pascual Paving	Rollers	Diesel	Average	1	6	36	0.38	100	24	2024	1.7	Diesel	93
San Pascual Paving	Pavers	Diesel	Average	1	8	81	0.42	100	24	2024	1.7	Diesel	139

Total	**Gasoline**	**-**
Total	**Diesel**	**12,950**
		12,950

Onroad Construction Energy Use

Year 2024

Vehicle Types	MPG by Fuel Type					Population by Fuel Type					
	Gasoline	Diesel	Electricity	Natural Gas	Plug-in Hybrid	Gasoline	Diesel	Electricity	Natural Gas	Plug-in Hybrid	Total
LDA	29.3	41.2	0.4	0.000	28.2	5,451,205	15,009	284,963	0	152,679	5,903,856
LDT1	24.4	23.4	0.4	0.000	28.0	505,255	186	1,243	0	739	507,423
LDT2	23.9	31.9	0.4	0.000	27.9	2,551,917	8,409	16,572	0	21,729	2,598,626
LHDT1	13.6	20.5	0.6	0.000	0.0	205,772	107,344	793	0	0	313,909
LHDT2	11.9	17.3	0.6	0.000	0.0	32,210	47,494	205	0	0	79,909
MCY	41.5	0.0	0.0	0.000	0.0	248,270	0	0	0	0	248,270
MDV	19.5	23.7	0.4	0.000	27.6	1,622,854	20,420	18,088	0	13,081	1,674,443
MH	4.9	10.1	0.0	0.000	0.0	30,227	12,282	0	0	0	42,510
MHDT	5.2	8.9	1.0	8.3	0.0	25,496	117,140	365	1,526	0	144,526
HHDT	4.0	6.1	1.8	6.0	0.0	66	101,735	317	10,386	0	112,504
OBUS	5.1	7.0	1.1	8.8	0.0	5,427	3,049	12	487	0	8,975
SBUS	8.9	7.3	1.2	4.2	0.0	2,859	3,436	23	3,247	0	9,564
UBUS	7.0	6.6	2.1	3.2	0.0	894	14	132	5,035	0	6,076
						10,682,454	436,518	322,712	20,681	188,228	11,650,593

Daily Trips							Gasoline Consumption			Diesel Consumption		
Phase Name	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker	Vendor	Haul	Worker	Vendor	Haul
San Rafael Demolition	10	0	0	18.5	10.2	20						
San Rafael Site Preparation	8	0	5	18.5	10.2	20						
San Rafael Grading	8	0	6	18.5	10.2	20						
San Rafael Building Construc	0	0	0	18.5	10.2	20						
San Rafael Paving	5	0	0	18.5	10.2	20						
San Pascual Demolition	10	0	0	18.5	10.2	20						
San Pascual Site Preparatior	8	0	6	18.5	10.2	20						
San Pascual Grading	15	0	8	18.5	10.2	20						
San Pascual Building Constru	0	0	0	18.5	10.2	20						
San Pascual Paving	0	0	0	18.5	10.2	20						
Total Trips												
San Rafael Demolition	220	0	0	18.5	10.2	20	167	0	0	0	0	0
San Rafael Site Preparation	184	0	115	18.5	10.2	20	140	0	0	0	0	344
San Rafael Grading	352	0	264	18.5	10.2	20	267	0	1	1	0	789
San Rafael Building Construc	0	0	0	18.5	10.2	20	0	0	0	0	0	0
San Rafael Paving	115	0	0	18.5	10.2	20	87	0	0	0	0	0
San Pascual Demolition	220	0	0	18.5	10.2	20	167	0	0	0	0	0
San Pascual Site Preparatior	360	0	270	18.5	10.2	20	273	0	1	1	0	807
San Pascual Grading	990	0	528	18.5	10.2	20	751	0	2	2	0	1,577
San Pascual Building Constru	0	0	0	18.5	10.2	20	0	0	0	0	0	0
San Pascual Paving	0	0	0	18.5	10.2	20	0	0	0	0	0	0
Total							**1,852**	**0**	**1**	**2**	**0**	**1,132**

Appendix E-1

San Rafael Geotechnical Evaluation

Geotechnical Evaluation

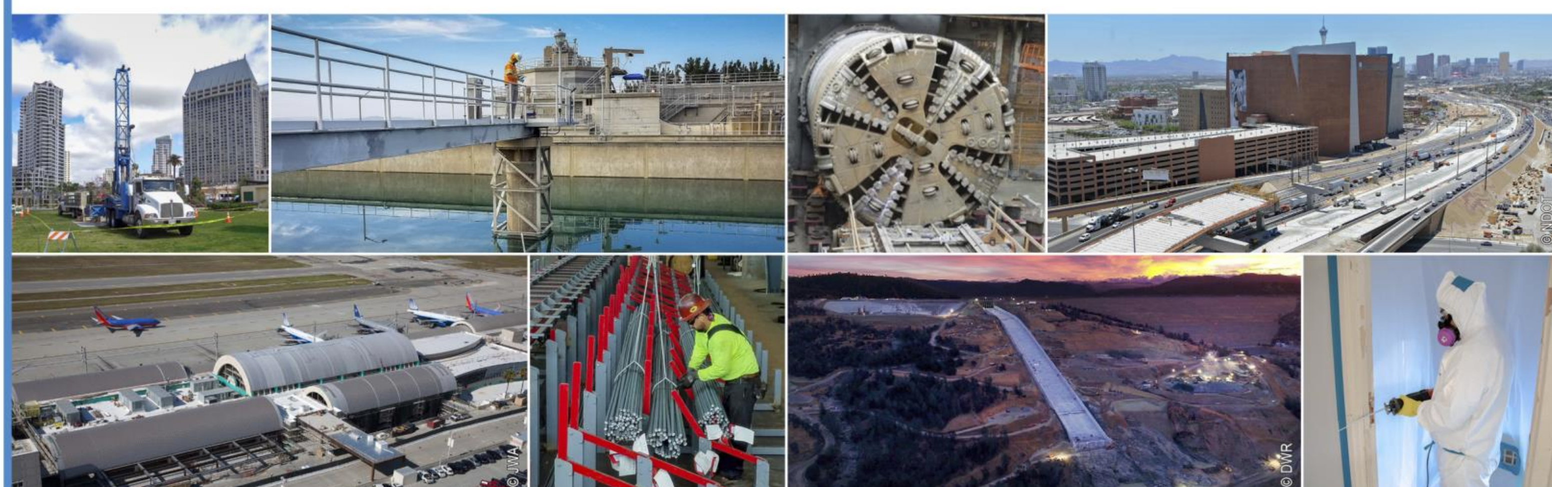
San Rafael Treatment Wetland
Arroyo Seco Water Reuse and Natural Stream Restoration Project

Pasadena, California

Craftwater Engineering, Inc.

45 South Arroyo Parkway, B6 | Pasadena, California 91105

June 22, 2022 | Project No. 211880001



Geotechnical | Environmental | Construction Inspection & Testing | Forensic Engineering & Expert Witness

Geophysics | Engineering Geology | Laboratory Testing | Industrial Hygiene | Occupational Safety | Air Quality | GIS

Ninyo & Moore

Geotechnical & Environmental Sciences Consultants

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

CELEBRATING 35 YEARS

Geotechnical Evaluation
San Rafael Treatment Wetland
Arroyo Seco Water Reuse and Natural Stream Restoration Project
Pasadena, California

Ms. Courtney Semlow
Craftwater Engineering, Inc.
45 South Arroyo Parkway, B6 | Pasadena, California 91105

June 22, 2022 | Project No. 211880001

Aura E. Scharf, GIT
Senior Staff Geologist

Daniel Chu, PhD, PE, GE
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER DANIEL B. CHU No. GE2096 GEOTECHNICAL STATE OF CALIFORNIA

Greg M. Corson, PG, CEG
Principal Geologist

CERTIFIED ENGINEERING GEOLOGIST GREGORY M. CORSON No. 2310 STATE OF CALIFORNIA

AES/GMC/DBC/mlc

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A – Boring Logs

B – Laboratory Testing

C – Analytical Test Results (Drum Characterization)

1 INTRODUCTION

In accordance with your request and authorization, we have performed a geotechnical evaluation for the Arroyo Seco Water Reuse and Natural Stream Restoration project located along the lower Arroyo Seco in the Cities of Pasadena and South Pasadena, California (Figure 1). We understand that the purpose of the project is to reduce the Maximum Total Daily Loads within the Upper Los Angeles River by improving the water quality within Arroyo Seco and its tributary, San Rafael Creek. In general, the project consists of the construction/rehabilitation of two stormwater treatment wetlands along Arroyo Seco, including the San Rafael Treatment Wetland and the San Pasqual Treatment Wetland. Each wetland location will include additional site improvements, such as stormwater diversion structures, stormwater pre- and post-treatment facilities, restoration of existing riparian habitats, and development of recreational opportunities. The purpose of our study was to evaluate the subsurface soil and geologic conditions at each wetland location, including the infiltration rates of the on-site soils, in order to provide geotechnical recommendations for the design and construction of the proposed improvements. This report presents our findings, conclusions, and geotechnical recommendations for design and construction of the proposed improvements at the site of the San Rafael Treatment Wetland (San Rafael Site). Our findings, conclusions and geotechnical recommendations associated with the site of the San Pascual Treatment Wetland (San Pascual Site) are provided under separate cover (Ninyo & Moore, 2022).

2 SCOPE OF SERVICES

Our scope of services for the San Rafael Site included the following:

- Project coordination and planning with subcontractors and personnel from Craftwater Engineering, Inc. the design team, the Cities of Pasadena and South Pasadena, and attendance at a project kick-off meeting.
- Review of readily available background materials, including published topographic maps, geologic maps, fault and seismic hazard maps, groundwater data, stereoscopic aerial photographs, project related plans, and in-house geotechnical information.
- Acquisition of a Pasadena Water and Power soil-boring permit.
- Field reconnaissance to observe and document the site conditions, mark-out proposed hollow-stem-auger (HSA) boring locations for underground utility clearance by Underground Service Alert.
- Subsurface exploration consisting of the drilling, sampling, and logging of six HSA borings, ranging in depths from approximately 10 feet to 31½ feet.
- Field percolation testing in two of the HSA borings in general accordance with the 2021 Los Angeles County Public Work's (LACDPW) Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration.

- Geotechnical laboratory testing of representative soil samples to evaluate in-situ moisture content and dry density, gradation, percentage of particles finer than the No. 200 sieve, Atterberg limits, direct shear strength, and soil corrosivity.
- Data compilation and engineering analysis of the information obtained from our background review, subsurface evaluation, percolation testing, and laboratory testing.
- Preparation of this geotechnical report presenting our findings, conclusions, and recommendations pertaining to the design and construction of the proposed improvements.

3 SITE DESCRIPTION

The San Rafael Site consists of a triangular-shaped, undeveloped lot located along the bottom of a steeply sided canyon cut though the Repetto Hills by Arroyo Seco and its tributaries. The site is located at the confluence of San Rafael Creek and Arroyo Seco (Figures 1 and 2). The lot is bounded on the west by San Rafael Creek, on the southeast by the Arroyo Seco channel, and on the north by an approximately 70-foot-high slope that ascends to a residential property. The confluence of the drainages is at the southwest corner of the site. The lower approximately 30 vertical feet of the north slope has an inclination that decreases from approximately 1.3 to 1.5:1 (horizontal to vertical) in its upper reaches to approximately 3:1 (horizontal to vertical) near the base of the slope. The upper approximately 40 vertical feet of the slope ranges from 0.5:1 to 0.8:1 (horizontal to vertical) with some near vertical sections along a bedrock outcrop that extends across the slope face, approximately mid-slope height. The channels of Arroyo Seco and San Rafael Creek are concrete-lined adjacent to the site, drain toward the south, and are approximately 10 and 5 feet in depth, respectively. The site is accessed by two bridges that cross each drainage channel. According to the County of Los Angeles (2022), the site gently slopes downward toward the southwest with site elevations ranging from 626 feet above mean sea level (MSL) along the base of the slope at the north end of the site to approximately 621 feet MSL at the southwest corner of the site. The site surface is generally areas of bare soil and relatively dense vegetation of bushes, grasses, and trees.

4 PROJECT DESCRIPTION AND PROPOSED CONSTRUCTION

According to Craftwater (2020), the site will be improved to become a new wetland with storage ponds that will treat and infiltrate wet weather flow diverted from San Rafael Creek. The new wetland and ponds will have a storage capacity of approximately 2.6 acre-feet, based on a ponding depth of approximately 5 feet over a footprint of approximately 0.52 acres. It is anticipated that ponds will be bounded by shallow slopes. Water will be diverted from the San Rafael Creek with a new approximately 12-foot-long by 3-foot-wide by 1.5-foot-deep concrete diversion/drop-inlet structure installed along the bottom of the San Rafael Creek at the northwest corner of the site. Stormwater collected by the inlet structure (up to 25 cubic feet per second) will be diverted to the wetland by a 30-inch-diameter pipeline with an in-line hydrodynamic separator for pre-treatment of the water and a 3-way actuated valve vault. Dry weather stormwater flow along San Rafael Creek will be directed to a new natural stream that will be constructed on top of the lower reach of the concrete channel (approximately 190 feet in length). A new reinforced concrete slab will also be installed to cover the lower reach of the channel. Overflow from the wetland will be discharged into Arroyo Seco by an 18-inch-diameter pipeline with an in-line post-treatment structure at the southeast side of the site. A 12-inch dry weather discharge pipeline will be constructed at the southwest end of site. It is anticipated that the pipelines and valve structure will generally be less than 10 feet in depth. The pre- and post-treatment hydrodynamic separators are anticipated to be on the order of 15 feet in depth. Other site improvements include the removal and reconstruction the pedestrian bridge over San Rafael Creek and the construction of new enhanced trails and landscaping.

5 SUBSURFACE EVALUATION AND LABORATORY TESTING

Our subsurface evaluation was conducted on April 27, 2022, and consisted of the drilling, logging, and sampling of five HSA borings (B-1, B-2, B-3, P-1 and P-2). The borings were drilled using a limited-access drill rig with 8-inch diameter augers. Borings B-1, B-2, and B-3 were drilled to depths of approximately 30.4, 18.6, and 30.2 feet, respectively. Borings P-1 and P-2 were drilled to depths of approximately 10.2 and 10.1 feet, respectively. The borings were logged in the field by a representative of Ninyo & Moore and representative bulk and relatively undisturbed soil samples were collected from the borings at selected depths for laboratory testing. Percolation testing was performed in borings P-1 and P-2 as further discussed in Section 8 of this report. Logs of the exploratory borings are provided in Appendix A. The approximate locations of the borings are presented on Figures 2 and 3. The borings were backfilled with cement-bentonite and/or soil cuttings upon completion of the drilling and percolation testing.

Geotechnical laboratory testing of representative soil samples included tests to evaluate in-situ moisture content and dry density, gradation, percentage of particles finer than the No. 200 sieve, Atterberg limits, direct shear strength, and soil corrosivity. Moisture and density test results are presented on the boring logs in Appendix A. The remaining test results are presented in Appendix B.

Soil cuttings from borings backfilled with cement-bentonite grout were placed in 55-gallon drums, and composite soil samples of the drummed soil were collected in 4-ounce jars for waste characterization. The samples were stored in a chilled cooler and delivered to SunStar Laboratories for analytical testing under chain-of-custody protocol. The samples were tested for total petroleum hydrocarbons (gas and diesel range) per United Stated Environmental Protection Agency (EPA) Test Method 8015B, Title 22 metals per EPA Test Methods 6010B/7470/7471, and volatile organic compounds per EPA Test Method 8260B. Based on the characterization test results, the drums were disposed at an approved landfill (Soil Safe in Adelanto, California) by a licensed transportation subcontractor (Belshire) as non-hazardous material. The analytical test results are provided in Appendix C.

6 GEOLOGIC AND SUBSURFACE CONDITIONS

The project site is located within the Los Angeles Basin of the Transverse Ranges Geomorphic Province (Norris and Webb, 1990). The basin has been divided into four blocks, the northeastern, northwestern, southwestern, and central blocks that are separated by prominent fault systems. The site is located at the northern edge of the northeastern block, which consists of a synclinal basin between the San Gabriel and Verdugo Mountains to the north and Whittier fault zone to the south. The basin is infilled with up to 12,000 feet of marine Cenozoic sedimentary rock and Miocene volcanics overlying metamorphic/granitic basement rock. The basin rocks are generally overlain by variably aged alluvial fan and stream deposits shed from the mountains on the north.

According to Campbell, et al. (2014), the project site is generally underlain by late Pleistocene-age young alluvium and a sandstone unit of the Topanga Formation (Figure 4). The young alluvium is mapped along the bottoms of the San Rafael and Arroyo Seco drainages and described by Campbell, et al. (2014) as unconsolidated, stream-deposited silt, sand and gravel. The California Department of Mines and Geology (CDMG, 1998a,b) has mapped the young alluvium as Holocene-aged deposits consisting of loose to medium dense, sand, silt and gravel. Campbell, et al. (2014) has mapped the sandstone unit of the Topanga Formation beneath portions of the site and within the adjacent hills on either sides of the drainages and described it as light brown and gray, medium to coarse grained, well-bedded, sandstone with regional dips of approximately 31 to 77 degrees to the northeast. It is anticipated that similar bedrock is present beneath the younger alluvium at variable depths. Campbell, et al. (2014) also indicate that the bedrock in the area. It is anticipated that various fills associated with original construction of the Arroyo Seco and San Rafael Creek channels and bridge structures are present at the site.

Materials encountered during our subsurface exploration generally consisted of undocumented fill, young alluvium, and Topanga Formation bedrock as described below. Detailed descriptions of the materials encountered in our borings are presented on the boring logs in Appendix A.

6.1 Undocumented Fill

Undocumented fill was encountered in our borings to depths ranging from approximately 3 to 5 feet. The undocumented fill generally consisted of brown, dark brown, reddish brown, moist, medium dense, poorly graded sand with silt, silty sand, and sandy silt with variable amounts of gravel, cobbles, and debris (i.e., pieces of brick, asphalt concrete, glass and plastic). Information regarding the placement of existing fill including ground preparation, remedial excavation, methods of fill placement, and the degree of compaction during placement is unknown to us.

6.2 Young Alluvium

Young alluvium was encountered beneath the undocumented fill to the total depth explored in borings P-1 and P-2 and to depths ranging from approximately 14 to 19 feet in borings B-1 through B-3. The young alluvium generally consisted of interbedded deposits of brown, grayish brown, and light brown, moist to wet, loose to very dense, poorly graded gravel with sand and well-graded sand with silt, silty sand, and sandy silt with variable amounts of gravel, cobbles, and possible boulders.

6.3 Topanga Formation

Topanga Formation bedrock was encountered below the young alluvium in boring B-1, B-2, and B-3 to the total depth explored of up to approximately 30.4 feet. The Topanga Formation generally consisted of gray, moist to wet, soft to moderately hard, weakly to moderately cemented, silty sandstone with variable amounts of gravel.

7 GROUNDWATER

Groundwater was encountered during drilling in boring B-3 at a depth of approximately 15 feet. The depth to groundwater was measured in boring B-3 approximately 25 minutes after completion of drilling at a depth of approximately 13.6 feet. CDMG (1998a,b) indicates that the historic high depth to groundwater at the project site is approximately 20 feet. It would be anticipated that the depth to groundwater would be shallower than this published historic high depth to groundwater adjacent to the stream beds where surface flows occurs, especially during and after storm events.

Fluctuations in the level of groundwater will occur due to variations in ground surface topography, subsurface stratification, rainfall, irrigation practices, groundwater pumping, and other factors that were not evident at the time of our field evaluation.

8 FIELD PERCOLATION TESTING

Percolation testing was performed in our borings P-1 and P-2 in general accordance with the 2021 LACDPW Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration. The testing was performed to evaluate the infiltration rates of the on-site soils at the approximate invert depth of the proposed wetland for use in the project design. The percolation testing was performed within the young granular alluvial deposits. The approximate locations of the percolation test borings are shown on Figures 2 and 3.

Preparation of each boring for percolation testing included the installation of a 2-inch-diameter slotted polyvinyl chloride (PVC) pipe in each boring and backfilling the bottom approximately 5 feet of annular space between the borehole wall and pipe with clean gravel. The infiltration zones were pre-soaked with water for at least one hour prior to performing percolation testing. After the borings were pre-soaked, falling-head percolation testing was performed in the borings.

The falling-head test method involved placing clean water into the PVC pipe to establish a head of water and measuring the rate at which the water level dropped in the pipe at consecutive time intervals (approximately 10 minutes). The test was repeated at each location until three consecutive measurements provided similar results and a stabilized rate was obtained. The field percolation rates were calculated by measuring the total volume of water infiltrated during the time interval and dividing by the surface area of the tested zone of the respective boring. The measured field percolation rates are presented in Table 1.

The 2021 LACDPW guidelines indicate that the measured field percolation rates should be reduced to account for the long-term performance of the proposed Best Management Practices (BMPs) by dividing the field rates by the “Total Reduction Factor (RF).” They define the RF as the sum of the "test-specific" reduction factor (RF_t), the "site variability" reduction factor (RF_v), and the "long-term siltation, plugging, and maintenance" reduction factor (RF_s) (i.e., $RF=RF_t+RF_v+RF_s$). The guidelines (CLADPW, 2021) indicate that the RF_t is applied to account for variations in the direction of flow during the test and the reliability of the different test methods and ranges from 1 to 3. We recommend using an RF_t value of 2 for the small dimeter boring test method used in this evaluation. The RF_v value is applied to account for site variability, number of tests, and thoroughness of the subsurface investigation and ranges from 1 to 3. Based on our explorations and relative consistency of materials encountered between borings, we recommend using an RF_v value of 1. The long-term siltation, plugging, and maintenance value (RF_s) also ranges from 1 to 3 and will generally vary on the level of pre-treatment performed prior to infiltration and the level of future maintenance of the system. For the purposes of this evaluation, we have assumed an RFs value of 1; however, the RF_s value should be provided by the BMP designer. The RF_t, RF_v, RF_s, and resulting RF values used in our analysis are presented in Table 1. The adjusted percolation rates based on these values are also presented in Table 1.

Table 1 – Percolation Test Results

Test Boring	Test Type	Approximate Depth of Tested Zone (feet)	Field Percolation Rate (inches/hour)	Reduction Factor				Adjusted Percolation Rate (inches/hour)
				RF_t	RF_v	RF_s	RF	
P-1	Falling Head	8 – 10	15.1	2	1	1	4	3.8
P-2	Falling Head	8 – 10	11.6	2	1	1	4	2.9

Notes:
RF_t – Test Specific Reduction Factor
RF_v – Site Variability Reduction Factor
RF_s – Long-Term Siltation, Plugging, and Maintenance Reduction Factor (To be adjusted by the BMP designer)
RF – Total Reduction Factor

Based on our evaluation, we recommend that an adjusted percolation rate of 2.9 inches per hour, following adjustments by the BMP designer for RF_s, be used for project design.

In addition, we recommend that new or existing buildings be set-back from the proposed infiltration facility a minimum of 15 feet or a distance where the bottom of the lowest foundation element of the structure is at least 10 horizontal feet outside of an imaginary 1:1 (horizontal to vertical) plane projected downward and outward from the zone of infiltration.

9 FLOOD HAZARDS

Based on our review of flood insurance rate maps for the project area (Federal Emergency Management Agency [FEMA], 2008), the project site is not located in the 100-year Flood Hazard Area. The site is located within “Other Flood Areas – Zone X,” which includes areas potentially subject to 500-year floods, areas of 100-year floods with average depths of less than one foot, and areas protected by levees.

10 FAULTING AND SEISMICITY

The site is in a seismically active area, as is the majority of southern California, and the potential for strong ground motion in the project area is considered significant during the design life of the proposed project. Figure 5 shows the approximate site location relative to the major faults in the region. The site is not located within a State of California Earthquake Fault Zone (EFZ) (formerly known as an Alquist-Priolo Special Studies Zone) (Hart and Bryant, 2018). The nearest mapped active fault to the site is the Raymond fault located approximately 0.4 mile south of the site (United States Geological Survey [USGS], 2008) (Figure 5).

The principal seismic hazards evaluated at the subject site are surface fault rupture, ground motion, liquefaction, and seismically induced landslides. A brief description of these principal seismic hazards is discussed in the following sections.

10.1 Surface Fault Rupture

Surface fault rupture is the offset or rupturing of the ground surface by relative displacement across a fault during an earthquake. Based on our review of referenced geologic and fault hazard data, the project site is not transected by known active faults. Therefore, the potential for surface rupture is relatively low. However, lurching or cracking of the ground surface as a result of nearby seismic events is possible.

10.2 Ground Motion

Considering the proximity of the site to active faults capable of producing a maximum moment magnitude of 6.0 or more, the project area has a high potential for experiencing strong ground motion. The 2019 California Building Code (CBC) specifies that the risk-targeted maximum considered earthquake (MCE_R) ground motion response accelerations be used to evaluate seismic loads for design of buildings and other structures. The MCE_R ground motion response accelerations are based on the spectral response accelerations for 5 percent damping in the direction of maximum horizontal response and incorporate a target risk for structural collapse equivalent to 1 percent in 50 years with deterministic limits for near-source effects. The average shear wave velocity (V_S) for the upper 30 meters of soil (V_{S30}) is approximately 468 meters per second (m/s) (California Geologic Society [CGS], 2017). Accordingly, the site is considered to be a Site Class C. The horizontal peak ground acceleration that corresponds to the MCE_R for the project area was calculated as 0.92g using the 2019 Structural Engineers Association of California (SEAOC)/Office of Statewide Health Planning and Development (OSHPD) seismic design tool (web-based). Spectral response acceleration parameters, consistent with the 2019 CBC, are also provided in Section 12.3 for the evaluation of seismic load on the proposed wetland.

The 2019 CBC specifies that the potential for liquefaction and soil strength loss be evaluated, where applicable, for the mapped maximum considered earthquake geometric mean (MCE_G) peak ground acceleration (PGA_M) with adjustment for site class effects in accordance with the American Society of Civil Engineers 7-16 Standard. The MCE_G PGA is based on the geometric mean PGA with a 2 percent probability of exceedance in 50 years. The PGA_M was calculated as 1.1g using the 2019 SEAOC/OSHPD seismic design tool (web-based).

10.3 Liquefaction

Liquefaction is the phenomenon in which loosely deposited granular soils with silt and clay contents of less than approximately 35 percent and non-plastic silts located below the water table undergo rapid loss of shear strength when subjected to strong earthquake-induced ground shaking. Ground shaking of sufficient duration results in the loss of grain-to-grain contact due to a rapid rise in pore water pressure and causes the soil to behave as a fluid for a brief period of time. Liquefaction is known generally to occur in saturated or near saturated cohesionless soils at depths shallower than 50 feet. Factors known to influence liquefaction potential include composition and thickness of soil layers, grain size, relative density, groundwater level, degree of saturation, and both intensity and duration of ground shaking.

The State of California Hazard Zones map (CGS, 2017 and 2022a,b) indicates that the southern portion of the site is located in an area mapped as being potentially susceptible to liquefaction (Figure 6). However, based on our understanding of the proposed improvements and the fact that the project does not meet the requirements of a “project” per the Seismic Hazards Mapping Act, an evaluation of the potential for liquefaction and liquefaction-related risks, including dynamic settlement and lateral spread were not included in our evaluation. In addition, due to the existence of shallow formational material it is our opinion that soil liquefaction is not a design consideration for this project.

10.4 Landslides and Rockfall Hazard

Our evaluation did not include a detailed evaluation of the landslide or rockfall susceptibility or stability of the natural slopes adjacent to the project. Our review of geologic literature indicates that landslides are not present on the slopes adjacent to the site (Figure 4); however, the ascending slopes along the north side of the site and west of Rafael Creek are mapped as being susceptible to earthquake-induced landslides (CGS, 2017 and 2022a,b) (Figure 6). According to Campbell, et al. (2014), bedding in the area dips to the northeast, which is considered favorable for stability of the slope along the north side of the site. The proposed project improvements are situated on relatively flat and gently sloping ground areas underlain by fill and alluvial deposits, which are not considered susceptible to landslides. The evaluation of potential landslide and rockfall hazards associated with the adjacent steep canyon slopes was beyond the scope of our evaluation.

In general, it is anticipated that excavations made to construct the site improvements will be shallow in nature and not extend into the toe of the slope. Detailed project plans should be provided for our review prior to construction. Additional analyses could be warranted based on the proposed improvements and their locations to the adjacent slopes and chosen construction methods.

11 CONCLUSIONS

Based on the results of our evaluation, it is our opinion that the proposed project and associated improvements for the San Rafael Treatment Wetland are feasible from a geotechnical standpoint provided the recommendations presented in this report are incorporated into the design and construction of the project. In general, the following conclusions were made:

- The subject site is generally underlain by undocumented fill over young alluvial deposits consisting of moist to wet, loose to very dense, poorly graded gravel, well-graded sand with silt, poorly graded sand with silt, silty sand, and sandy silt with variable amounts of gravel, cobbles, and possible boulders. The young alluvial deposits are underlain by Topanga Formation bedrock consisting of weakly to moderately cemented sandstone. The fill materials are considered to be potentially compressible.

- In general, excavations in the existing fill soil, young alluvium, and Topanga Formation bedrock should be feasible with earthmoving equipment in good working condition.

- We anticipate that the on-site excavated materials should be suitable for re-use as engineered fill and trench backfill provided, they are free of trash, debris, roots, contamination, deleterious materials, and cobbles or hard lumps of material in excess of 4 inches in diameter. Oversize materials will be encountered during site excavations and should be anticipated by the contactor. Processing of the materials to bring them near the laboratory optimum moisture content (i.e., drying and/or wetting) prior to use as fill should also be planned by the contractor.

- The on-site soils are generally granular and will be prone to caving during excavation. The on-site soils should be considered as Type C soils in accordance with United States Department of Labor Occupational Safety and Health Administration (OSHA) regulations. Accordingly, temporary excavations deeper than 4 feet in depth should be shored or laid back at inclinations of 1½ to 1 (horizontal to vertical) or flatter.

- Where excavations cannot be laid back, temporary shoring is anticipated. Shoring should be designed by the contractor to support the excavation sidewalls and to reduce the potential for settlement of adjacent structures, roadways and other site improvements. Shoring should be designed in accordance with OSHA regulations.

- Our percolation testing indicates that the alluvial deposits at the approximate invert depth of the infiltration facility have an adjusted infiltration rate 2.9 inches per hour. We recommend using this value for design of the project; however, this rate should be adjusted as needed in accordance with the 2021 LACDPW guidelines.

- Groundwater was measured in our exploratory boring B-3 at depth of approximately 13.6 feet after completion of drilling. Fluctuations in the level of groundwater will occur due to variations in ground surface topography, subsurface stratification, rainfall, irrigation practices, groundwater pumping, and other factors that were not evident at the time of our field evaluation.

- The site is located within a mapped Seismic Hazards Zone considered susceptible to liquefaction (CGS, 2017 and 2022a,b). However, due to the shallow depth to bedrock as well as the dense nature of alluvium soil liquefaction is not a design consideration for this project.

- The adjacent steep slopes north and west of the site are located within a mapped Seismic Hazards Zone as being susceptible to seismically induced landslides (CGS, 2017 and 2022a,b).
- The site is not located within an EFZ with the potential for fault rupture as defined by the Alquist-Priolo Earthquake Fault Zoning Act (Hart and Bryant, 2018). The probability of surface fault rupture at the site is considered to below.
- Based on the results of our laboratory testing (relatively dense and moist materials), hydro-collapse of the on-site alluvial soils resulting from on-site infiltration is not considered a design issue.
- The site is not located within a designated flood inundation zone from the 100-year flood event (FEMA, 2008).
- Based on our laboratory corrosion testing, the on-site soil can be classified as non-corrosive per the 2021 Caltrans Corrosion Guidelines.

12 RECOMMENDATIONS

The following sections present our geotechnical recommendations for design and construction of the project. This project is in preliminary design phase and some aspects of the design will be subject to change. Ninyo & Moore should review the final plans and develop additional geotechnical recommendations as appropriate. These recommendations are based on our evaluation of the site geotechnical conditions, our understanding of the planned construction, and experience in the vicinity of the project. The work should be performed in conformance with the recommendations presented in this report, project specifications, and appropriate agency standards.

12.1 Earthwork

We anticipate that earthwork at the site will consist of cuts and fills associated with construction of the treatment wetland, installation of associated structures (i.e., new drop structure, actuated valve, hydrodynamic separators, and new foundations for the San Rafael pedestrian bridge), preparation of subgrades for at-grade improvements, and trenching and backfilling of underground utilities and pipelines. Based on our understanding of the project, we anticipate that excavations for the project will vary from approximately 2 to 15 feet in depth. Earthwork operations should be performed in accordance with the requirements of applicable governing agencies and the recommendations presented in the following sections.

12.1.1 Pre-Construction Conference

We recommend that grading and foundation plans be submitted to Ninyo & Moore for review to check for conformance to the recommendations provided in this report. We further recommend that a pre-construction conference be held to discuss the grading recommendations presented in this report. The owner and/or their representative, the governing agencies' representatives, the civil engineer, Ninyo & Moore, and the contractor should be in attendance to discuss the work plan, project schedule, and earthwork requirements.

12.1.2 Clearing and Site Preparation

Prior to performing excavations or other earthwork, the site should be cleared of existing site improvements and foundations, gravel, debris, vegetation, and loose or otherwise unsuitable soils. Materials generated from the clearing/demolition operations should be removed from the project site and disposed of at a legal dump site. Existing utilities to remain in-place should be located and protected from damage by construction activities. Excavations resulting from the removal of foundations, underground utilities, and/or other underground improvements, should be backfilled with compacted fill in general accordance with the fill and compaction recommendations presented below.

12.1.3 Excavation Characteristics

We anticipate that excavations in the undocumented fill, alluvial deposits, and bedrock should be feasible with earthmoving equipment in good working order. Based on the results of our subsurface exploration, we anticipate that the subsurface soils encountered during excavations will generally consist of granular materials of poorly graded gravel, well-graded sand with silt, poorly graded sand with silt, silty sand, and sandy silt with variable amounts of gravel, cobbles, and possible boulders, and bedrock of variably cemented sandstone. Based on our experience, strongly cemented beds and/or concretions may be encountered in the Topanga Formation bedrock that may present difficulty during excavations. During excavations, the contractor should anticipate encountering oversize materials, including cobbles, boulders, and debris in the existing fills. Oversize materials, is not considered suitable for use as backfill should be disposed of off-site. Processing of the excavated materials to bring them near the laboratory optimum moisture content (i.e., drying and/or wetting) prior to use as fill should be planned by the contractor. Contractors should make their own independent evaluation of the excavatability of the on-site materials prior to submitting their bids, including allowances for processing the soils.

We anticipate that temporary excavations in wet soils will not be stable at inclinations steeper than approximately 3 to 1 (horizontal to vertical). Groundwater and/or seepage should be anticipated from excavations. Temporary excavations should be evaluated in the field at the time of construction by our representative.

12.1.4 Subgrade Preparation for Treatment Wetland

Based on our exploratory borings, granular alluvial deposits are anticipated to be encountered at the bottom of the planned treatment wetland that should be suitable for its intended purpose. The excavation bottoms should be evaluated by our representative during the excavation work. In the event that unsuitable material is encountered along the bottom of the excavation, including debris in the fill material, the unsuitable material should be removed and replaced with loosely packed clean sand or gravel, such as drainage rock. The actual recommendations for removal and replacement should be based on our field observations. We recommend that minimal compaction be performed on the exposed subgrade, and materials used to replace unsuitable materials (if needed). Compaction of the subgrade could potentially reduce the infiltration rate of the wetland. If the subgrade of the wetland is compacted, we recommend that additional percolation testing be performed. It is anticipated that the side slopes for the new treatment wetland will be cut slopes that expose granular existing fill and alluvial soils. The cut side slopes should be constructed at inclinations of approximately 3 to 1 (horizontal to vertical) or flatter. The outer approximately 8 inches of the cut slope surfaces be scarified, moisture-conditioned, and compacted to a relative compaction of 90 percent as evaluate by ASTM International (ASTM) D 1557. If new fills will be placed along the bottom or sides of the wetland, we recommend that the new fill materials be placed on relatively dense alluvial deposits and/or bedrock material. The areas to receive new fill should be observed by our representative during the excavation work. The upper approximately 8 inches of exposed bottom beneath areas to receive fill should be scarified, moisture-conditioned and recompacted to a relative compaction of 90 percent as evaluated by ASTM D 1557.

12.1.5 Treatment of Near-Surface Soils for Pedestrian Bridge and Buried Structures

In order to provide suitable support and reduce the potential for settlement of proposed bridge replacement structure over San Rafael Creek and buried structures (i.e., the drop structure, hydro-dynamic separators, valves, etc.), we recommend that the existing undocumented fill, upper loose alluvial deposits, and/or upper soft/loose bedrock should be removed and recompacted from beneath the footprints of these structures. The excavations should extend deep enough to provide 2 feet or more of newly compacted fill material beneath the proposed foundations. The overexcavation should expose relatively dense alluvial deposits and/or bedrock. Additional overexcavation of loose and/or wet areas may be appropriate. The excavation bottoms should be evaluated by our representative during the excavation work and additional recommendations, if needed, be based on field observations. The limits of removal should extend approximately 2 feet beyond the footprint of the foundations for the buried structures or a distance equal to the depth of the overexcavations beneath the foundations, whichever is farther. If drainage rock is placed beneath the foundations for the buried structures, the rock can be considered part of the 2-foot-thick layer of compacted fill beneath the foundations. Prior to placing compacted fill and/or drainage rock, the upper approximately 8 inches of the exposed bottom should be scarified, moisture-conditioned to near optimum moisture content, and recompacted to a relative compaction of 90 percent as evaluated by ASTM D 1557.

12.1.6 Temporary Excavations

We recommend that excavations be designed and constructed in accordance with OSHA regulations. These regulations provide shoring design parameters for excavations and trenches up to 20 feet deep based on the soil types encountered. Trenches over 20 feet deep should be designed by the contractor's engineer based on site-specific geotechnical analyses. For planning purposes, we recommend that the undocumented fill and alluvial soils be considered as OSHA Type C soil and the bedrock be considered as OSHA Type B soil.

For trench or other excavations, OSHA requirements regarding personnel safety should be met by using appropriate shoring or by laying back the slopes no steeper than 1½:1 (horizontal to vertical) for Type C soils and 1:1 (horizontal to vertical) for Type B soils. Temporary excavations that encounter seepage may need shoring or may be mitigated by placing sandbags or gravel along the base of the seepage zone. Excavations encountering seepage should be evaluated on a case-by-case basis. On-site safety of personnel is the responsibility of the contractor.

Care should be taken by the contractor to avoid undermining adjacent existing foundations and improvements. New excavations should not extend within the "zone of influence" of existing foundations, if present, which is defined as a 1:1 (horizontal to vertical) plane projecting out from the bottom outside edge of the foundations. In the event that excavations will extend within the "zone of influence" of existing foundations, our office should be notified, and appropriate recommendations provided, such as temporary underpinning of impacted foundations and/or temporary shoring.

12.1.7 Shoring

Where temporary slopes are not possible, shoring will be appropriate. The design of the shoring system should consider the excavation characteristics of the onsite soil, temporary excavation stability, and the impact of construction on existing structures.

Shoring systems will be constructed through fill, alluvial deposits, and bedrock. We anticipate that braced driven sheet pile shoring systems will be appropriate for the project to depths up to approximately 30 feet. Cantilevered shoring systems (if used) should be limited to heights of up to 10 feet. Braced and cantilevered shoring systems should be designed using the lateral earth pressure values presented on Figures 7 and 8, respectively. The recommended design pressures are based on the assumptions that the shoring system is constructed without raising the ground surface elevation behind the shoring wall, that there are no surcharge loads, such as soil stockpiles and construction materials, and that no loads act above a 1:1 (horizontal to vertical) plane extending up and back from the base of the shoring system. For shoring walls subjected to the above-mentioned surcharge loads, the contractor should include the effect of these loads on the lateral pressures against the shoring system. The shoring systems planned for the project should be reviewed by our office to evaluate the design considerations and geotechnical parameters used. Ground settlement may occur behind the shoring system wall during excavation. The amount of settlement depends on the type of shoring system, the contractor's workmanship, and soil conditions. We recommend that structures/improvements in the vicinity of the planned shoring installation be reviewed with regard to foundation support and tolerance to settlement. To reduce the potential for distress to adjacent structures, we recommend that the shoring system be designed to limit the ground settlement behind the shoring system to ½ inch or less, which would equal approximately ½ inch of deflection. Potential causes of settlement that should be addressed include settlement during installation of the shoring, excavation for structure construction, construction vibrations, and removal of the support system. The vibrations from the driving of sheet piles, if used, may result in some dynamic settlement of granular soils that may affect the adjacent structures. We recommend that shoring installation be evaluated carefully by the contractor prior to construction and that ground vibration and settlement monitoring be performed during construction. Vibration and settlement monitoring should be performed during sheet pile driving, if used. If settlement is detected or peak particle velocities of approximately 0.4 inch per second or more are measured adjacent to existing improvements, the sheet pile driving should be stopped and evaluated. The evaluation may include changing the hammer vibration frequency and monitoring for settlement and vibrations. To reduce the potential for settlement associated with sheet pile removal, sheet piles may be left in place. In the event excessive settlement or other damage occurs associated with the pile driving operations, it may be appropriate to perform grouting beneath nearby structure(s) to mitigate the pile driving effects. We recommend that shoring installation be evaluated carefully by the contractor prior to construction.

The contractor should retain a licensed, qualified and experienced engineer to design the shoring system. The shoring parameters presented in this report are minimum requirements, and the contractor should evaluate the adequacy of these parameters and make the modifications as needed for their design. We recommend that the contractor take appropriate measures to protect workers. OSHA requirements pertaining to worker safety should be observed.

12.1.8 Construction Dewatering

Groundwater was measured at a depth of approximately 13½ feet in boring B-3 during our field exploration. Excavations in the alluvial soils that extend below this depth should anticipate saturated soil conditions and possible dewatering. As indicated, the depth to groundwater may vary depending on many site factors, including variations in ground surface topography, subsurface stratification, rainfall, irrigation practices, and groundwater pumping, and during or shortly after storm events given the proximity of the site to San Rafael Creek and Arroyo Seco. The dewatering system design should be performed by a specialty dewatering contractor. Disposal of groundwater should be performed in accordance with guidelines of the Regional Water Quality Control Board.

12.1.9 Fill Material

In general, the on-site soils should be suitable for reuse as fill materials, provided they are free of trash, debris, oversize material, or other deleterious materials. Fill should generally be free of rocks or lumps of material in excess of 4 inches in diameter. Rocks or hard lumps larger than approximately 4 inches in diameter should be broken into smaller pieces or should be removed from the site.

Fill used as backfill of buried structures should consist of free-draining, granular, non-expansive soil that conforms with the latest edition of Greenbook for structure backfill. “Non-expansive” can be defined as soil having an EI of 20 or less in accordance with ASTM Test Method D 4829 (CBC, 2019). The on-site granular soils are anticipated to meet this requirement.

Imported fill material should consist of clean, non-expansive, granular material which also conforms to the latest addition of Greenbook for structure backfill. The soil should also be tested for corrosive properties prior to importing. We recommend that the imported materials meet the 2021 Caltrans criteria for non-corrosive soils (i.e., soils having a chloride concentration of 500 parts per million [ppm] or less, a soluble sulfate content of approximately 0.15 percent (1,500 ppm) or less, a pH value of 5.5 or higher, or an electrical resistivity of

1,500 ohm-centimeters or more). Materials for use as fill should be evaluated by Ninyo & Moore prior to importing. The contractor should be responsible for the uniformity of import material brought to the site.

12.1.10 Fill Placement and Compaction

In general, fill material, including structure and trench backfill and fill placed beneath foundations, should be moisture-conditioned and compacted in horizontal lifts to a relative compaction of 90 percent or more as evaluated by ASTM D 1557. Fill material with less than 15 percent fines (passing No. 200 sieve) should be compacted to 95 percent relative compaction as evaluated by ASTM D 1557. Fill material should be moisture-conditioned to slightly above the laboratory optimum moisture content. The lift thickness for fill soils will depend on the type of compaction equipment used but generally should not exceed 8 inches in loose thickness. Special care should be exercised to avoid damaging pipes during compaction of trench backfill. Placement and compaction of the fill soils should be in general accordance with local grading ordinances and good construction practice.

12.2 Underground Utilities

We anticipate that underground pipelines will be supported on native alluvial deposits. Based on the conceptual plans (Craftwater, 2020), pipeline inverts are anticipated to be on the order of 5 to 10 feet in depth.

12.2.1 Pipe Bedding

We recommend that pipes be supported on 6 inches or more of granular bedding material, such as sand, with a sand equivalent value of 30 or more. Bedding material should be placed around the pipe and 12 inches or more above the top of the pipe in accordance with the current Greenbook. Special care should be taken not to allow voids beneath the pipe. Compaction of the bedding material and backfill should proceed up both sides of the pipe. Trench backfill, including bedding material, should be placed in accordance with the recommendations presented in the Earthwork section of this report.

12.2.2 Trench Backfill

Based on our subsurface evaluation, the on-site soils should generally be suitable for re-use as trench backfill provided, they are free of organic material, clay lumps, debris, and rocks more than approximately 4 inches in diameter. We recommend that trench backfilling be in general conformance with the Greenbook standard specifications for structure backfill. Fill should be moisture-conditioned to at or slightly above the laboratory optimum. Wet soils should be allowed to dry to a moisture content near the optimum prior to their placement as trench backfill. Trench backfill should be compacted to a relative compaction of 90 percent or more as evaluated by ASTM D 1557. Lift thickness for trench backfill will depend on the type of compaction equipment utilized but should generally be placed in horizontal lifts not exceeding 8 inches in loose thickness. Special care should be exercised to avoid damaging the pipelines during compaction of the backfill.

12.2.3 Modulus of Soil Reaction for Pipe Design

The modulus of soil reaction is used to characterize the stiffness of soil backfill placed along the sides of buried flexible pipelines for the purpose of evaluating deflection caused by the weight of the backfill above the pipe. We recommend that a modulus of soil reaction of 1,000 pounds per square inch be used for design, provided that granular bedding material is placed adjacent to the pipe, as recommended in the previous section.

12.3 Site-Specific Seismic Design Considerations

Design of the proposed improvements should be performed in accordance with the requirements of governing jurisdictions and applicable building codes. Table 2 presents the site-specific spectral response acceleration parameters in accordance with the CBC (2019) guidelines.

Table 2 – 2019 California Building Code Seismic Design Criteria

Site Coefficients and Spectral Response Acceleration Parameters	Values
Site Class	C
Mapped Spectral Response Acceleration at 0.2-second Period, S_s	2.107
Mapped Spectral Response Acceleration at 1.0-second Period, S_1	0.748
Site-modified Spectral Response Acceleration at 0.2-second Period, S_{MS}	2.529
Site-modified Spectral Response Acceleration at 1.0-second Period, S_{M1}	1.047
Site Design Spectral Response Acceleration at 0.2-second Period, S_{DS}	1.686
Site Design Spectral Response Acceleration at 1.0-second Period, S_{D1}	0.698
Site- modified Peak Ground Acceleration, PGA_M	1.099

12.4 Foundations

Our evaluation indicated that proposed buried structures (i.e., drop structure, hydrodynamic separators, and valves, etc.) may be supported by mat foundations. Information regarding the bridge reconstruction, such as type of existing foundations, whether the existing foundations will be reused, etc. were unknown by our firm when preparing this report. For preliminary planning purposes, we are assuming that the new bridge will be supported on new spread footing foundations. The new mat and spread footing foundations should be designed in accordance with structural considerations and the following recommendations. In addition, requirements of the appropriate governing jurisdictions and applicable building codes should be considered in the design of the structures:

12.4.1 Spread Footings

Spread footings for the bridge structure should be placed directly on compacted fill in accordance with the recommendations presented in the Earthwork section of this report. The spread footings should extend 24 inches or more below the lowest adjacent finished grade. Continuous and isolated footings should have a width of 24 inches or more. Continuous footings should be reinforced with two No. 4 steel reinforcing bars, one placed near the top and one placed near the bottom of the footings, and further detailed in accordance with the recommendations of the structural engineer.

Footings, as described above and bearing on compacted fill, may be designed using a net allowable bearing capacity of 3,000 pounds per square foot (psf). Total and differential settlements for footings designed in accordance with the above recommendations are estimated to be less than approximately 1 inch and ½ inch over a horizontal span of 40 feet, respectively.

Footings bearing on compacted fill may be designed using a coefficient of friction of 0.4, where the total frictional resistance equals the coefficient of friction times the dead load. Footings may be designed using a passive resistance value of 300 psf per foot of depth, with a maximum value of 4,500 psf. The allowable lateral resistance can be taken as the sum of the frictional resistance and passive resistance, provided the passive resistance does not exceed one-half of the total allowable resistance. The passive resistance (including the maximum value) may be increased by one-third when considering loads of short duration such as wind or seismic forces.

12.4.2 Mat Foundations

Mat foundations may be supported on compacted fill in accordance with the recommendations presented in the Earthwork section of this report. Foundations should be designed in accordance with structural considerations and the following recommendations. In addition, requirements of the appropriate governing jurisdictions and applicable building codes should be considered in the design of the structures.

The mat foundations may be designed using a net allowable bearing capacity of 4,000 psf. The total and differential settlement corresponding to this allowable bearing load are estimated to be less than approximately 1 inch and ½ inch over a horizontal span of 40 feet, respectively.

Mat foundations typically experience some deflection due to loads placed on the mat and the reaction of the soils directly underlying the mat. A design modulus of subgrade reaction (K) of 50 tons per cubic foot may be used for the subgrade soils in evaluating such deflections.

12.5 Lateral Earth Pressures for Underground Structures

Walls for below-grade structures when constructed as recommended above may be designed for lateral pressures represented by the pressure diagram on Figure 9. To reduce the potential for pipe-to-wall differential settlement, which could cause pipe shearing, we recommend that a flexible pipe joint be located close to the exterior of the wall. The type of joint should be such that minor relative movement can be accommodated without distress. The pipe connections should be sufficiently flexible to withstand differential settlement of approximately ¾ inch.

12.6 Corrosivity

Laboratory testing was performed on a representative shallow soil sample collected from boring B-1 to evaluate soil pH, electrical resistivity, water-soluble chloride content, and water-soluble sulfate content. The soil pH and electrical resistivity tests were performed in general accordance with California Test Method (CT) 643. Chloride content tests were performed in general accordance with CT 422. Sulfate testing was performed in general accordance with CT 417. The soil pH of the sample tested was measured to be 7.4 and the electrical resistivity was measured to be 7,260 ohm-centimeters. The chloride content of the sample was measured to be 10 ppm. The sulfate content of the sample was measured to be 0.001 percent by weight (i.e., 10 ppm). Based on the laboratory test results and 2021 Caltrans corrosion criteria, the soils at the project site can be classified as non-corrosive, which is defined as having earth materials with less than 500 ppm chlorides, less than 0.15 percent sulfates (i.e., 1,500 ppm), a pH of 5.5 or more, or an electrical resistivity of 1,500 ohm-cm or more. The corrosivity test results are presented in Appendix B.

12.7 Concrete Placement

Concrete in contact with soil or water that contains high concentrations of water-soluble sulfates can be subject to premature chemical and/or physical deterioration. Based on the CBC (2019), the potential for sulfate attack is negligible for water-soluble sulfate contents in soil ranging from 0.00 to 0.10 percent by weight, moderate for water-soluble sulfate contents ranging from 0.10 to 0.20 percent by weight, severe for water-soluble sulfate contents ranging from 0.20 to 2.00 percent by weight, and very severe for water-soluble sulfate contents over 2.00 percent by weight. The soil samples tested for this evaluation, using CT 417, indicate water-soluble sulfate contents of approximately 0.001 and 0.002 percent by weight (i.e., 10 and 20 ppm). Accordingly, the on-site soils are considered to have a negligible potential for sulfate attack. Per ACI (2019b), Type II cement is appropriate for the site improvements. However, due to the potential variability of the soils on site, consideration should be given to using Type II/V cement for the project.

To reduce the potential for shrinkage cracks in the concrete during curing, we recommend that the concrete for the proposed improvements be placed with a slump of 4 inches based on ASTM C 143. The slump should be checked periodically at the site prior to concrete placement. We further recommend that concrete cover over reinforcing steel for foundations be provided in accordance with CBC (2019). The structural engineer should be consulted for additional concrete specifications.

12.8 Stormwater Infiltration Gallery

Based on our subsurface evaluation, the site is generally underlain by undocumented fill and alluvial deposits consisting of poorly graded gravel, well-graded sand with silt, poorly graded sand with silt, silty sand, and sandy silt with variable amounts of gravel, cobbles, and possible boulders. We recommend that an infiltration rate of 2.9 inches per hour, following adjustments by the BMP designer for RF_s, be used for the site alluvial soils. As previously discussed, we anticipate that stormwater will mound/perch on top of the bedrock encountered at depths of approximately 14 to 19 feet across the majority of the site. It is anticipated that infiltrated stormwater will move laterally along this contact. We recommend that the bottoms of the wetland be further evaluated during construction. Additional recommendations may be provided at that time if fine-grained materials are present within the alluvial deposits exposed at the bottom of the wetland, such as removing the fine-grained material and replacing it with granular material.

Based on our evaluation, the potential for hydro-collapse settlement associated with infiltration is generally low due to the proposed depth of infiltration. However, we generally recommend a setback of 15 feet or more between settlement sensitive structures and proposed infiltration areas.

12.9 Drainage

Proper surface drainage is imperative for satisfactory site performance. Positive drainage should be provided and maintained to direct surface water away from existing foundations. Positive drainage is defined as a slope of 2 percent or more for a distance of 5 feet or more away from foundations and tops of slopes. Runoff should then be directed by the use of swales or pipes into a collective drainage system. Area drains for landscaped and paved areas are recommended. Surface waters should not be allowed to pond adjacent to footings. We recommend that above-ground structures, if constructed, have roof drains and downspouts installed to collect runoff.

12.10 Landscaping

Project landscaping should consist of drought tolerant plants. Landscape irrigation should be kept to a level just sufficient to maintain plant vigor. Overwatering should not be permitted.

13 CONSTRUCTION OBSERVATION

The recommendations provided in this report are based on our understanding of the proposed project and our evaluation of the data collected based on subsurface conditions disclosed by widely spaced exploratory borings. It is imperative that the geotechnical consultant checks the interpolated subsurface conditions during construction. We recommend that Ninyo & Moore review the project plans and specifications prior to construction. It should be noted that, upon review of these documents, some recommendations presented in this report may be revised or modified.

During construction we recommend that the duties of the geotechnical consultant include, but not be limited to:

- Observing site clearing, grubbing, and removals.
- Observing excavation bottoms, including the bottom of the proposed wetland.
- Observing preparation of pavement and foundation subgrades.
- Observing placement and compaction of fill, including trench and structure backfill.
- Evaluating imported materials prior to their use as fill (if used).
- Performing field tests to evaluate fill compaction.
- Observing foundation excavations for bearing materials and cleaning prior to placement of reinforcing steel or concrete.
- Performing material testing services including concrete compressive strength and steel tensile strength tests and inspections.

The recommendations provided in this report assume that Ninyo & Moore will be retained as the geotechnical consultant during the construction phase of this project. If another geotechnical consultant is selected, we request that the selected consultant indicate to the owner and to our firm in writing that our recommendations are understood and that they are in full agreement with our recommendations.

14 LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analysis presented in this geotechnical report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Please also note that our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified, and additional recommendations, if warranted, will be provided upon request. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

15 REFERENCES

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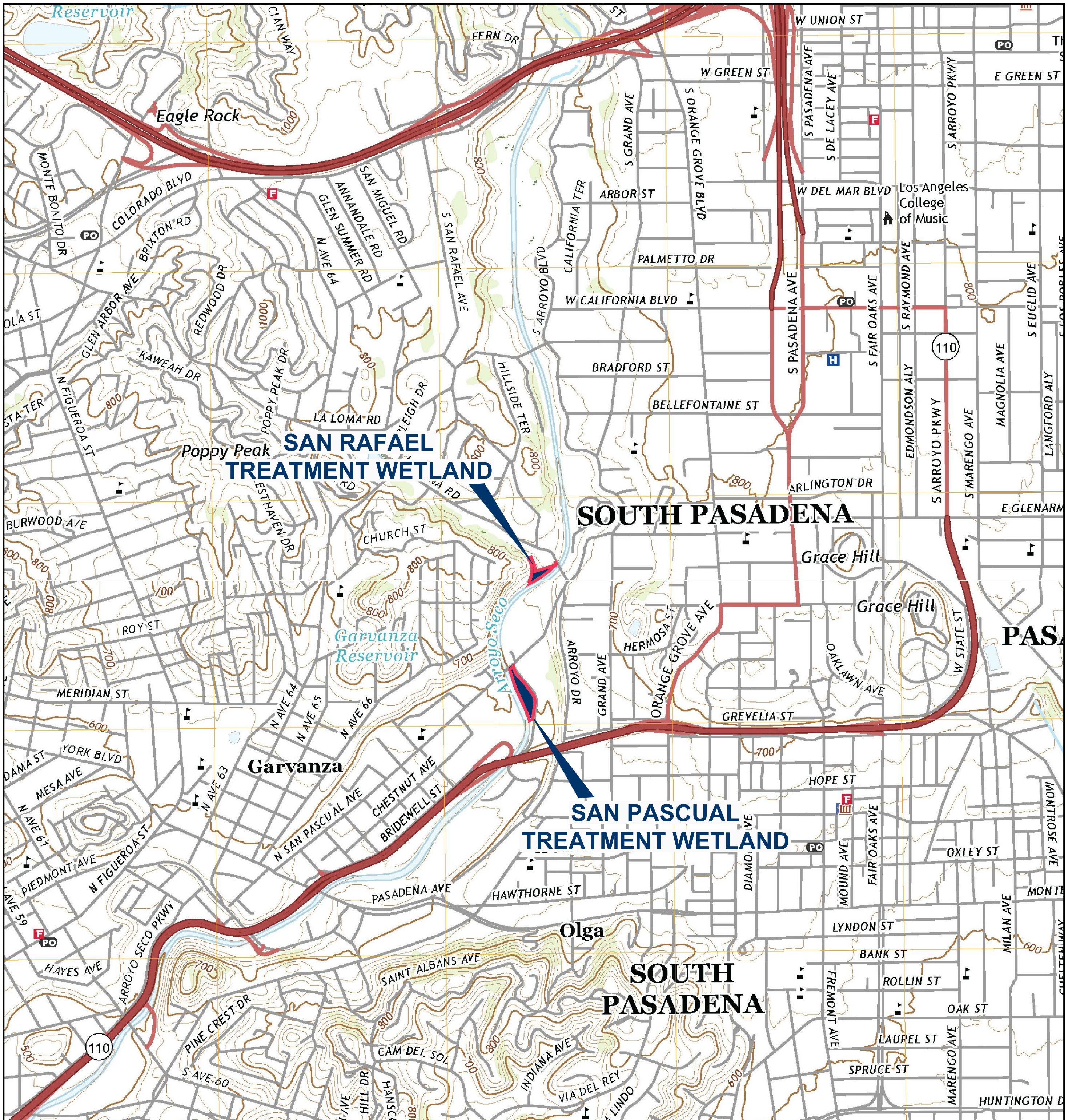
FIGURES



NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: USGS, 2022.

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FIGURE 1

SITE LOCATION

SAN RAFAEL TREATMENT WETLAND
PASADENA, CALIFORNIA

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Geotechnical & Environmental Sciences Consultants

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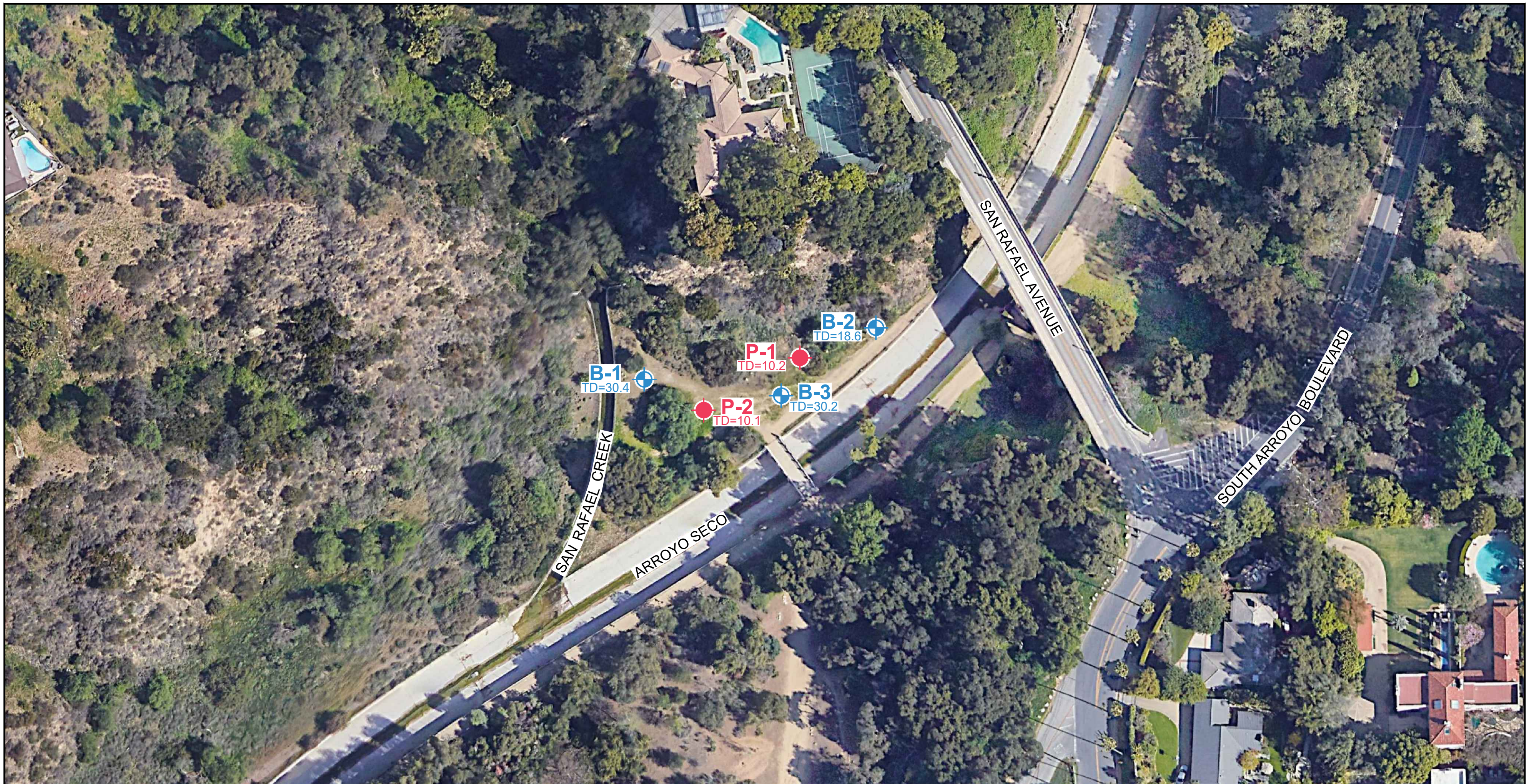

LEGEND

B-3 TD=30.2	⌖	BORING; TD=TOTAL DEPTH IN FEET
P-2 TD=10.1	●	PERCOLATION TEST; TD=TOTAL DEPTH IN FEET

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: GOOGLE EARTH, 2022.

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FIGURE 2

Ninyo & Moore

Geotechnical & Environmental Sciences Consultants

SITE AERIAL PHOTOGRAPH

SAN RAFAEL TREATMENT WETLAND
PASADENA, CALIFORNIA

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LEGEND

B-3 TD=30.2 BORING; TD=TOTAL DEPTH IN FEET

P-2 TD=10.1 PERCOLATION TEST; TD=TOTAL DEPTH IN FEET

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: GOOGLE EARTH, 2022; CRAFTWATER ENGINEERING, INC., 2020.

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FIGURE 3

SITE PLAN

SAN RAFAEL TREATMENT WETLAND
PASADENA, CALIFORNIA

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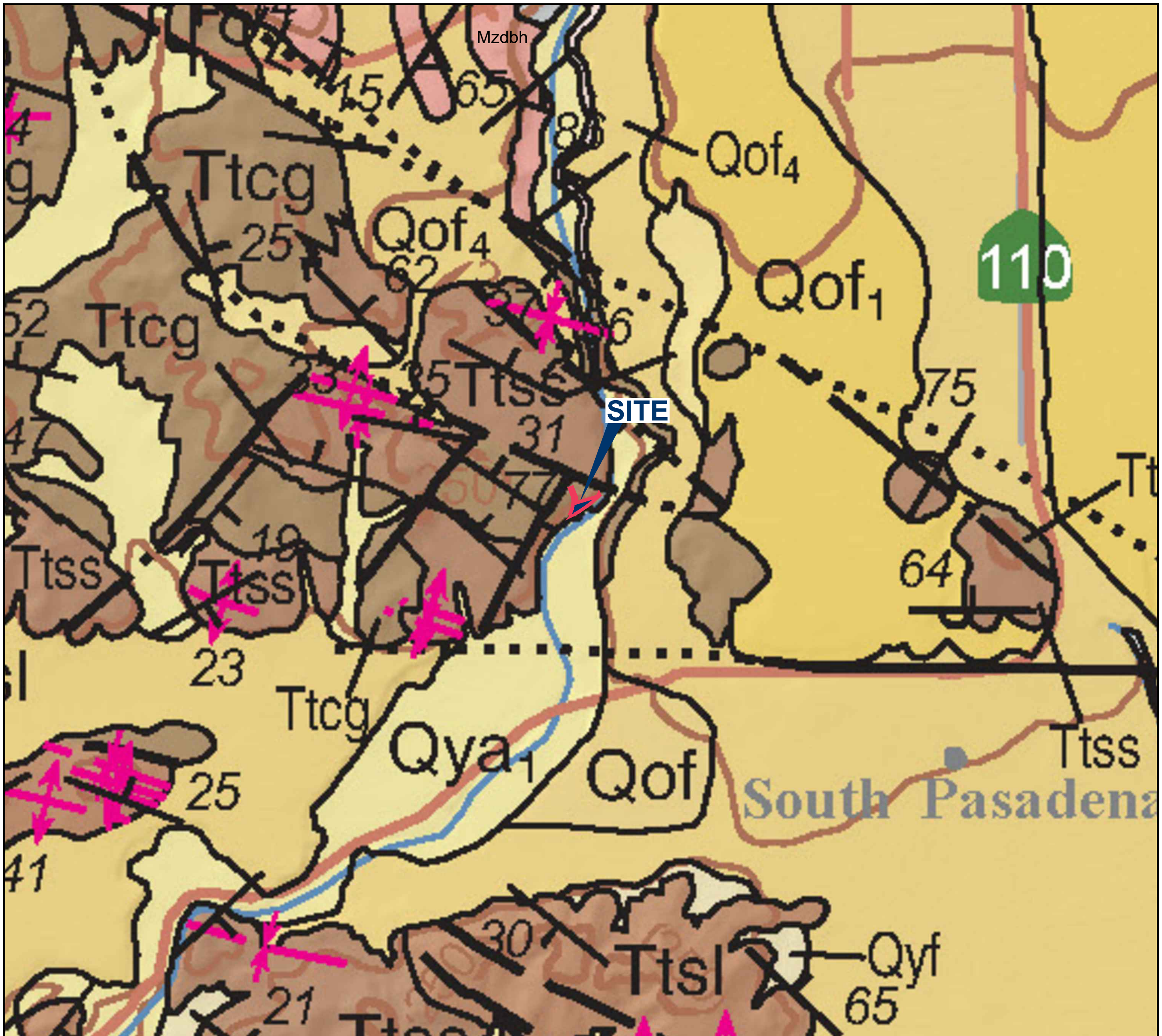
Geotechnical & Environmental Sciences Consultants



LEGEND

Qya	YOUNG ALLUVIUM	Ttcg	TOPANGA GROUP - CONGLOMERATE
Qyf	YOUNG ALLUVIAL FAN DEPOSITS	Mzdbh	BIOTITE - HORNBLENDE DIORITE
Qof	OLD ALLUVIAL FAN DEPOSITS		GEOLOGIC CONTACT
Ttss	TOPANGA GROUP - SANDSTONE		FAULT; DASHED WHERE INFERRED; DOTTED WHERE CONCEALED
Ttsl	TOPANGA GROUP - SILTSTONE		SYNCLINE; DASHED WHERE INFERRED
			ANTICLINE; DASHED WHERE INFERRED

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NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: CAMPBELL, R.H., ET AL., 2014.

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FIGURE 4

REGIONAL GEOLOGY

SAN RAFAEL TREATMENT WETLAND
PASADENA, CALIFORNIA

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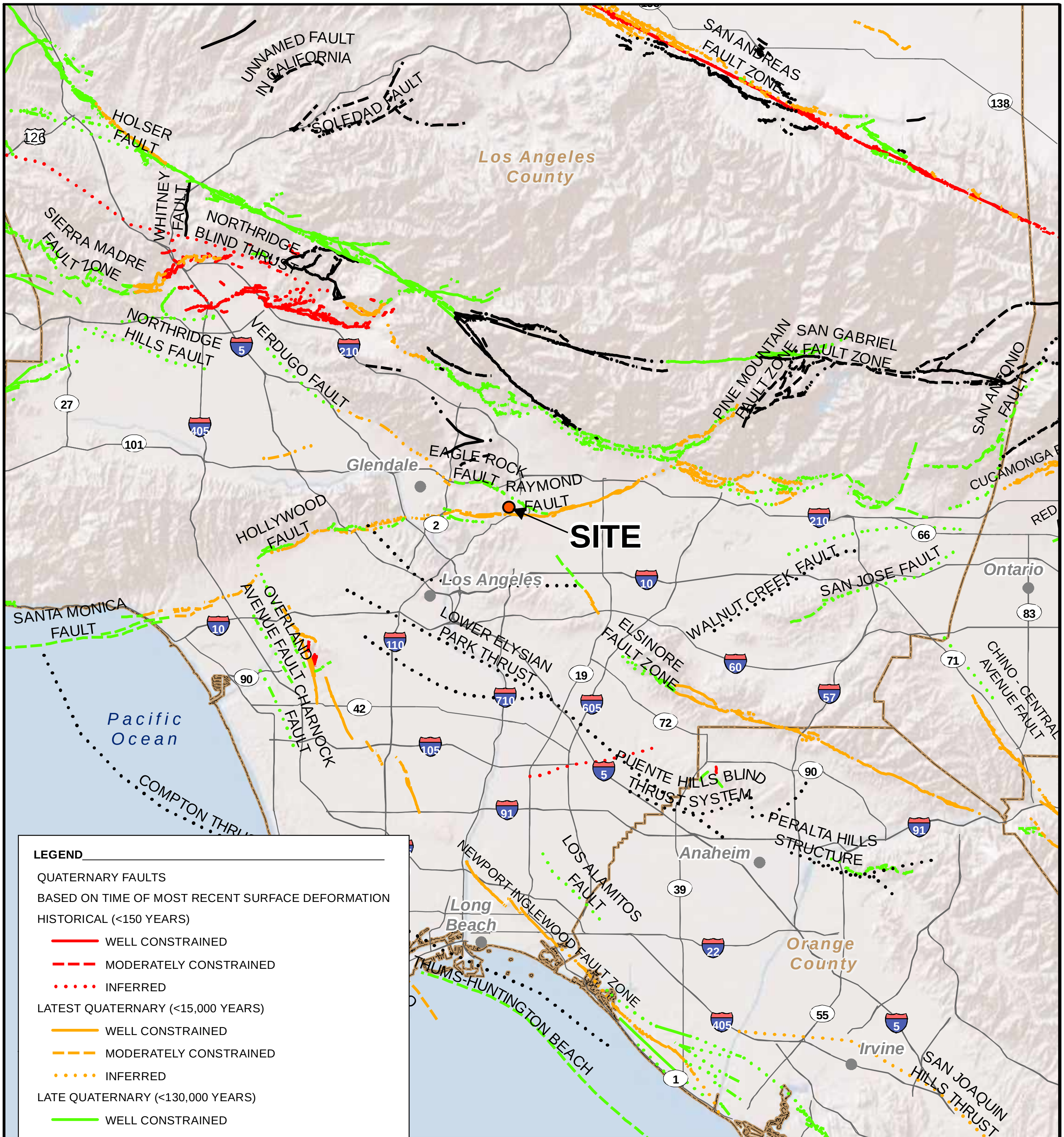
Geotechnical & Environmental Sciences Consultants



SOURCES: CALIFORNIA GEOLOGICAL SURVEY, ACCESSED MAY 31, 2022, AT: https://www.usgs.gov/natural-hazards/earthquake-hazards/faults; ESRI, 2021.

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

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FIGURE 5

FAULT LOCATIONS

SAN RAFAEL TREATMENT WETLAND
PASADENA, CALIFORNIA

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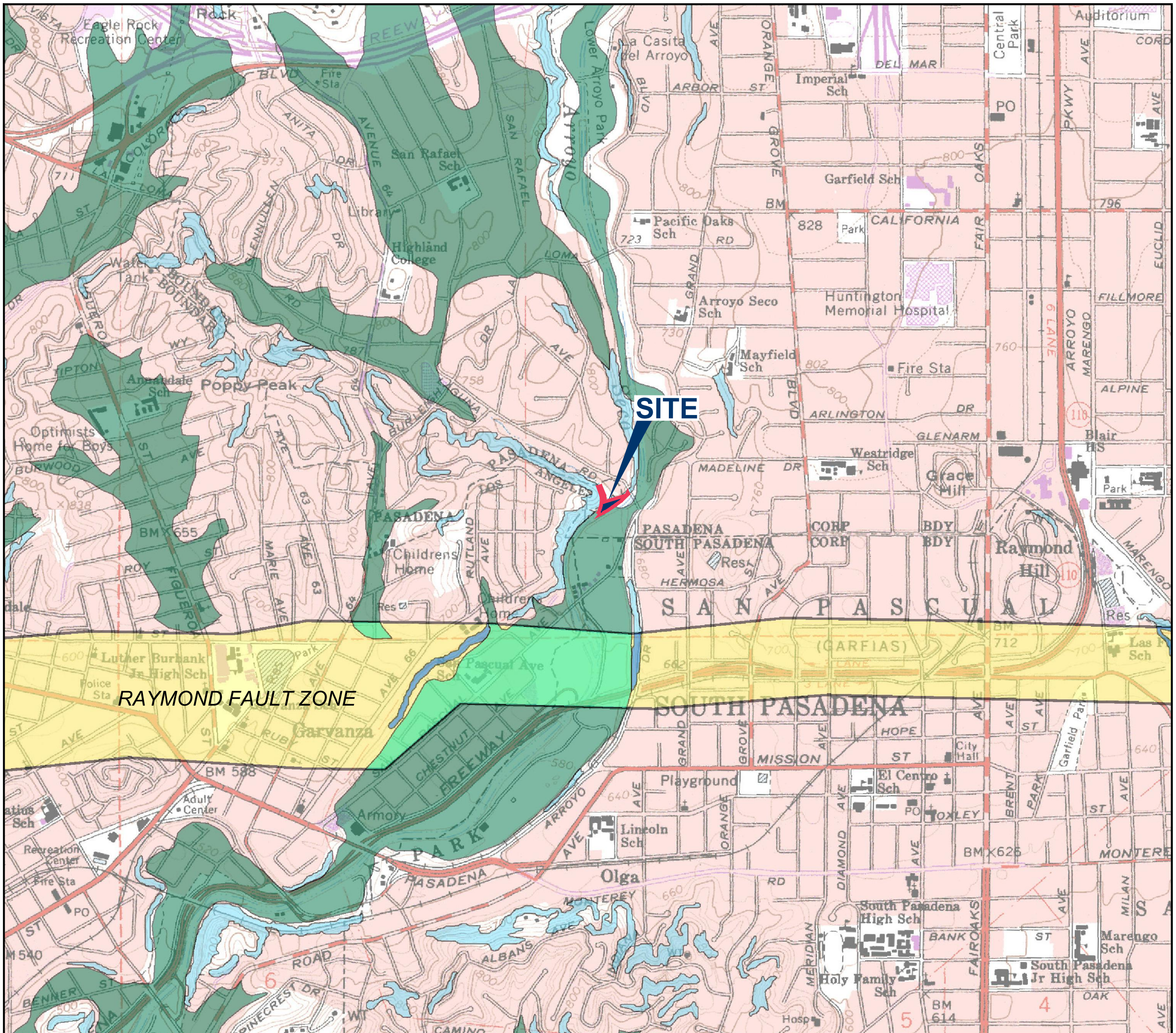

LEGEND

EARTHQUAKE-INDUCED LANDSLIDES
Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

LIQUEFACTION
Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

EARTHQUAKE FAULT ZONES
Zone boundaries are delineated by straight-line segments; the boundaries define the zone encompassing active faults that constitute a potential hazard to structures from surface faulting or fault creep such that avoidance as described in Public Resources Code Section 2621.5(a) would be required.

OVERLAPPING EARTHQUAKE FAULT AND SEISMIC HAZARD ZONES

Overlap of Earthquake Fault Zone and Liquefaction Zone
Areas that are covered by both Earthquake Fault Zone and Liquefaction Induced Landslide Zone.

Overlap of Earthquake Fault Zone and Earthquake-Induced Landslide Zone
Areas that are covered by both Earthquake Fault Zone and Earthquake-Induced Landslide Zone.

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NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: CGS, 1999, REVISED 2017.

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FIGURE 6

SEISMIC HAZARD ZONES

SAN RAFAEL TREATMENT WETLAND
PASADENA, CALIFORNIA

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

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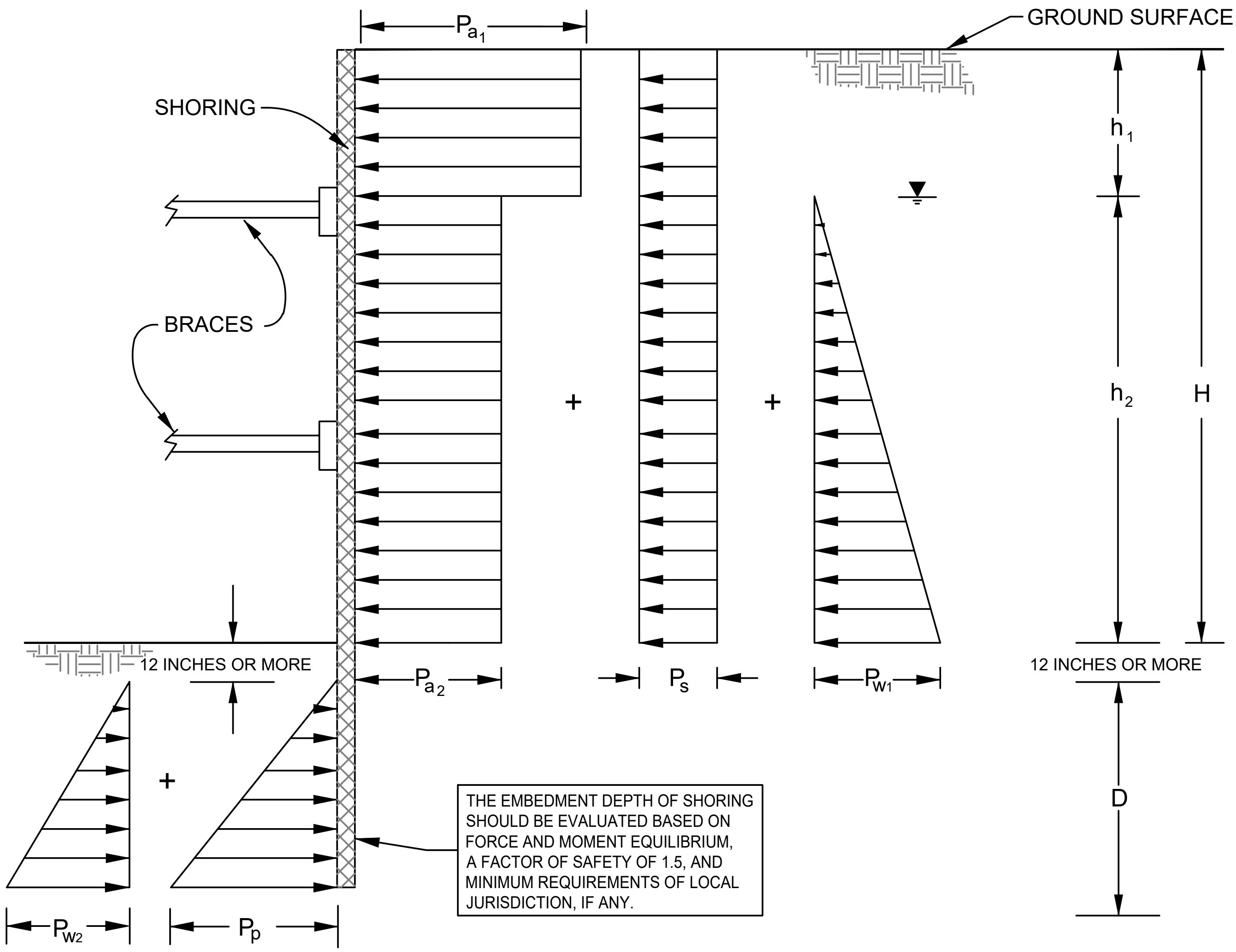

NOTES:

1. APPARENT LATERAL EARTH PRESSURES, P_{a1} AND P_{a2}
   $P_{a_1} = 25h_1$ psf
   $P_{a_2} = 12h_2$ psf
2. CONSTRUCTION TRAFFIC INDUCED SURCHARGE PRESSURE, P_s
   $P_s = 120$ psf
3. HYDROSTATIC PRESSURE, P_{w1} & P_{w2}
   $P_{w1} = 62.4(H - h)$ psf
   $P_{w2} = 62.4D$ psf
4. PASSIVE PRESSURE, P_p
   $P_p = 200D$ psf
5. SURCHARGES FROM EXCAVATED SOIL OR CONSTRUCTION MATERIALS ARE NOT INCLUDED
6. H, h_1, h_2 AND D ARE IN FEET
7. GROUNDWATER TABLE
8. P_{w2} IS APPLICABLE WHEN DEWATERING IS TO BE PERFORMED FROM INSIDE OR OUTSIDE OF THE EXCAVATION

NOT TO SCALE

FIGURE 7

LATERAL EARTH PRESSURES FOR BRACED EXCAVATION

SAN RAFAEL TREATMENT WETLAND
PASADENA, CALIFORNIA

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

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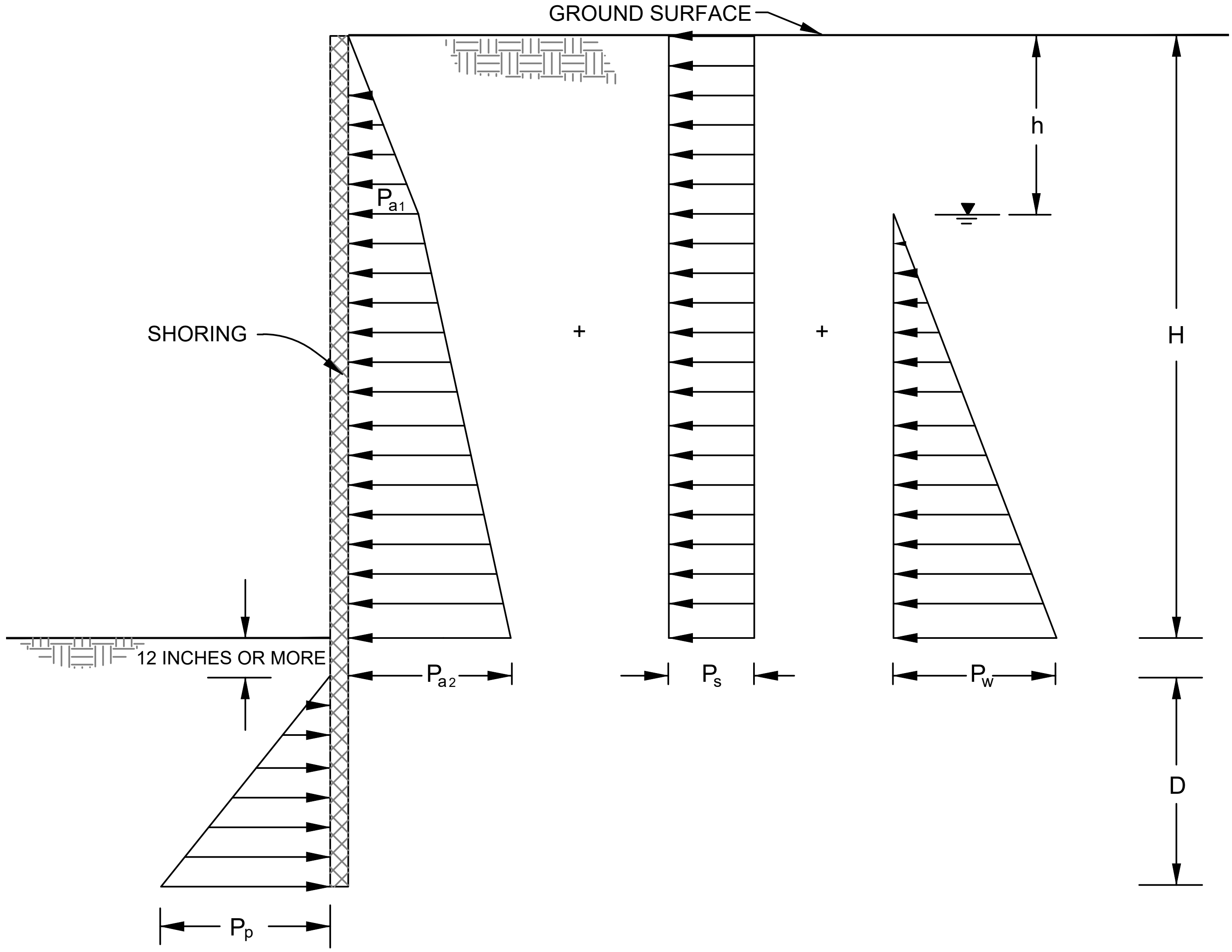

NOTES:

1. ACTIVE LATERAL EARTH PRESSURE, P_a
   P_{a1} = 37h psf; P_{a2} = P_{a1} + 18(H - h) psf
2. CONSTRUCTION TRAFFIC INDUCED SURCHARGE PRESSURE, P_s
   P_s = 72 psf
3. HYDROSTATIC PRESSURE, P_w
   P_w =62.4(H - h) psf
4. PASSIVE LATERAL EARTH PRESSURE, P_p
   P_p = 200D psf
5. SURCHARGES FROM EXCAVATED SOIL OR CONSTRUCTION MATERIALS ARE NOT INCLUDED
6. H, h AND D ARE IN FEET
7. GROUNDWATER TABLE

NOT TO SCALE

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FIGURE 8

LATERAL EARTH PRESSURES FOR TEMPORARY CANTILEVERED SHORING

SAN RAFAEL TREATMENT WETLAND
PASADENA, CALIFORNIA

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

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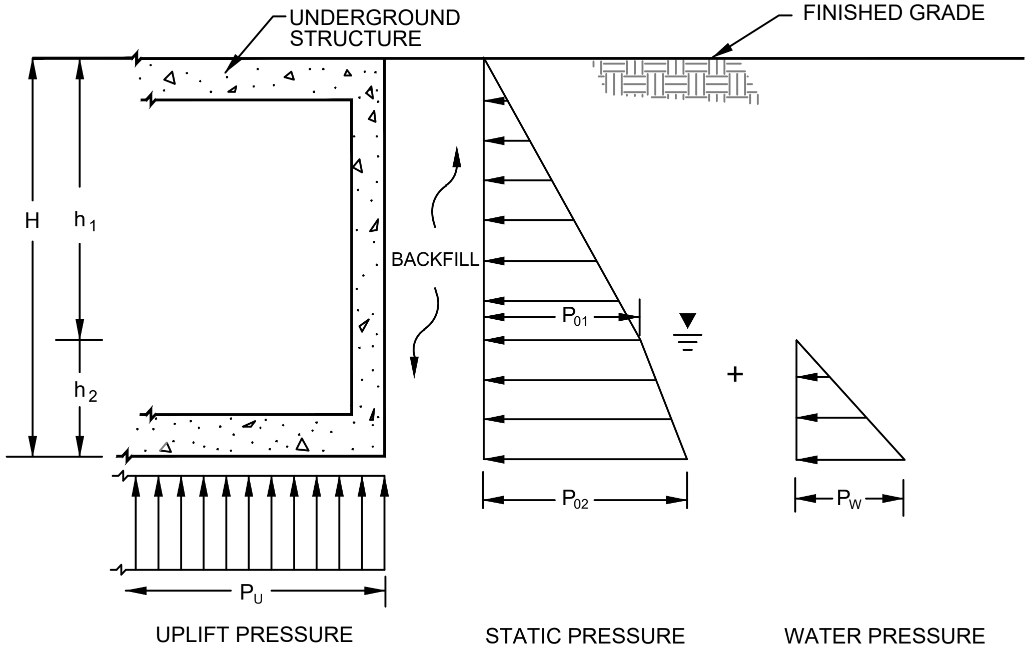

NOTES:

1. APPARENT LATERAL EARTH PRESSURES, P_{01} AND P_{02}
   $P_{01} = 57h_1$ psf
   $P_{02} = 57h_1 + 28h_2$ psf
2. HYDROSTATIC PRESSURE, P_w
   $P_w = 62.4h_2$ psf
3. UPLIFT PRESSURE, P_u
   $P_u = 62.4h_2$ psf
4. SURCHARGE PRESSURES CAUSED BY VEHICLES OR NEARBY STRUCTURES ARE NOT INCLUDED
5. H, h_1 AND h_2 ARE IN FEET
6. GROUNDWATER TABLE

NOT TO SCALE

9_211880001_LEP-US.dwg (San Rafael) 06/17/2022 JDP

FIGURE 9

LATERAL EARTH PRESSURES FOR UNDERGROUND STRUCTURES

SAN RAFAEL TREATMENT WETLAND
PASADENA, CALIFORNIA

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211880001 I 6/22

APPENDIX A

Boring Logs

APPENDIX A

BORING LOGS

Field Procedure for the Collection of Disturbed Samples
Disturbed soil samples were obtained in the field using the following method.

Bulk Samples
Bulk samples of representative earth materials were obtained from the exploratory borings. The samples were bagged and transported to the laboratory for testing.

The Standard Penetration Test (SPT) Sampler
Disturbed drive samples of earth materials were obtained by means of a Standard Penetration Test sampler. The sampler is composed of a split barrel with an external diameter of 2 inches and an unlined internal diameter of $1^3/_8$ inches. The sampler was driven into the ground 12 to 18 inches with a 140-pound hammer falling freely from a height of 30 inches in general accordance with ASTM D 1586. The blow counts were recorded for every 6 inches of penetration; the blow counts reported on the logs are those for the last 12 inches of penetration. Soil samples were observed and removed from the sampler, bagged, sealed and transported to the laboratory for testing.

Field Procedure for the Collection of Relatively Undisturbed Samples
Relatively undisturbed soil samples were obtained in the field using the following method.

The Modified Split-Barrel Drive Sampler
The sampler, with an external diameter of 3 inches, was lined with 1-inch-long, thin brass rings with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with the weight of a hammer in general accordance with ASTM D 3550. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the hammer, and the number of blows per foot of driving are presented on the boring logs as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

BORING LOG EXPLANATION SHEET

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	
0								Bulk sample.
								Modified split-barrel drive sampler.
								No recovery with modified split-barrel drive sampler.
								Sample retained by others.
								Standard Penetration Test (SPT).
5								No recovery with a SPT.
			XX/XX					Shelby tube sample. Distance pushed in inches/length of sample recovered in inches.
								No recovery with Shelby tube sampler.
								Continuous Push Sample.
								Seepage.
10								Groundwater encountered during drilling.
								Groundwater measured after drilling.
							SM	MAJOR MATERIAL TYPE (SOIL): Solid line denotes unit change.
							CL	Dashed line denotes material change.
15								Attitudes: Strike/Dip b: Bedding c: Contact j: Joint f: Fracture F: Fault cs: Clay Seam s: Shear bss: Basal Slide Surface sf: Shear Fracture sz: Shear Zone sbs: Shear Bedding Surface
20								The total depth line is a solid line that is drawn at the bottom of the boring.

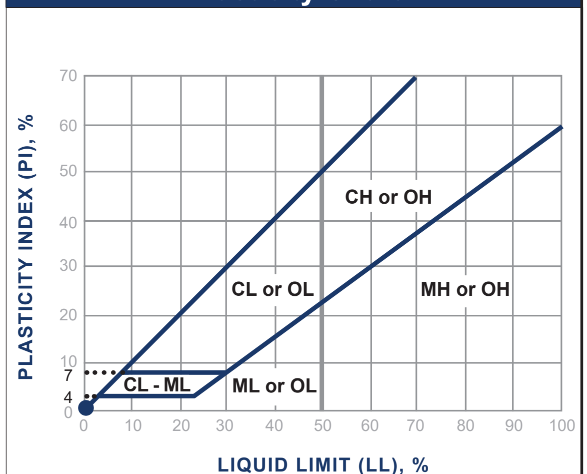
Soil Classification Chart Per ASTM D 2488

Primary Divisions			Secondary Divisions: Group Symbol	Group Name
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	GRAVEL more than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVEL less than 5% fines	GW	well-graded GRAVEL
			GP	poorly graded GRAVEL
		GRAVEL with DUAL CLASSIFICATIONS 5% to 12% fines	GW-GM	well-graded GRAVEL with silt
			GP-GM	poorly graded GRAVEL with silt
			GW-GC	well-graded GRAVEL with clay
			GP-GC	poorly graded GRAVEL with clay
		GRAVEL with FINES more than 12% fines	GM	silty GRAVEL
			GC	clayey GRAVEL
			GC-GM	silty, clayey GRAVEL
	SAND 50% or more of coarse fraction passes No. 4 sieve	CLEAN SAND less than 5% fines	SW	well-graded SAND
			SP	poorly graded SAND
		SAND with DUAL CLASSIFICATIONS 5% to 12% fines	SW-SM	well-graded SAND with silt
			SP-SM	poorly graded SAND with silt
			SW-SC	well-graded SAND with clay
			SP-SC	poorly graded SAND with clay
		SAND with FINES more than 12% fines	SM	silty SAND
			SC	clayey SAND
			SC-SM	silty, clayey SAND
FINE-GRAINED SOILS 50% or more passes No. 200 sieve	SILT and CLAY liquid limit less than 50%	INORGANIC	CL	lean CLAY
			ML	SILT
			CL-ML	silty CLAY
		ORGANIC	OL (PI > 4)	organic CLAY
			OL (PI < 4)	organic SILT
	SILT and CLAY liquid limit 50% or more	INORGANIC	CH	fat CLAY
			MH	elastic SILT
		ORGANIC	OH (plots on or above "A"-line)	organic CLAY
			OH (plots below "A"-line)	organic SILT
	Highly Organic Soils		PT	Peat

Grain Size

Description		Sieve Size	Grain Size	Approximate Size
Boulders		> 12"	> 12"	Larger than basketball-sized
Cobbles		3 - 12"	3 - 12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4 - 3"	3/4 - 3"	Thumb-sized to fist-sized
	Fine	#4 - 3/4"	0.19 - 0.75"	Pea-sized to thumb-sized
Sand	Coarse	#10 - #4	0.079 - 0.19"	Rock-salt-sized to pea-sized
	Medium	#40 - #10	0.017 - 0.079"	Sugar-sized to rock-salt-sized
	Fine	#200 - #40	0.0029 - 0.017"	Flour-sized to sugar-sized
Fines		Passing #200	< 0.0029"	Flour-sized and smaller

Plasticity Chart



Apparent Density - Coarse-Grained Soil

Apparent Density	Spooling Cable or Cathead: SPT (blows/foot)	Spooling Cable or Cathead: Modified Split Barrel (blows/foot)	Automatic Trip Hammer: SPT (blows/foot)	Automatic Trip Hammer: Modified Split Barrel (blows/foot)
Very Loose	≤ 4	≤ 8	≤ 3	≤ 5
Loose	5 - 10	9 - 21	4 - 7	6 - 14
Medium Dense	11 - 30	22 - 63	8 - 20	15 - 42
Dense	31 - 50	64 - 105	21 - 33	43 - 70
Very Dense	> 50	> 105	> 33	> 70

Consistency - Fine-Grained Soil

Consistency	Spooling Cable or Cathead: SPT (blows/foot)	Spooling Cable or Cathead: Modified Split Barrel (blows/foot)	Automatic Trip Hammer: SPT (blows/foot)	Automatic Trip Hammer: Modified Split Barrel (blows/foot)
Very Soft	< 2	< 3	< 1	< 2
Soft	2 - 4	3 - 5	1 - 3	2 - 3
Firm	5 - 8	6 - 10	4 - 5	4 - 6
Stiff	9 - 15	11 - 20	6 - 10	7 - 13
Very Stiff	16 - 30	21 - 39	11 - 20	14 - 26
Hard	> 30	> 39	> 20	> 26

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USCS METHOD OF SOIL CLASSIFICATION

DATE DRILLED 4/27/22	BORING NO. B-1	
GROUND ELEVATION 623' ± (MSL)	SHEET 1	OF 1
METHOD OF DRILLING 8" Hollow-Stem Auger (MR Drilling)		
DRIVE WEIGHT 140 lbs. (Auto. Trip Hammer)	DROP 30"	
SAMPLED BY ANP	LOGGED BY ANP	REVIEWED BY GMC

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SP-SM	FILL: Brown, moist, medium dense, poorly graded SAND with silt; trace gravel; cobbles.
							ML	Dark brown, moist, medium dense, sandy SILT with gravel and cobbles; trace pieces of brick and glass.
			14	6.7	102.2		SM	YOUNG ALLUVIUM: Brown, moist, loose, silty SAND; few gravel; roots.
							SW-SM	Grayish brown, moist, very dense, well-graded SAND with silt and gravel.
10			46					
								TOPANGA FORMATION: Gray, moist, moderately soft to moderately hard, weakly cemented, silty SANDSTONE; trace gravel.
			50/2"	6.0	121.9			
20			50/2"					
			50/6" 40/2"					
30			50/5"					
								Total Depth = 30.4 Feet. Groundwater was not encountered during drilling. Backfilled with on-site soil on 4/27/22. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
40								

DATE DRILLED	4/27/22	BORING NO.	B-2		
GROUND ELEVATION	626' ± (MSL)	SHEET	1	OF	1
METHOD OF DRILLING	8" Hollow-Stem Auger (MR Drilling)				
DRIVE WEIGHT	140 lbs. (Auto. Trip Hammer)	DROP	30"		
SAMPLED BY	ANP	LOGGED BY	ANP	REVIEWED BY	GMC

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0	Bulk					SP-SM	FILL: Reddish brown, moist, medium dense, poorly graded SAND with silt; trace gravel; cobbles.
						ML	Dark brown, moist, medium dense, sandy SILT; trace gravel; roots.
						SP-SM	Brown, moist, medium dense, poorly graded SAND with silt, gravel and cobbles.
	Driven	50/5"	1.8	121.3		SM	YOUNG ALLUVIUM: Grayish brown, moist, very dense, silty SAND; few to little gravel; cobbles.
10	Driven	50/5"				ML	Grayish brown, moist, very dense, sandy SILT; few to little gravel; cobbles.
	Driven	50/4"	4.4	110.7			TOPANGA FORMATION: Gray, moist, moderately soft, weakly to moderately cemented, silty SANDSTONE; trace gravel; cobbles. @ 17': Increase in moisture. Refusal.
		50/1"					Total Depth = 18.6 feet. (Refusal) Groundwater was not encountered during drilling. Backfilled with on-site soil on 4/27/22. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20							
30							
40							

DATE DRILLED	4/27/22	BORING NO.	B-3
GROUND ELEVATION	623' ± (MSL)	SHEET 1 OF 1	
METHOD OF DRILLING	8" Hollow-Stem Auger (MR Drilling)		
DRIVE WEIGHT	140 lbs. (Auto. Trip Hammer)	DROP	30"
SAMPLED BY	ANP	LOGGED BY ANP	REVIEWED BY GMC

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0	X						SM	FILL: Brown, moist, medium dense, silty SAND; trace gravel, glass, and asphalt concrete; cobbles.
		X	67/11"	1.6	120.3		GP	YOUNG ALLUVIUM: Light brown, moist, very dense, poorly graded GRAVEL with sand; cobbles and/or possible boulders.
							SM	Light brown, moist, very dense, silty SAND; few to little gravel; cobbles.
10		X	43					
								@ 13.6': Groundwater measured 25 minutes after drilling; wet.
							GP	Light brown, wet, very dense, poorly graded GRAVEL with sand. @ 15': Groundwater encountered during drilling.
		X	50/6"	8.0	134.3			
20		X	50/4"					TOPANGA FORMATION: Gray, wet, soft, weakly cemented, silty SANDSTONE.
		X	50/5"	12.7	120.1			Moderately soft.
30		X	50/2"					Total Depth = 30.2 feet. Groundwater was encountered during drilling at approximately 15 feet. Groundwater was measured at approximately 13.6 feet 25 minutes after completion of drilling. Backfilled with cement grout on 4/27/22.
40								

Notes:
Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

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DATE DRILLED	4/27/22	BORING NO.	P-1
GROUND ELEVATION	627' ± (MSL)	SHEET 1 OF 1	
METHOD OF DRILLING	8" Hollow-Stem Auger (MR Drilling)		
DRIVE WEIGHT	140 lbs. (Auto. Trip Hammer)	DROP	30"
SAMPLED BY	ANP	LOGGED BY ANP	REVIEWED BY GMC

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SP-SM	FILL: Reddish brown, moist, medium dense, poorly graded SAND with silt; trace gravel; cobbles.
							ML	Dark brown, moist, medium dense, sandy SILT; trace gravel and brick pieces.
							SW-SM	YOUNG ALLUVIUM: Brown, moist, medium dense, well-graded SAND with silt and gravel.
			29					
			18					
			81					Very dense.
10								Total Depth = 10.2 feet. Groundwater was not encountered during drilling. In-situ percolation test performed on 4/27/22.
20								
30								
40								

Notes:
Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

DATE DRILLED 4/27/22 BORING NO. P-2

GROUND ELEVATION 622' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Hollow-Stem Auger (MR Drilling)

DRIVE WEIGHT 140 lbs. (Auto. Trip Hammer) DROP 30"

SAMPLED BY ANP LOGGED BY ANP REVIEWED BY GMC

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0	■						SP-SM	FILL: Reddish brown, moist, medium dense, poorly graded SAND with silt; trace gravel; roots up to 1/2-inch in diameter.
	■						ML	Dark brown, moist, medium dense, sandy SILT; trace gravel. @ 3': Piece of plastic. @ 4': Pieces of brick.
		■	22				SP-SM	YOUNG ALLUVIUM: Light brown, moist, dense, poorly graded SAND with silt; trace gravel.
		■	40	2.0	108.7		SP	Light brown, moist, medium dense, poorly graded SAND with gravel.
10								Total Depth = 10.1 feet. Groundwater was not encountered during drilling. In-situ percolation test performed on 4/27/22. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20								
30								
40								

APPENDIX B

Laboratory Testing

APPENDIX B

LABORATORY TESTING

Classification
Soils were visually and texturally classified in accordance with the Unified Soil Classification System (USCS) in general accordance with ASTM D 2488. Soil classifications are indicated on the logs of the exploratory borings in Appendix B.

In-Place Moisture and Density Tests
The moisture content and dry density of relatively undisturbed samples obtained from the exploratory borings were evaluated in general accordance with ASTM D 2937. The test results are presented on the logs of the exploratory borings in Appendix B.

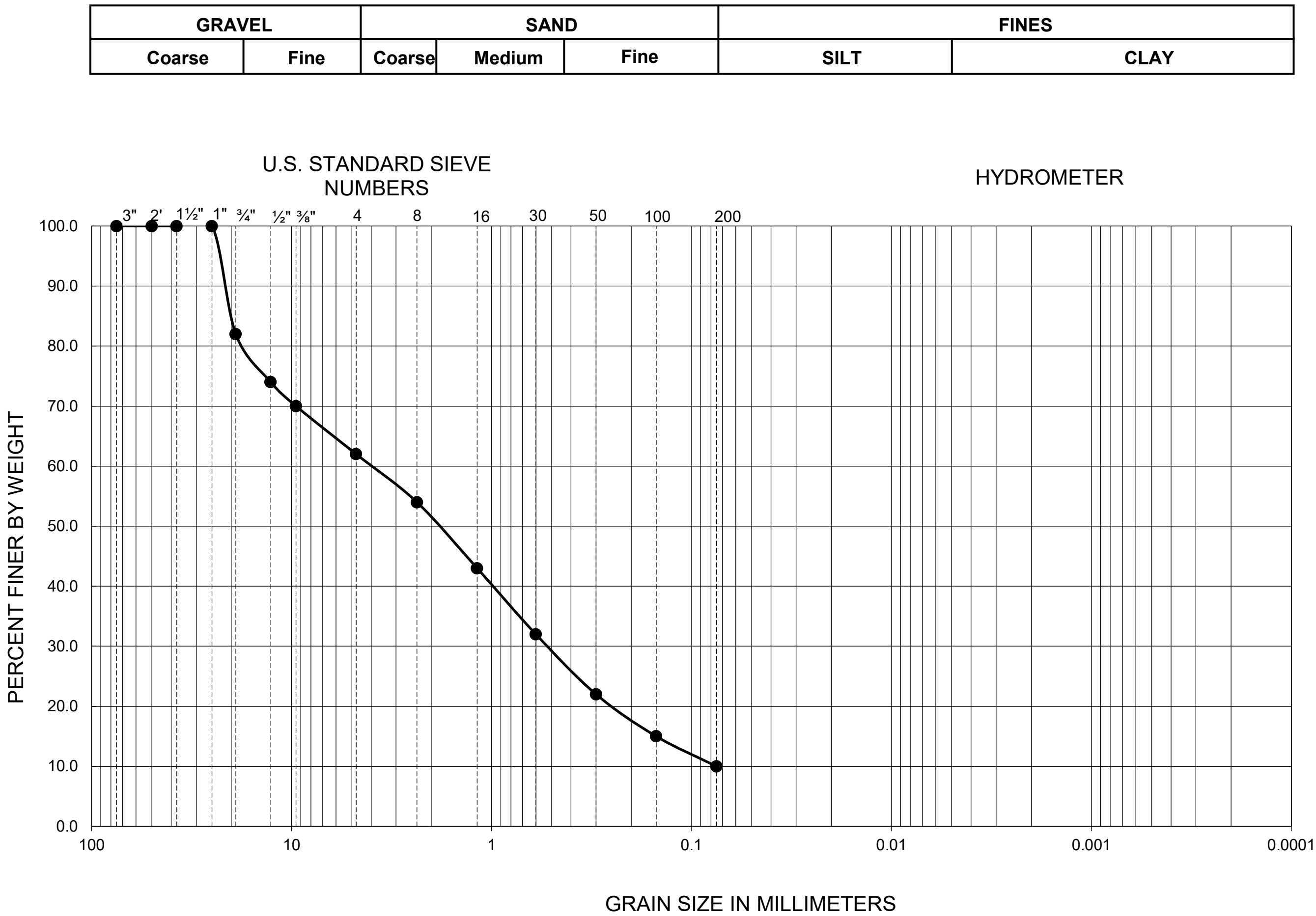
Gradation Analysis
Gradation analysis tests were performed on selected representative soil samples in general accordance with ASTM D 422. The grain-size distribution curves are shown on Figures B-1 through B-3. These test results were utilized in evaluating the soil classifications in accordance with the USCS.

200 Wash
An evaluation of the percentage of particles finer than the No. 200 sieve in selected soil samples was performed in general accordance with ASTM D 1140. The results of the tests are presented on Figure B-4.

Atterberg Limits
A test was performed on a selected representative fine-grained soil sample to evaluate the liquid limit, plastic limit, and plasticity index in general accordance with ASTM D 4318. These test results were utilized to evaluate the soil classification in accordance with the USCS. The test results and classifications are shown on Figure B-5.

Direct Shear Tests
A direct shear test was performed on relatively undisturbed sample in general accordance with ASTM D 3080 to evaluate the shear strength characteristics of selected materials. The sample was inundated during shearing to represent adverse field conditions. The results are shown on Figure B-6.

Soil Corrosivity Tests
Soil pH and resistivity test was performed on a representative sample in general accordance with CT 643. The soluble sulfate and chloride content of the selected sample was evaluated in general accordance with CT 417 and CT 422, respectively. The test results are presented on Figure B-7.



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-1	10.0-11.5	--	--	--	0.08	0.53	3.90	52.0	1.0	10	SW-SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 6913

FIGURE B-1

GRADATION TEST RESULTS

SAN RAFAEL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

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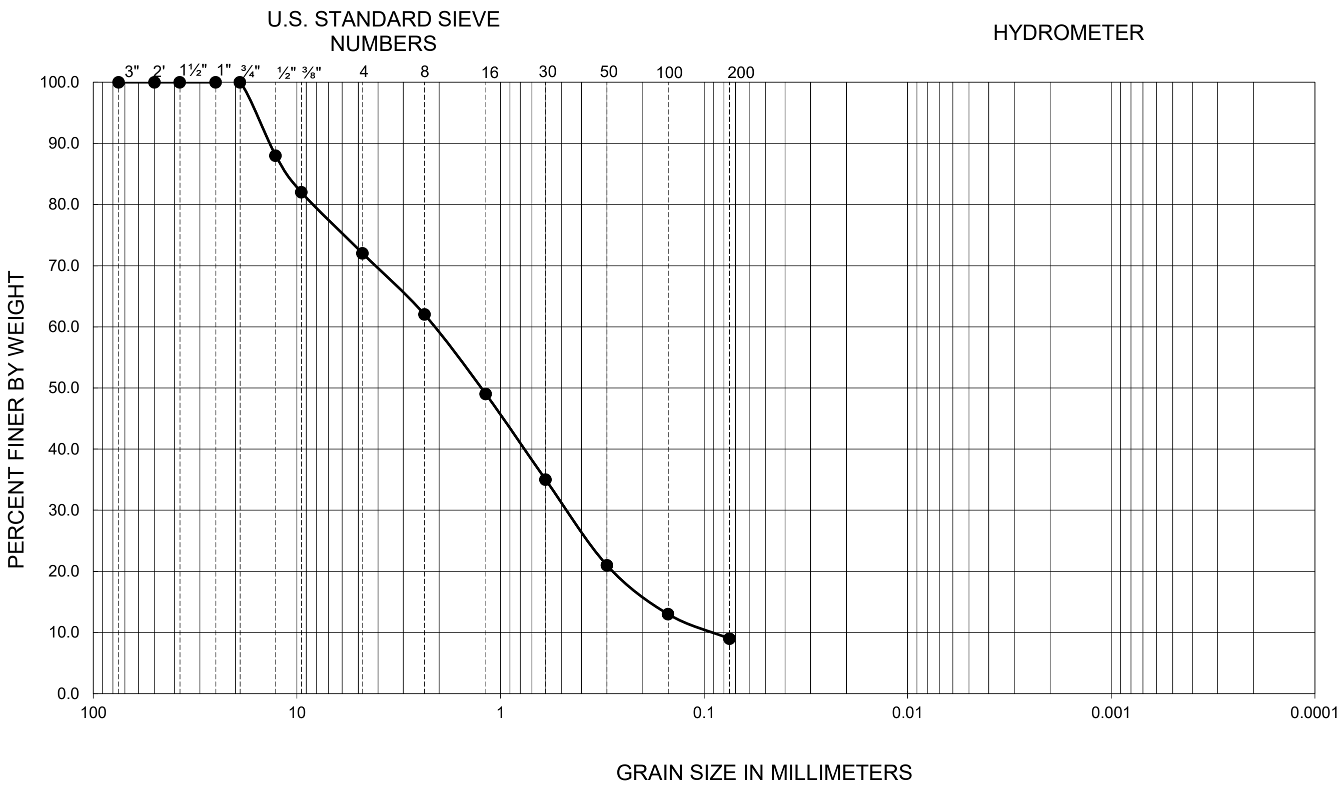
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	P-1	6.5-8.0	--	--	--	0.09	0.48	2.10	23.3	1.2	9	SW-SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 6913

FIGURE B-2

GRADATION TEST RESULTS

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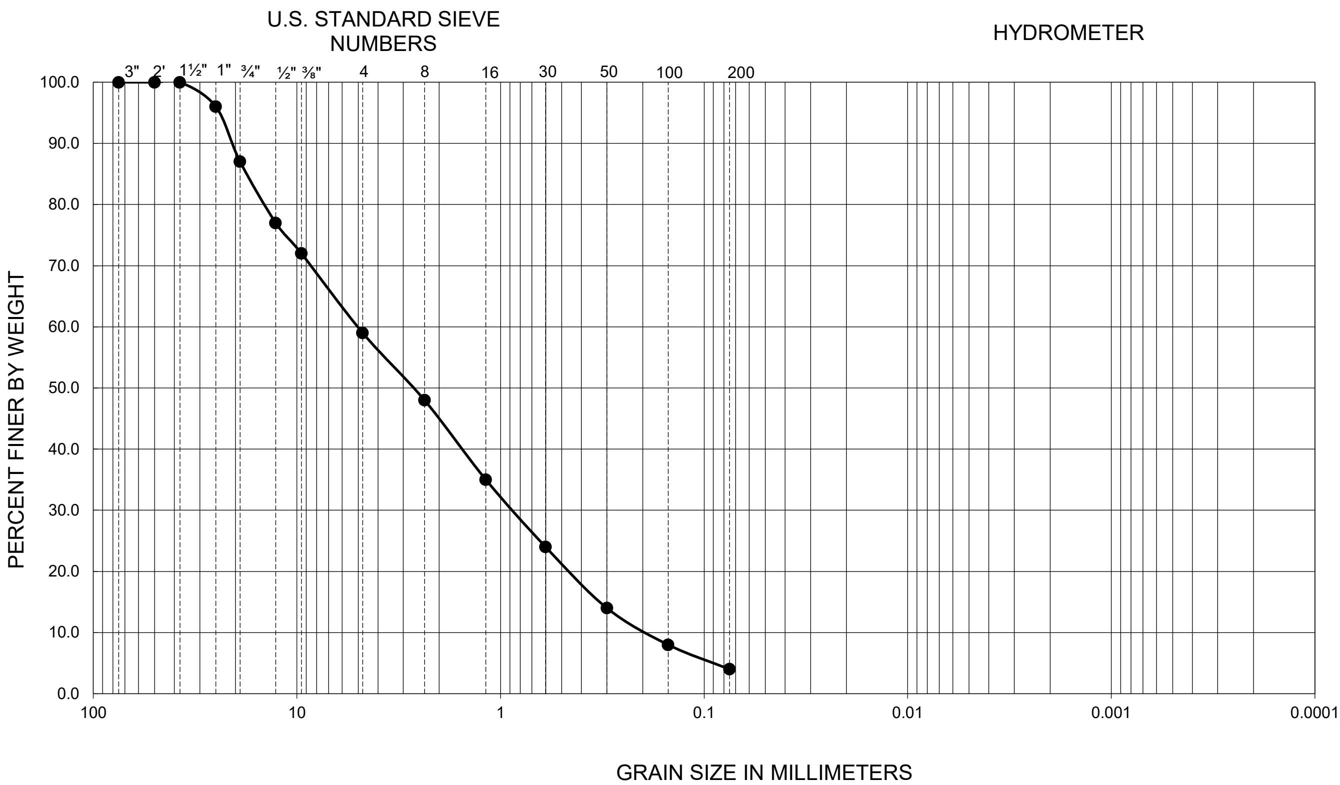
SAN RAFAEL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

211880001 | 6/22

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	P-2	8.5-10.0	--	--	--	0.20	0.88	5.00	25.0	0.8	4	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 6913

FIGURE B-3

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GRADATION TEST RESULTS

SAN RAFAEL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

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SAMPLE LOCATION	SAMPLE DEPTH (ft)	DESCRIPTION	PERCENT PASSING NO. 4	PERCENT PASSING NO. 200	USCS OR EQUIVALENT (TOTAL SAMPLE)
B-1	5.0-6.5	SILTY SAND	90	25	SM
B-1	20.0-21.0	SILTY SANDSTONE	96	34	SM
B-3	5.0-6.5	POORLY GRADED GRAVEL WITH SAND	43	2	GP
B-3	15.0-16.0	POORLY GRADED GRAVEL WITH SAND	50	4	GP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 1140

FIGURE B-4

NO. 200 SIEVE ANALYSIS TEST RESULTS

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SAN RAFAEL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

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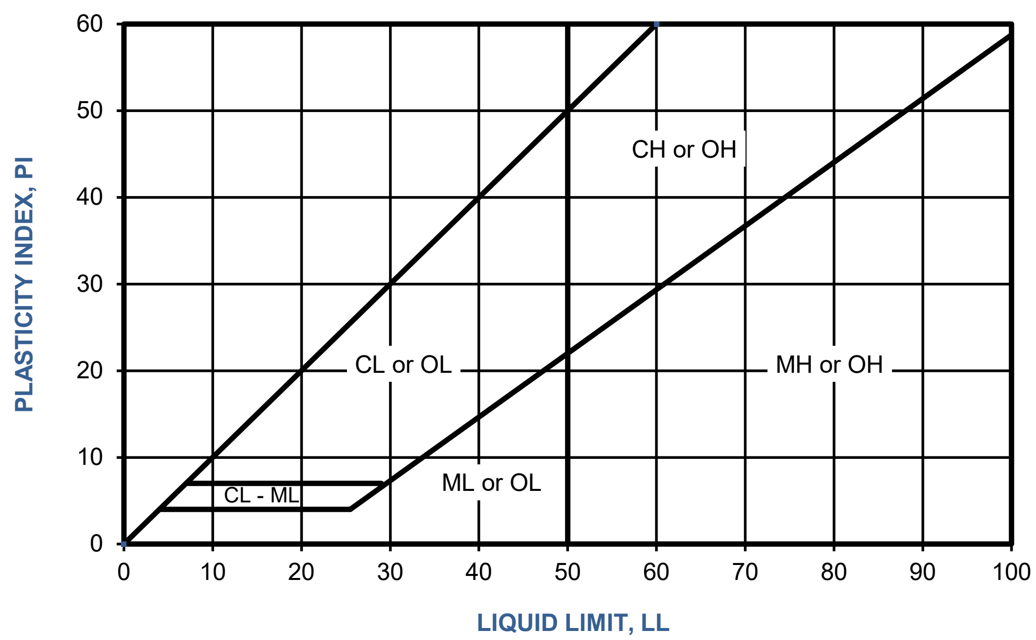
SYMBOL	LOCATION	DEPTH (ft)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	USCS CLASSIFICATION (Fraction Finer Than No. 40 Sieve)	USCS
●	B-2	10.0 - 11.0	-	-	NP	ML	ML

NP - INDICATES NON-PLASTIC



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4318

FIGURE B-5

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ATTERBERG LIMITS TEST RESULTS

SAN RAFAEL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

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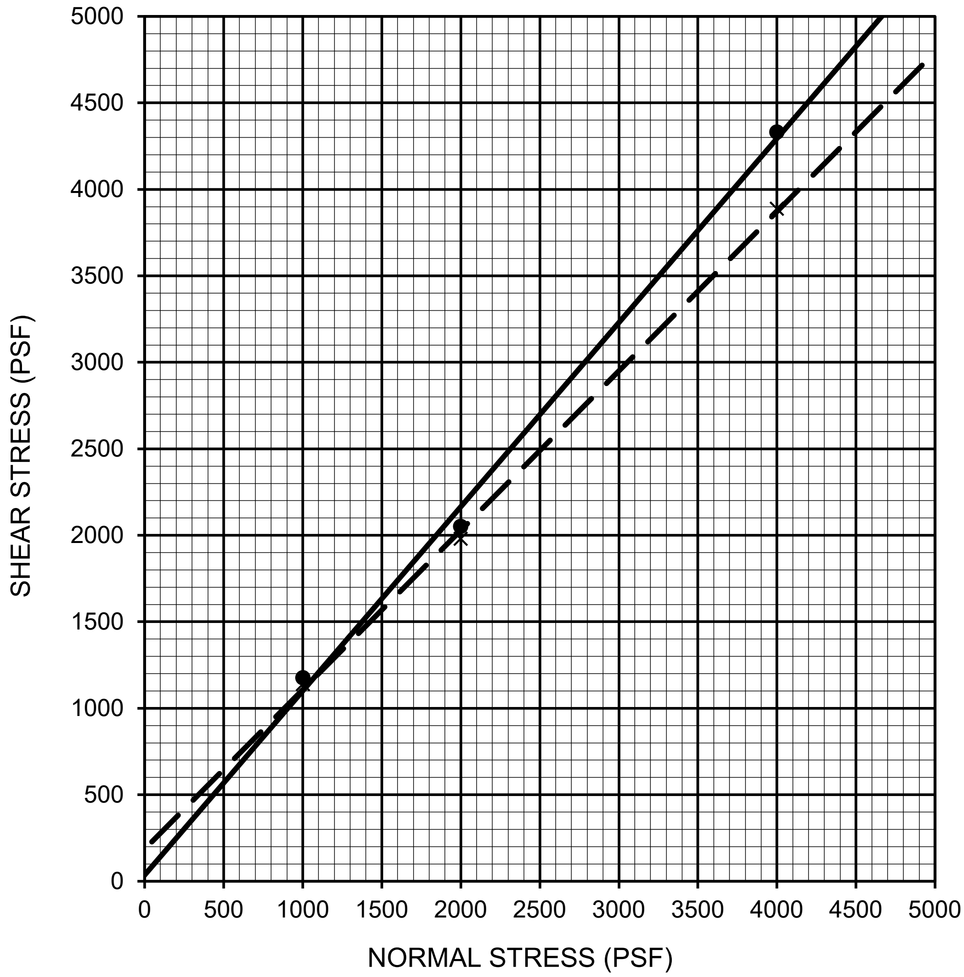

Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion (psf)	Friction Angle (degrees)	Soil Type (Equivalent)
SILTY SANDSTONE	——●——	B-1	15.0-16.0	Peak	36	47	SM
SILTY SANDSTONE	– – X – –	B-1	15.0-16.0	Ultimate	186	43	SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080

FIGURE B-6

DIRECT SHEAR TEST RESULTS

SAN RAFAEL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

211880001 | 6/22

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SAMPLE LOCATION	SAMPLE DEPTH (ft)	pH [1]	RESISTIVITY [1] (ohm-cm)	SULFATE CONTENT [2]		CHLORIDE CONTENT [3] (ppm)
				(ppm)	(%)	
B-1	3.0-5.0	7.4	7,260	10	0.001	10

[1] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 643
[2] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 417
[3] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 422

FIGURE B-7

CORROSIVITY TEST RESULTS

SAN RAFAEL TREATMENT WESTLAND
SOUTH PASADENA, CALIFORNIA

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

APPENDIX C

Analytical Test Results
(Drum Characterization)

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

09 May 2022

Aura Scharf
Ninyo & Moore
475 Goddard, Ste. 200
Irvine, CA 92618

RE: Arroyo Seco - San Rafael Water Reuse 2 Natural

Enclosed are the results of analyses for samples received by the laboratory on 04/29/22 16:55. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Joann Marroquin

Joann Marroquin For Taili Iinuma
Project Manager

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project:	Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number:	211880001	**Reported:**
Irvine CA, 92618	Project Manager:	Aura Scharf	05/09/22 16:51

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Drum #1_B-3	T221276-01	Soil	04/27/22 15:10	04/29/22 16:55
Composite 2:1 Drum#2_B-2A - Drum #1_B-1A	T221276-04	Soil	04/28/22 11:30	04/29/22 16:55

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Joann Marroquin

Joann Marroquin For Taili Iinuma, Project Manager

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore 475 Goddard, Ste. 200 Irvine CA, 92618	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural Project Number: 211880001 Project Manager: Aura Scharf	Reported: 05/09/22 16:51

DETECTIONS SUMMARY

Sample ID: Drum #1_B-3 **Laboratory ID:** T221276-01

Analyte	Result	Reporting Limit	Units	Method	Notes
Barium	**57**	1.0	mg/kg	EPA 6010b	
Chromium	**26**	2.0	mg/kg	EPA 6010b	
Cobalt	**4.1**	2.0	mg/kg	EPA 6010b	
Copper	**5.4**	1.0	mg/kg	EPA 6010b	
Nickel	**2.8**	2.0	mg/kg	EPA 6010b	
Vanadium	**25**	5.0	mg/kg	EPA 6010b	
Zinc	**22**	1.0	mg/kg	EPA 6010b	

Sample ID: Composite 2:1 Drum#2_B-2A - Drum **Laboratory ID:** T221276-04

Analyte	Result	Reporting Limit	Units	Method	Notes
Barium	**45**	1.0	mg/kg	EPA 6010b	
Chromium	**26**	2.0	mg/kg	EPA 6010b	
Cobalt	**6.2**	2.0	mg/kg	EPA 6010b	
Copper	**8.3**	1.0	mg/kg	EPA 6010b	
Nickel	**8.3**	2.0	mg/kg	EPA 6010b	
Vanadium	**45**	5.0	mg/kg	EPA 6010b	
Zinc	**38**	1.0	mg/kg	EPA 6010b	
Mercury	**0.13**	0.10	mg/kg	EPA 7471A Soil	

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Joann Marroquin

Joann Marroquin For Taili Iinuma, Project Manager

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Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Drum #1_B-3

T221276-01 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			SunStar Laboratories, Inc.						
Extractable Petroleum Hydrocarbons by 8015B									
C6-C12 (GRO)	ND	10	mg/kg	1	22E0008	05/02/22	05/06/22	EPA 8015B	
C13-C28 (DRO)	ND	10	"	"	"	"	"	"	
C29-C40 (MORO)	ND	10	"	"	"	"	"	"	
Surrogate: p-Terphenyl		*90.3 %*	*65-135*		*"*	*"*	*"*	*"*	
Metals by EPA 6010B									
Antimony	ND	3.0	mg/kg	1	22E0004	05/02/22	05/03/22	EPA 6010b	
Silver	ND	2.0	"	"	"	"	"	"	
Arsenic	ND	5.0	"	"	"	"	"	"	
Barium	**57**	1.0	"	"	"	"	"	"	
Beryllium	ND	1.0	"	"	"	"	05/03/22	"	
Cadmium	ND	2.0	"	"	"	"	05/03/22	"	
Chromium	**26**	2.0	"	"	"	"	"	"	
Cobalt	**4.1**	2.0	"	"	"	"	"	"	
Copper	**5.4**	1.0	"	"	"	"	"	"	
Lead	ND	3.0	"	"	"	"	"	"	
Molybdenum	ND	5.0	"	"	"	"	"	"	
Nickel	**2.8**	2.0	"	"	"	"	"	"	
Selenium	ND	5.0	"	"	"	"	"	"	
Thallium	ND	5.0	"	"	"	"	"	"	
Vanadium	**25**	5.0	"	"	"	"	"	"	
Zinc	**22**	1.0	"	"	"	"	"	"	
Cold Vapor Extraction EPA 7470/7471									
Mercury	ND	0.10	mg/kg	1	22E0005	05/02/22	05/03/22	EPA 7471A Soil	

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949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Drum #1_B-3

T221276-01 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

SunStar Laboratories, Inc.

Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bromobenzene	ND	2.5	ug/kg	1	22E0023	05/02/22	05/03/22	EPA 8260B	
Bromochloromethane	ND	2.5	"	"	"	"	"	"	
Bromodichloromethane	ND	2.5	"	"	"	"	"	"	
Bromoform	ND	2.5	"	"	"	"	"	"	
Bromomethane	ND	2.5	"	"	"	"	"	"	
n-Butylbenzene	ND	2.5	"	"	"	"	"	"	
sec-Butylbenzene	ND	2.5	"	"	"	"	"	"	
tert-Butylbenzene	ND	2.5	"	"	"	"	"	"	
Carbon tetrachloride	ND	2.5	"	"	"	"	"	"	
Chlorobenzene	ND	2.5	"	"	"	"	"	"	
Chloroethane	ND	2.5	"	"	"	"	"	"	
Chloroform	ND	2.5	"	"	"	"	"	"	
Chloromethane	ND	2.5	"	"	"	"	"	"	
2-Chlorotoluene	ND	2.5	"	"	"	"	"	"	
4-Chlorotoluene	ND	2.5	"	"	"	"	"	"	
Dibromochloromethane	ND	2.5	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.0	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	2.5	"	"	"	"	"	"	
Dibromomethane	ND	2.5	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloroethane	ND	2.5	"	"	"	"	"	"	
1,2-Dichloroethane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloroethene	ND	2.5	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	2.5	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	2.5	"	"	"	"	"	"	
1,2-Dichloropropane	ND	2.5	"	"	"	"	"	"	
1,3-Dichloropropane	ND	2.5	"	"	"	"	"	"	
2,2-Dichloropropane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloropropene	ND	2.5	"	"	"	"	"	"	

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475 Goddard, Ste. 200	Project Number: 211880001	Reported:
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Drum #1_B-3

T221276-01 (Soil)

SunStar Laboratories, Inc.

Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	2.5	ug/kg	1	22E0023	05/02/22	05/03/22	EPA 8260B	
trans-1,3-Dichloropropene	ND	2.5	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.5	"	"	"	"	"	"	
Isopropylbenzene	ND	2.5	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.5	"	"	"	"	"	"	
Methylene chloride	ND	10	"	"	"	"	"	"	
Naphthalene	ND	2.5	"	"	"	"	"	"	
n-Propylbenzene	ND	2.5	"	"	"	"	"	"	
Styrene	ND	2.5	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	2.5	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	2.5	"	"	"	"	"	"	
Tetrachloroethene	ND	2.5	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	2.5	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	2.5	"	"	"	"	"	"	
Trichloroethene	ND	2.5	"	"	"	"	"	"	
Trichlorofluoromethane	ND	2.5	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	2.5	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	2.5	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	2.5	"	"	"	"	"	"	
Vinyl chloride	ND	2.5	"	"	"	"	"	"	
Benzene	ND	2.5	"	"	"	"	"	"	
Toluene	ND	2.5	"	"	"	"	"	"	
Ethylbenzene	ND	2.5	"	"	"	"	"	"	
m,p-Xylene	ND	5.0	"	"	"	"	"	"	
o-Xylene	ND	2.5	"	"	"	"	"	"	
Acetone	ND	5.0	"	"	"	"	"	"	
Methyl ethyl ketone	ND	5.0	"	"	"	"	"	"	
Methyl isobutyl ketone	ND	5.0	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	5.0	"	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*104 %*	*75.4-139*		*"*	*"*	*"*	*"*	

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Joann Marroquin For Taili Iinuma, Project Manager

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949.297.5020 Phone
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475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Drum #1_B-3

T221276-01 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by EPA Method 8260B									
Surrogate: Dibromofluoromethane		*91.8 %*	*73.1-125*		*22E0023*	*05/02/22*	*05/03/22*	*EPA 8260B*	
Surrogate: Toluene-d8		*97.8 %*	*82.6-117*		*"*	*"*	*"*	*"*	

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475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Composite 2:1 Drum#2_B-2A - Drum #1_B-1A

T221276-04 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Extractable Petroleum Hydrocarbons by 8015B									
C6-C12 (GRO)	ND	10	mg/kg	1	22E0008	05/02/22	05/06/22	EPA 8015B	
C13-C28 (DRO)	ND	10	"	"	"	"	"	"	
C29-C40 (MORO)	ND	10	"	"	"	"	"	"	
Surrogate: p-Terphenyl		*93.0 %*	*65-135*		*"*	*"*	*"*	*"*	
Metals by EPA 6010B									
Antimony	ND	3.0	mg/kg	1	22E0004	05/02/22	05/03/22	EPA 6010b	
Silver	ND	2.0	"	"	"	"	"	"	
Arsenic	ND	5.0	"	"	"	"	"	"	
Barium	**45**	1.0	"	"	"	"	"	"	
Beryllium	ND	1.0	"	"	"	"	05/03/22	"	
Cadmium	ND	2.0	"	"	"	"	05/03/22	"	
Chromium	**26**	2.0	"	"	"	"	"	"	
Cobalt	**6.2**	2.0	"	"	"	"	"	"	
Copper	**8.3**	1.0	"	"	"	"	"	"	
Lead	ND	3.0	"	"	"	"	"	"	
Molybdenum	ND	5.0	"	"	"	"	"	"	
Nickel	**8.3**	2.0	"	"	"	"	"	"	
Selenium	ND	5.0	"	"	"	"	"	"	
Thallium	ND	5.0	"	"	"	"	"	"	
Vanadium	**45**	5.0	"	"	"	"	"	"	
Zinc	**38**	1.0	"	"	"	"	"	"	
Cold Vapor Extraction EPA 7470/7471									
Mercury	**0.13**	0.10	mg/kg	1	22E0005	05/02/22	05/03/22	EPA 7471A Soil	

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949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore 475 Goddard, Ste. 200 Irvine CA, 92618	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural Project Number: 211880001 Project Manager: Aura Scharf	Reported: 05/09/22 16:51

Composite 2:1 Drum#2_B-2A - Drum #1_B-1A

T221276-04 (Soil)

SunStar Laboratories, Inc.

Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bromobenzene	ND	2.5	ug/kg	1	22E0023	05/02/22	05/03/22	EPA 8260B	
Bromochloromethane	ND	2.5	"	"	"	"	"	"	
Bromodichloromethane	ND	2.5	"	"	"	"	"	"	
Bromoform	ND	2.5	"	"	"	"	"	"	
Bromomethane	ND	2.5	"	"	"	"	"	"	
n-Butylbenzene	ND	2.5	"	"	"	"	"	"	
sec-Butylbenzene	ND	2.5	"	"	"	"	"	"	
tert-Butylbenzene	ND	2.5	"	"	"	"	"	"	
Carbon tetrachloride	ND	2.5	"	"	"	"	"	"	
Chlorobenzene	ND	2.5	"	"	"	"	"	"	
Chloroethane	ND	2.5	"	"	"	"	"	"	
Chloroform	ND	2.5	"	"	"	"	"	"	
Chloromethane	ND	2.5	"	"	"	"	"	"	
2-Chlorotoluene	ND	2.5	"	"	"	"	"	"	
4-Chlorotoluene	ND	2.5	"	"	"	"	"	"	
Dibromochloromethane	ND	2.5	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.0	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	2.5	"	"	"	"	"	"	
Dibromomethane	ND	2.5	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloroethane	ND	2.5	"	"	"	"	"	"	
1,2-Dichloroethane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloroethene	ND	2.5	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	2.5	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	2.5	"	"	"	"	"	"	
1,2-Dichloropropane	ND	2.5	"	"	"	"	"	"	
1,3-Dichloropropane	ND	2.5	"	"	"	"	"	"	
2,2-Dichloropropane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloropropene	ND	2.5	"	"	"	"	"	"	

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475 Goddard, Ste. 200	Project Number: 211880001	Reported:
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Composite 2:1 Drum#2_B-2A - Drum #1_B-1A
T221276-04 (Soil)

SunStar Laboratories, Inc.

Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	2.5	ug/kg	1	22E0023	05/02/22	05/03/22	EPA 8260B	
trans-1,3-Dichloropropene	ND	2.5	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.5	"	"	"	"	"	"	
Isopropylbenzene	ND	2.5	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.5	"	"	"	"	"	"	
Methylene chloride	ND	10	"	"	"	"	"	"	
Naphthalene	ND	2.5	"	"	"	"	"	"	
n-Propylbenzene	ND	2.5	"	"	"	"	"	"	
Styrene	ND	2.5	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	2.5	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	2.5	"	"	"	"	"	"	
Tetrachloroethene	ND	2.5	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	2.5	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	2.5	"	"	"	"	"	"	
Trichloroethene	ND	2.5	"	"	"	"	"	"	
Trichlorofluoromethane	ND	2.5	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	2.5	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	2.5	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	2.5	"	"	"	"	"	"	
Vinyl chloride	ND	2.5	"	"	"	"	"	"	
Benzene	ND	2.5	"	"	"	"	"	"	
Toluene	ND	2.5	"	"	"	"	"	"	
Ethylbenzene	ND	2.5	"	"	"	"	"	"	
m,p-Xylene	ND	5.0	"	"	"	"	"	"	
o-Xylene	ND	2.5	"	"	"	"	"	"	
Acetone	ND	5.0	"	"	"	"	"	"	
Methyl ethyl ketone	ND	5.0	"	"	"	"	"	"	
Methyl isobutyl ketone	ND	5.0	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	5.0	"	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*98.8 %*	*75.4-139*		"	"	"	"	

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949.297.5020 Phone
949.297.5027 Fax

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475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Composite 2:1 Drum#2_B-2A - Drum #1_B-1A

T221276-04 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by EPA Method 8260B									
Surrogate: Dibromofluoromethane		*96.4 %*	*73.1-125*		*22E0023*	*05/02/22*	*05/03/22*	*EPA 8260B*	
Surrogate: Toluene-d8		*95.2 %*	*82.6-117*		*"*	*"*	*"*	*"*	

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Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Extractable Petroleum Hydrocarbons by 8015B - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0008 - EPA 3550B GC										
Blank (22E0008-BLK1)				Prepared: 05/02/22 Analyzed: 05/06/22						
C6-C12 (GRO)	ND	10	mg/kg							
C13-C28 (DRO)	ND	10	"							
C29-C40 (MORO)	ND	10	"							
Surrogate: p-Terphenyl	*91.7*		*"*	*100*		*91.7*	*65-135*			
LCS (22E0008-BS1)				Prepared: 05/02/22 Analyzed: 05/06/22						
C13-C28 (DRO)	400	10	mg/kg	500		80.9	75-125			
Surrogate: p-Terphenyl	*91.7*		*"*	*100*		*91.7*	*65-135*			
LCS Dup (22E0008-BSD1)				Prepared: 05/02/22 Analyzed: 05/06/22						
C13-C28 (DRO)	410	10	mg/kg	500		82.3	75-125	1.76	20	
Surrogate: p-Terphenyl	*91.9*		*"*	*100*		*91.9*	*65-135*			

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PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

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Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Metals by EPA 6010B - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0004 - EPA 3050B										
Blank (22E0004-BLK1)				Prepared: 05/02/22 Analyzed: 05/03/22						
Antimony	ND	3.0	mg/kg							
Silver	ND	2.0	"							
Arsenic	ND	5.0	"							
Barium	ND	1.0	"							
Beryllium	ND	1.0	"							
Cadmium	ND	2.0	"							
Chromium	ND	2.0	"							
Cobalt	ND	2.0	"							
Copper	ND	1.0	"							
Lead	ND	3.0	"							
Molybdenum	ND	5.0	"							
Nickel	ND	2.0	"							
Selenium	ND	5.0	"							
Thallium	ND	5.0	"							
Vanadium	ND	5.0	"							
Zinc	ND	1.0	"							
LCS (22E0004-BS1)				Prepared: 05/02/22 Analyzed: 05/03/22						
Arsenic	102	5.0	mg/kg	100		102	75-125			
Barium	99.9	1.0	"	100		99.9	75-125			
Cadmium	99.0	2.0	"	100		99.0	75-125			
Chromium	99.8	2.0	"	100		99.8	75-125			
Lead	102	3.0	"	100		102	75-125			
Matrix Spike (22E0004-MS1)	**Source: T221266-01**			Prepared: 05/02/22 Analyzed: 05/03/22						
Arsenic	81.2	5.0	mg/kg	100	0.812	80.4	75-125			
Barium	106	1.0	"	100	27.1	78.9	75-125			
Cadmium	80.6	2.0	"	100	0.153	80.5	75-125			
Chromium	86.7	2.0	"	100	7.24	79.5	75-125			
Lead	75.1	3.0	"	100	2.48	72.6	75-125			QM-05

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949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Metals by EPA 6010B - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0004 - EPA 3050B										
Matrix Spike Dup (22E0004-MSD1)		**Source: T221266-01**		Prepared: 05/02/22 Analyzed: 05/03/22						
Arsenic	78.7	5.0	mg/kg	100	0.812	77.9	75-125	3.03	20	
Barium	113	1.0	"	100	27.1	86.0	75-125	6.41	20	
Cadmium	75.1	2.0	"	100	0.153	74.9	75-125	7.15	20	QM-05
Chromium	84.2	2.0	"	100	7.24	76.9	75-125	2.99	20	
Lead	75.9	3.0	"	100	2.48	73.4	75-125	1.07	20	QM-05

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Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Cold Vapor Extraction EPA 7470/7471 - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0005 - EPA 7471A Soil										
Blank (22E0005-BLK1)				Prepared: 05/02/22 Analyzed: 05/03/22						
Mercury	ND	0.10	mg/kg							
LCS (22E0005-BS1)				Prepared: 05/02/22 Analyzed: 05/03/22						
Mercury	0.347	0.10	mg/kg	0.410		84.8	80-120			
Matrix Spike (22E0005-MS1)	**Source: T221266-01**			Prepared: 05/02/22 Analyzed: 05/03/22						
Mercury	0.329	0.10	mg/kg	0.385	ND	85.6	75-125			
Matrix Spike Dup (22E0005-MSD1)	**Source: T221266-01**			Prepared: 05/02/22 Analyzed: 05/03/22						
Mercury	0.279	0.10	mg/kg	0.397	ND	70.3	75-125	16.6	20	QM-05

SunStar Laboratories, Inc.

Joann Marroquin

Joann Marroquin For Taili Iinuma, Project Manager

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Providing Quality Analytical Services Nationwide

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Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Volatile Organic Compounds by EPA Method 8260B - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0023 - EPA 5030 GCMS										
Blank (22E0023-BLK1)				Prepared & Analyzed: 05/02/22						
Bromobenzene	ND	2.5	ug/kg							
Bromochloromethane	ND	2.5	"							
Bromodichloromethane	ND	2.5	"							
Bromoform	ND	2.5	"							
Bromomethane	ND	2.5	"							
n-Butylbenzene	ND	2.5	"							
sec-Butylbenzene	ND	2.5	"							
tert-Butylbenzene	ND	2.5	"							
Carbon tetrachloride	ND	2.5	"							
Chlorobenzene	ND	2.5	"							
Chloroethane	ND	2.5	"							
Chloroform	ND	2.5	"							
Chloromethane	ND	2.5	"							
2-Chlorotoluene	ND	2.5	"							
4-Chlorotoluene	ND	2.5	"							
Dibromochloromethane	ND	2.5	"							
1,2-Dibromo-3-chloropropane	ND	5.0	"							
1,2-Dibromoethane (EDB)	ND	2.5	"							
Dibromomethane	ND	2.5	"							
1,2-Dichlorobenzene	ND	2.5	"							
1,3-Dichlorobenzene	ND	2.5	"							
1,4-Dichlorobenzene	ND	2.5	"							
Dichlorodifluoromethane	ND	2.5	"							
1,1-Dichloroethane	ND	2.5	"							
1,2-Dichloroethane	ND	2.5	"							
1,1-Dichloroethene	ND	2.5	"							
cis-1,2-Dichloroethene	ND	2.5	"							
trans-1,2-Dichloroethene	ND	2.5	"							
1,2-Dichloropropane	ND	2.5	"							
1,3-Dichloropropane	ND	2.5	"							
2,2-Dichloropropane	ND	2.5	"							
1,1-Dichloropropene	ND	2.5	"							
cis-1,3-Dichloropropene	ND	2.5	"							
trans-1,3-Dichloropropene	ND	2.5	"							
Hexachlorobutadiene	ND	2.5	"							
Isopropylbenzene	ND	2.5	"							

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Joann Marroquin

Joann Marroquin For Taili Iinuma, Project Manager

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PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

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949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Volatile Organic Compounds by EPA Method 8260B - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0023 - EPA 5030 GCMS										
Blank (22E0023-BLK1)				Prepared & Analyzed: 05/02/22						
p-Isopropyltoluene	ND	2.5	ug/kg							
Methylene chloride	ND	10	"							
Naphthalene	ND	2.5	"							
n-Propylbenzene	ND	2.5	"							
Styrene	ND	2.5	"							
1,1,2,2-Tetrachloroethane	ND	2.5	"							
1,1,1,2-Tetrachloroethane	ND	2.5	"							
Tetrachloroethene	ND	2.5	"							
1,2,3-Trichlorobenzene	ND	2.5	"							
1,2,4-Trichlorobenzene	ND	2.5	"							
1,1,2-Trichloroethane	ND	2.5	"							
1,1,1-Trichloroethane	ND	2.5	"							
Trichloroethene	ND	2.5	"							
Trichlorofluoromethane	ND	2.5	"							
1,2,3-Trichloropropane	ND	2.5	"							
1,3,5-Trimethylbenzene	ND	2.5	"							
1,2,4-Trimethylbenzene	ND	2.5	"							
Vinyl chloride	ND	2.5	"							
Benzene	ND	2.5	"							
Toluene	ND	2.5	"							
Ethylbenzene	ND	2.5	"							
m,p-Xylene	ND	5.0	"							
o-Xylene	ND	2.5	"							
Acetone	ND	5.0	"							
Methyl ethyl ketone	ND	5.0	"							
Methyl isobutyl ketone	ND	5.0	"							
2-Hexanone (MBK)	ND	5.0	"							
Surrogate: 4-Bromofluorobenzene	*52.6*		*"*	*50.0*		*105*	*75.4-139*			
Surrogate: Dibromofluoromethane	*46.4*		*"*	*50.0*		*92.7*	*73.1-125*			
Surrogate: Toluene-d8	*49.3*		*"*	*50.0*		*98.6*	*82.6-117*			

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Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Volatile Organic Compounds by EPA Method 8260B - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0023 - EPA 5030 GCMS										
LCS (22E0023-BS1)				Prepared & Analyzed: 05/02/22						
Chlorobenzene	53.0	2.5	ug/kg	50.0		106	65.2-124			
1,1-Dichloroethene	52.1	2.5	"	50.0		104	60.9-131			
Trichloroethene	53.7	2.5	"	50.0		107	62.1-126			
Benzene	49.9	2.5	"	50.0		99.8	65.3-127			
Toluene	49.7	2.5	"	50.0		99.4	64.3-122			
Surrogate: 4-Bromofluorobenzene	*48.9*		"	*50.0*		*97.9*	*75.4-139*			
Surrogate: Dibromofluoromethane	*47.0*		"	*50.0*		*94.1*	*73.1-125*			
Surrogate: Toluene-d8	*49.6*		"	*50.0*		*99.3*	*82.6-117*			
Matrix Spike (22E0023-MS1)	**Source: T221277-02**			Prepared & Analyzed: 05/02/22						
Chlorobenzene	46.0	2.5	ug/kg	50.0	ND	92.0	65.2-125			
1,1-Dichloroethene	41.2	2.5	"	50.0	ND	82.5	60.9-131			
Trichloroethene	44.8	2.5	"	50.0	ND	89.6	62.1-126			
Benzene	41.6	2.5	"	50.0	ND	83.2	65.3-127			
Toluene	42.8	2.5	"	50.0	ND	85.7	64.3-125			
Surrogate: 4-Bromofluorobenzene	*48.9*		"	*50.0*		*97.9*	*75.4-139*			
Surrogate: Dibromofluoromethane	*45.6*		"	*50.0*		*91.2*	*73.1-125*			
Surrogate: Toluene-d8	*49.3*		"	*50.0*		*98.7*	*82.6-117*			
Matrix Spike Dup (22E0023-MSD1)	**Source: T221277-02**			Prepared & Analyzed: 05/02/22						
Chlorobenzene	48.0	2.5	ug/kg	50.0	ND	95.9	65.2-125	4.13	20	
1,1-Dichloroethene	47.0	2.5	"	50.0	ND	94.1	60.9-131	13.1	20	
Trichloroethene	47.7	2.5	"	50.0	ND	95.3	62.1-126	6.25	20	
Benzene	44.8	2.5	"	50.0	ND	89.5	65.3-127	7.34	20	
Toluene	44.6	2.5	"	50.0	ND	89.2	64.3-125	4.02	20	
Surrogate: 4-Bromofluorobenzene	*49.1*		"	*50.0*		*98.1*	*75.4-139*			
Surrogate: Dibromofluoromethane	*47.3*		"	*50.0*		*94.7*	*73.1-125*			
Surrogate: Toluene-d8	*49.3*		"	*50.0*		*98.6*	*82.6-117*			

SunStar Laboratories, Inc.

Joann Marroquin

Joann Marroquin For Taili Iinuma, Project Manager

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Notes and Definitions

QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to possible matrix interference. The LCS was within acceptance criteria. The data is acceptable as no negative impact on data is expected.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

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Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: Ninyo & Moore
Address: 475 Goddard, Suite 200
Phone: 949-753-7070 Fax:
Project Manager: Avra Scharf ascharf@ninyoandmoore.com

Date: 4/29/22 Page: 1 Of 1
Project Name: Arroyo Seco - San Rafael Water Reuse & Natural Stream Restoration Project
Collector: Allison Prizlow (ANP) Client Project #: 211880001
Batch #: T221276 EDF #:

Sample ID	Date Sampled	Time	Sample Type	Container Type	8260 (VOCs)	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	6010/7000 Title 22 Metals					Laboratory ID #	Comments/Preservative	Total # of containers
Drum#1_B-3	4/27/22	3:10	Soil	4oz Jar	X							X	X					1	one test	
Drum#2_B-2A	4/28/22	11:30	Soil	4oz Jar	X							X	X					2	composite 2 JARS (one test)	
Drum#1_B-1A	4/28/22	3:35	Soil	4oz Jar	X							X	X					3		

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Allison Prizlow	4/29/22 ; 2:59		4/29/22 ; 2:59
	4/29/22 4:30		4/29/22 16:30
	4/29/22 16:55		4.29.22 1655

Total # of containers
Chain of Custody seals Y/N/NA
Seals intact? Y/N/NA
Received good condition/cold 2.7°c

Turn around time: STD

Notes
2 tests total

Sample disposal Instructions: Disposal @ $2.00 each ____ Return to client ____ Pickup ____

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

Rev. 02 Date 07/19
Receiving Form 001

SAMPLE RECEIVING REVIEW SHEET

Batch/Work Order #: T221276

Client Name: NINYO & MOORE

Project: ARROYO SECO - SAN RAFAEL WATER REUSE 2 NATURAL STREAM RESTORATION

Delivered by: ☐ Client ☑ SunStar Courier ☐ GLS ☐ FedEx ☐ UPS

If Courier, Received by: MARVIN

Date/Time Courier Received: 4-29-22 16:30

Lab Received by: DAVE

Date/Time Lab Received: 4-29-22 16:55

Total number of coolers received: 1 Thermometer ID: SC-1 Calibration due: 8/24/22

Temperature: Cooler #1 2.6	°C +/- the CF (+0.1 °C)	= 2.7	°C corrected temperature
Temperature: Cooler #2	°C +/- the CF (+0.1 °C)	=	°C corrected temperature
Temperature: Cooler #3	°C +/- the CF (+0.1 °C)	=	°C corrected temperature
Temperature criteria = ≤ 6°C (no frozen containers)	Within criteria?		☑ Yes ☐ No ☐ N/A
If NO:			
Samples received on ice?	☐ Yes		☐ No → **Complete Non-Conformance Sheet**
If on ice, samples received same day collected?	☐ Yes → Acceptable		☐ No → **Complete Non-Conformance Sheet**

Custody seals intact on cooler/sample	☐ Yes	☐ No*	☑ N/A
Sample containers intact	☑ Yes	☐ No*	
Sample labels match Chain of Custody IDs	☑ Yes	☐ No*	
Total number of containers received match COC	☑ Yes	☐ No*	
Proper containers received for analyses requested on COC	☑ Yes	☐ No*	
Proper preservative indicated on COC/containers for analyses requested	☐ Yes	☐ No*	☒ N/A
Complete shipment received in good condition with correct temperatures, containers, labels, volumes preservatives and within method specified holding times	☑ **Yes**	☐ **No***	

* Complete Non-Conformance Receiving Sheet if checked

Cooler/Sample Review - Initials and date: MV 4-29-22

Comments:

Page 1 of 1

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PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T221276

Client: Ninyo & Moore | **Project Manager:** Taili Iinuma
Project: Arroyo Seco - San Rafael Water Reuse 2 Natural | **Project Number:** 211880001

Report To:
Ninyo & Moore
Aura Scharf
475 Goddard, Ste. 200
Irvine, CA 92618

Date Due:	05/09/22 17:00 (5 day TAT)		
Received By:	Dave Berner	Date Received:	04/29/22 16:55
Logged In By:	Jennifer Berger	Date Logged In:	05/02/22 11:31

Samples Received at: **2.7°C**

Custody Seals	No	Received On Ice	Yes
Containers Intact	Yes		
COC/Labels Agree	Yes		
Preservation Confir	No		

Analysis	Due	TAT	Expires	Comments
T221276-01 Drum #1_B-3 [Soil] Sampled 04/27/22 15:10 (GMT-08:00) Pacific Time (US &				
6010 Title 22	05/09/22 15:00	5	10/24/22 15:10	
8015 Carbon Chain	05/09/22 15:00	5	05/11/22 15:10	
8260	05/09/22 15:00	5	05/11/22 15:10	
T221276-02 Drum #2_B-2A [Soil] Sampled 04/28/22 11:30 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T221276-03 Drum #1_B-1A [Soil] Sampled 04/28/22 15:35 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T221276-04 Composite 2:1 Drum#2_B-2A - Drum #1_B-1A [Soil] Sampled 04/28/22 11:30 (GMT-08:00) Pacific Time (US &				**Composite samples Drum#2_B-2A, Drum#1_B-1A # 2,3**
6010 Title 22	05/09/22 15:00	5	10/25/22 11:30	
8015 Carbon Chain	05/09/22 15:00	5	05/12/22 11:30	
8260	05/09/22 15:00	5	05/12/22 11:30	

Analysis groups included in this work order

6010 Title 22

subgroup 6010B T22 7470/71 Hg

Reviewed By ____________ Date ____________

Manifest

SOIL SAFE OF CA – TPST
Non-Hazardous Soils

↓ Manifest # ↓

Date of Shipment:	Responsible for Payment:	Transport Truck #:	Facility #:	Approval Number:	Load #
6/6/22		876 476	A07	AS-4353	6611

Generator's Name and Billing Address:		
ARROYO PARK STONEY DRIVE SOUTH PASADENA, CA 91030	Generator's Phone #: 213-440-3543	
	Person to Contact:	
	FAX#:	Customer Account Number

Consultant's Name and Billing Address:		
	Consultant's Phone #:	
	Person to Contact:	
	FAX#:	Customer Account Number

Generation Site (Transport from): *(name & address)*		
ARROYO PARK STONEY DRIVE SOUTH PASADENA, CA 91030	Site Phone #:	
	Person to Contact:	
	FAX#:	

Designated Facility (Transport to): *(name & address)*		
SOIL SAFE 12328 HIBISCUS AVENUE ADELANTO, CA 92301	Facility Phone #: (800) 862-8001	
	Person to Contact: JOE PROVANSAL	
	FAX#: (760) 246-8004	

Transporter Name and Mailing Address:		
BELSHIRE 25971 TOWNE CENTRE DRIVE FOOTHILL RANCH, CA 92610 BESI: 342662	Transporter's Phone #: 949-460-5200	CAR000183913
	Person to Contact: LARRY MOOTHART	1629169
	FAX#: 949-460-5210	Customer Account Number

Description of Soil	Moisture Content	Contaminated by:	Approx. Qty:	Description of Delivery	Gross Weight	Tare Weight	Net Weight
Sand ☐ Organic ☐ Clay ☐ Other ☐	0 - 10% ☐ 10 - 20% ☐ 20% - over ☐	Gas ☐ Diesel ☐ Other ☐	3 DM	Soil ~~Safe~~	39820	38100	1720
Sand ☐ Organic ☐ Clay ☐ Other ☐	0 - 10% ☐ 10 - 20% ☐ 20% - over ☐	Gas ☐ Diesel ☐ Other ☐					.86

List any exception to items listed above: Scale Ticket # 170135

Generator's and/or consultant's certification: I/We certify that the soil referenced herein is taken entirely from those soils descried in the Soil Data Sheet completed and certified by me/us for the Generation Site shown above and nothing has been added or done to such soil that would alter it in any way.

Print or Type Name: Generator ☒ Consultant ☐	Signature and date:	Month	Day	Year
VICTOR MAGANA	NC. ARO	5	20	22

Transporter's certification: I/We acknowledge receipt of the soil referenced above and certify that such soil is being delivered in exactly the same condition as when received. I/We further certify that the soil is being directly transported from the Generation Site to the Designated Facility without off-loading, adding to, subtracting from or in any way delaying delivery to such site.

Print or Type Name:	Signature and date:	Month	Day	Year
Ivan Garcia		5	20	22

Discrepancies:

Recycling Facility certifies the receipt of the soil covered by this manifest except as noted above:

Print or Type Name:	Signature and date:
Joe Provansal / Barry Meek / Bill Bishop	6-6-22

Generator and/or Consultant — Transporter — Recycling Facility

Please print or type. ARROYOPA/2857517

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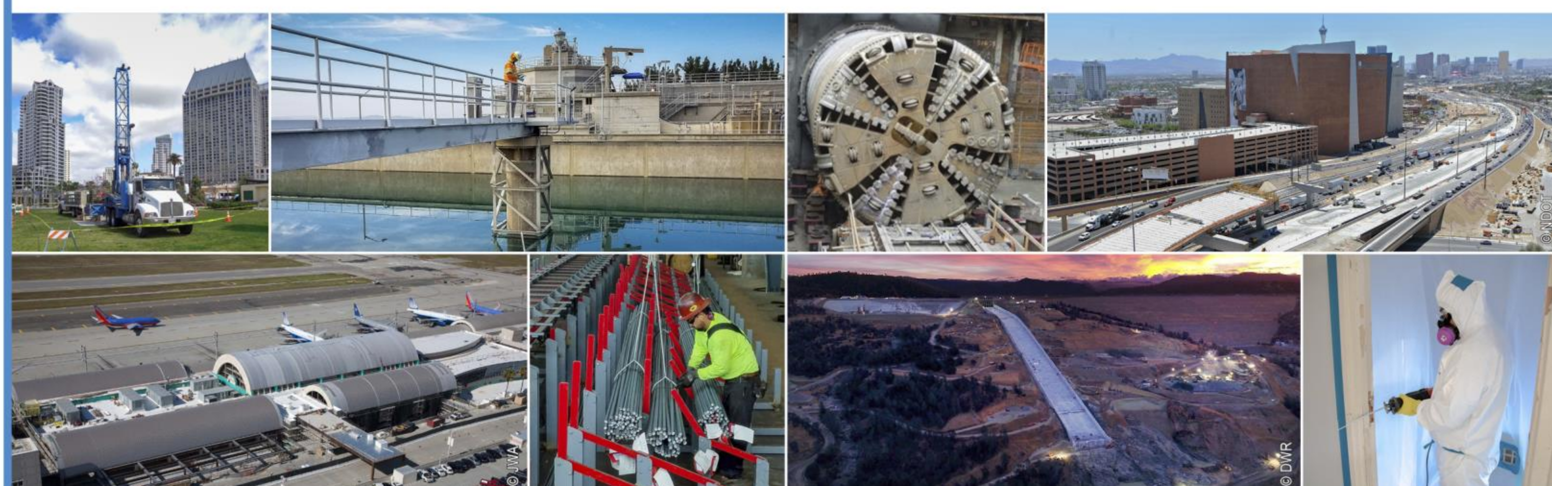

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Appendix E-2

San Pascual Geotechnical Evaluation

Geotechnical Evaluation

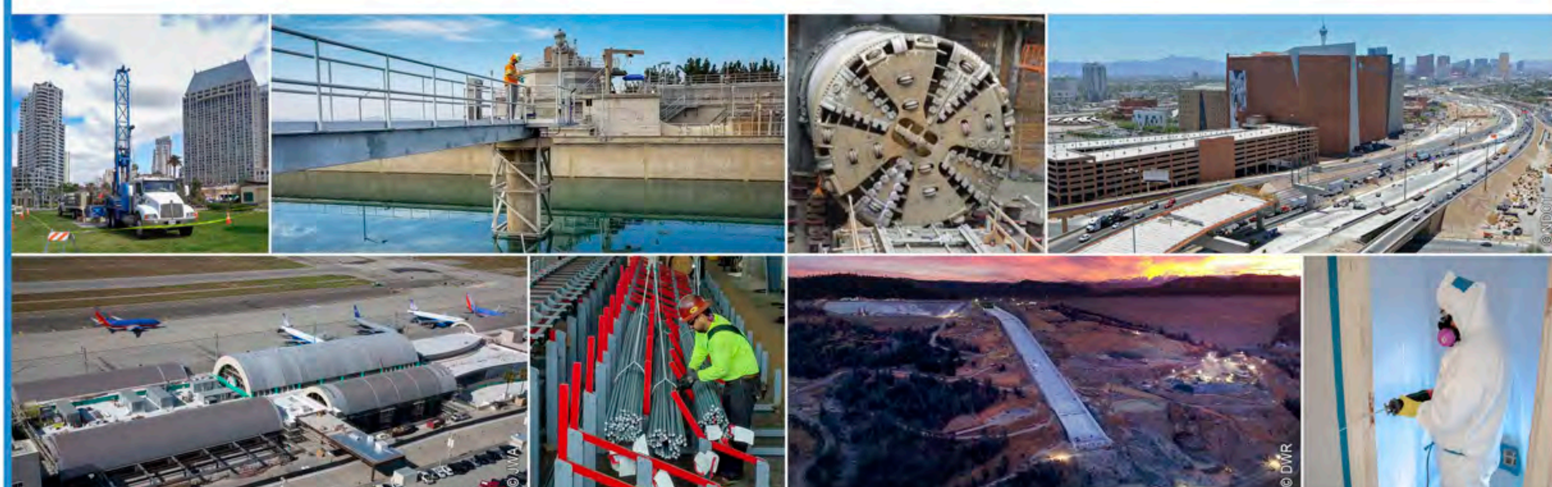
San Pascual Treatment Wetland Arroyo Seco Water Reuse and Natural Stream Restoration Project

South Pasadena, California

Craftwater Engineering, Inc.

45 South Arroyo Parkway, B6 | Pasadena, California 91105

June 17, 2022 | Project No. 211880001



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Geotechnical Evaluation

San Pascual Treatment Wetland Arroyo Seco Water Reuse and Natural Stream Restoration Project

South Pasadena, California

Ms. Courtney Semlow
Craftwater Engineering, Inc.
45 South Arroyo Parkway, B6 | Pasadena, California 91105

June 17, 2022 | Project No. 211880001

Aura E. Scharf, GIT
Senior Staff Geologist

Daniel Chu, PhD, PE, GE
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
DANIEL B. CHU
No. GE2096
GEOTECHNICAL
STATE OF CALIFORNIA

Greg M. Corson, PG, CEG
Principal Geologist

CERTIFIED ENGINEERING GEOLOGIST
GREGORY M. CORSON
No. 2310
STATE OF CALIFORNIA

AES/GMC/DBC/sc

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1 INTRODUCTION

In accordance with your request and authorization, we have performed a geotechnical evaluation for the Arroyo Seco Water Reuse and Natural Stream Restoration project located along the lower Arroyo Seco in the Cities of Pasadena and South Pasadena, California (Figure 1). We understand that the purpose of the project is to reduce the Maximum Total Daily Loads within the Upper Los Angeles River by improving the water quality within Arroyo Seco and its tributary, San Rafael Creek. In general, the project consists of the construction/rehabilitation of two stormwater treatment wetlands along Arroyo Seco, including the San Rafael Treatment Wetland and the San Pascual Treatment Wetland. Each wetland location will include additional site improvements, such as stormwater diversion structures, stormwater pre- and post-treatment facilities, restoration of existing riparian habitats, and development of recreational opportunities. The purpose of our study was to evaluate the subsurface soil and geologic conditions at each wetland location, including the infiltration rates of the on-site soils, in order to provide geotechnical recommendations for the design and construction of the proposed improvements. This report presents our findings, conclusions, and geotechnical recommendations for design and construction of the proposed improvements at the site of the San Pascual Treatment Wetland (San Pascual Site). Our findings, conclusions and geotechnical recommendations associated with the site of the San Rafael Treatment Wetland (San Rafael Site) are provided under separate cover (Ninyo & Moore, 2022).

2 SCOPE OF SERVICES

Our scope of services for the San Pascual Site included the following:

- Project coordination and planning with subcontractors and personnel from Craftwater Engineering, Inc., the design team, and the Cities of Pasadena and South Pasadena, and attendance at a project kick-off meeting.
- Review of readily available background materials, including published topographic maps, geologic maps, fault and seismic hazard maps, groundwater data, stereoscopic aerial photographs, project related plans, and in-house geotechnical information.
- Acquisition of well and encroachment permits from the City of South Pasadena.
- Field reconnaissance to observe and document the site conditions, mark-out proposed hollow-stem-auger (HSA) boring locations for underground utility clearance by Underground Service Alert.
- Subsurface exploration consisting of the drilling, sampling, and logging of seven HSA borings, ranging in depths from approximately 10 feet to 31½ feet.
- Field percolation testing in three of the HSA borings in general accordance with the 2021 Los Angeles County Department of Public Work's (LACDPW) Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration.

- Geotechnical laboratory testing of representative soil samples to evaluate in-situ moisture content and dry density, gradation, percentage of particles finer than the No. 200 sieve, Atterberg limits, direct shear strength, R-value, and soil corrosivity.

- Data compilation and engineering analysis of the information obtained from our background review, subsurface evaluation, percolation testing, and laboratory testing.

- Preparation of this geotechnical report presenting our findings, conclusions, and recommendations pertaining to the design and construction of the proposed improvements.

3 SITE DESCRIPTION

The San Pascual Site consists of a triangular-shaped lot along the east side of the lower Arroyo Seco Channel along the southern end of the Repetto Hills within the City of South Pasadena. The lot is bounded on the west and southwest by the Arroyo Seco channel, on the northeast and east by Stoney Drive, and on the north by San Pascual Drive. Arroyo Park is located on the opposite side of Stoney Drive from the site. The lot consists of an existing wetland area sloped downward toward the middle portions of the site approximately 8 to 10 feet below the surrounding ground surfaces. The depressed area, wetland area is covered with thick vegetation of bushes, grasses, and palm trees. Water was present on the ground surface within portions of the wetland area during our subsurface exploration discussed below. An outlet to Arroyo Seco is located at the southern end of the wetland. The north and south ends of the site consist of undeveloped dirt and gravel areas. A dirt pathway lined by a wood fence traverses the northeast and southeast sides of the basin. According to the County of Los Angeles (2022), elevations of the site ground surface around the perimeter of the wetland range from approximately 608 feet above mean sea level (MSL) at the north end of the site to 596 feet above MSL at the south end (Figure 2). The bottom elevations of the existing wetland and south outlet are approximately 590 and 578 feet, respectively. The adjacent channel of Arroyo Seco is concrete-lined and on the order of 12 to 15 feet deep (el. 590 to 578 feet MSL adjacent to the site).

4 PROJECT DESCRIPTION AND PROPOSED CONSTRUCTION

According to Craftwater (2020), the existing wetland will be improved to become a new wetland with a storage capacity of up to approximately 6.5 acre-feet. The new wetland will have ponding depth of approximately 5 feet and footprint of approximately 1.5 acres. It is anticipated that new slopes will be constructed along the outside of the wetland. Water will be diverted from the Arroyo Seco with a new approximately 30-foot-long by 3-foot-wide, by 1.5-foot-deep concrete drop-inlet structure installed along the bottom of the channel northwest of the site. A 30-inch-diameter pipeline will be constructed at the bottom of the structure to collect and divert water to the northern end of the wetland/reservoir. A hydrodynamic separator for pre-treatment of the water and actuated valve vault will be installed along the pipeline. A second pipeline, 18-inches in diameter, will be constructed at the southern end of the wetland/reservoir to return treated water to Arroyo Seco and a harvesting unit to collect and divert water for use as landscape irrigation at the adjacent Arroyo Park. The second pipeline will also include an in-line post-treatment filtration unit, actuated valve, and pump station. It is anticipated that the pipelines and structures (i.e., actuated valve boxes, hydrodynamic separator, pump station, filtration unit, and harvesting unit) will be installed to depths of up to approximately 15 feet in depth. Other site improvements include new pedestrian walkways/trails, fencing, landscaping, and a new parking lot with permeable pavers at the north end of the site.

5 SUBSURFACE EVALUATION AND LABORATORY TESTING

Our subsurface evaluation was conducted on April 26, 27, and 28, 2022, and consisted of the drilling, logging, and sampling of seven HSA borings (B-1A, B-2A, B-3A, and P-1A through P-4A). The borings were drilled using a limited-access drill rig with 8-inch diameter augers along the perimeter of the proposed wetland. The wetland area was inaccessible due to the presence of the heavy vegetation and water on the ground surface. Borings B-1A, B-2A, and B-3A were drilled to depths of approximately 30.3, 30.8, and 31.5 feet. Boring P-1A was drilled to a depth of approximately 10.2 feet and borings P-2A, P-3A, and P-4A were drilled to depths of approximately 10.1 feet. The borings were logged in the field by a representative of Ninyo & Moore and representative bulk and relatively undisturbed soil samples were collected from the borings at selected depths for laboratory testing. Percolation testing was performed in borings P-1A through P-4A as further discussed in Section 8 of this report. Logs of the exploratory borings are provided in Appendix A. The approximate locations of the borings are presented on Figures 2 and 3. The borings were backfilled with cement-bentonite and/or soil cuttings upon completion of the drilling and percolation testing.

Geotechnical laboratory testing of representative soil samples included tests to evaluate in-situ moisture content and dry density, gradation, percentage of particles finer than the No. 200 sieve direct shear strength, Atterberg limits, and soil corrosivity. Moisture and density test results are presented on the boring logs in Appendix A. The remaining test results are presented in Appendix B.

Soil cuttings from borings backfilled with cement-bentonite grout were placed in 55-gallon drums, and composite soil samples of the drummed soil were collected in 8-ounce jars for waste characterization. The samples were stored in a chilled cooler and delivered to SunStar Laboratories for analytical testing under chain-of-custody protocol. The samples were tested for total petroleum hydrocarbons (gas and diesel range) per United Stated Environmental Protection

Agency (EPA) Test Method 8015B, Title 22 metals per EPA Test Methods 6010B/7470/7471, and volatile organic compounds per EPA Test Method 8260B. Based on the characterization test results, the drums were disposed at an approved landfill (Soil Safe in Adelanto, California) by a licensed transportation subcontractor (Belshire) as non-hazardous material. The analytical test results are provided in Appendix C.

6 GEOLOGIC AND SUBSURFACE CONDITIONS

The project site is located within the Los Angeles Basin of the Transverse Ranges Geomorphic Province (Norris and Webb, 1990). The basin has been divided into four blocks, the northeastern, northwestern, southwestern, and central blocks that are separated by prominent fault systems. The site is located at the northern edge of the northeastern block, which consists of a synclinal basin between the San Gabriel to the north and Whittier fault zone to the south. The basin is infilled with up to 12,000 feet of marine Cenozoic sedimentary rock and Miocene volcanics overlying metamorphic/granitic basement rock. The basin rocks are generally overlain by variably aged alluvial fan and stream deposits shed from the mountains on the north.

The site is located along Arroyo Seco, where the drainage exits the southern end of the Repetto Hills. According to Campbell, et al. (2014), deposits of late Pleistocene-age young alluvium consisting of unconsolidated, stream-deposited silt, sand and gravel (Figure 4) are present along the bottom of the channel and beneath the site. These younger deposits are confined by sedimentary bedrock and older alluvial fan/terrace deposits within the Repetto Hills to the north and older alluvial deposits of varying age to the south. The bedrock and terrace deposits are in fault contact with the older alluvial deposits due to the east to west trending Raymond fault. Campbell, et al. (2014) indicates that the fault crosses through the site. The bedrock north of the fault is mapped as siltstone, sandstone, and conglomeratic units of the Topanga Formation. The California Department of Mines and Geology (CDMG, 1998) has mapped the young alluvium beneath the site as Holocene-aged deposits of loose to medium dense, sand, silt and gravel.

Materials encountered during our subsurface exploration generally consisted of undocumented fill younger alluvium, older alluvium, and Topanga Formation bedrock as described below. Detailed descriptions of the materials encountered in our borings are presented on the boring logs in Appendix A.

6.1 Undocumented Fill

Undocumented fill was encountered in our borings B-1A, P-1A, P-2A, and P-3A performed in the northern portions of the park (i.e., area of lower ground elevation) to depths ranging from approximately 3 to 4½ feet. The fill generally consisted of light brown and brown, moist, medium dense, sandy silt and silty sand with variable amounts of gravel and cobbles. Information regarding the placement of existing fill including ground preparation, remedial excavation, methods of fill placement, and the degree of compaction during placement, is unknown to us.

6.2 Younger Alluvium

Younger alluvium was encountered beneath the undocumented fill to depths ranging from approximately 9 to 14 feet in borings B-1A, B-2A, B-3A, and P-4A, and to the total depths explored (approximately 10 feet) in borings P-1A, P-2A, and P-3A. The younger alluvium generally consisted of interbedded granular deposits of light brown, brown, grayish brown, light grayish brown, olive brown, olive, grayish brown, dark gray, and light gray, moist to wet, loose to very dense, silty sand and poorly graded sand with silt with variable amounts of gravel, cobbles, and possible boulders.

6.3 Older Alluvium

Older alluvium was encountered beneath the fill and younger alluvium encountered in boring B-3A at a depth of approximately 9 feet. The older alluvium extended to a depth of approximately 29 feet and generally consisted of reddish brown and brown, moist, hard, sandy lean clay interbedded with yellowish brown, moist, mottled, very dense silty sand with gravel, cobbles, and possible boulders. Clasts of sandstone and siltstone were also present within the granular deposits.

6.4 Topanga Formation

Topanga Formation bedrock was encountered at depths ranging from approximately 9½ to 14 feet in borings B-1A, B-2A, and P-4A and at a depth of approximately 29 feet in boring B-3A. The bedrock generally consisted of gray, moist to wet, weakly cemented, sandstone with thin to thick laminations of dark brown, weakly indurated, siltstone; and dark brown, dark gray, and yellowish brown, moist to wet, soft, weakly indurated, claystone and siltstone with interbeds and laminations of light gray, moist, weakly cemented sandstone. The bedrock was generally ranged from soft to moderately soft, with the exception of hard, strongly cemented, sandstone that was encountered at a depth of approximately 29 feet in boring B-2A. The bedrock was variably weathered with some intensely weathered siltstone and claystone encountered in the upper portions of the borings.

7 GROUNDWATER

Seepage was encountered during drilling in borings B-1A, B-2A, and P-4A at depths of approximately 10.3, 12, and 8.5 feet, respectively. The depths of seepage suggest that perched groundwater is present at the contact between the younger alluvium and bedrock. The proximity of the borings to the edge of the wetland are an influence on the seepage conditions encountered. Groundwater was measured in borings B-1A and B-2A at depths of approximately 20 and 25.5 feet, respectively, after completion of drilling. Groundwater was not encountered in boring B-3A to the total depth explored of approximately 31.5 feet. CDMG (1998) indicates that the historic high depth to groundwater at the project site is 20 feet.

Fluctuations in the level of groundwater will occur due to variations in ground surface topography, subsurface stratification, rainfall, irrigation practices, groundwater pumping, and other factors that were not evident at the time of our field evaluation.

8 FIELD PERCOLATION TESTING

Percolation testing was performed in our borings P-1A, P-2A, and P-3A in general accordance with the 2021 LACDPW Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration. Percolation testing was not performed in boring P-4A due to the presence of standing water at the bottom of the boring (i.e., seepage encountered at approximately 8.5 feet). The testing was performed to evaluate the infiltration rates of the on-site soils at the approximate invert depth of the proposed wetland for use in the project design. The percolation testing was performed within the younger granular alluvial deposits. The approximate locations of the percolation test borings are shown on Figures 2 and 3.

Preparation of each boring for percolation testing included the installation of a 2-inch-diameter slotted polyvinyl chloride (PVC) pipe in each boring and backfilling the bottom approximately 5 feet of annular space between the borehole wall and pipe with clean gravel. The infiltration zones were pre-soaked with water for at least one hour prior to performing percolation testing. After the borings were pre-soaked, falling-head percolation testing was performed in the borings.

The falling-head test method involved placing clean water into the PVC pipe to establish a head of water and measuring the rate at which the water level dropped in the pipe at consecutive time intervals (approximately 10 minutes). The test was repeated at each location until three consecutive measurements provided similar results and a stabilized rate was obtained. The field percolation rates were calculated by measuring the total volume of water infiltrated during the time interval and dividing by the surface area of the tested zone of the respective boring. The measured field percolation rates are presented in Table 1.

The 2021 LACDPW guidelines indicate that the measured field percolation rates should be reduced to account for the long-term performance of the proposed BMPs by dividing the field rates by the “Total Reduction Factor (RF).” They define the RF as the sum of the "test-specific" reduction factor (RF_t), the "site variability" reduction factor (RF_v), and the "long-term siltation, plugging, and maintenance" reduction factor (RF_s) (i.e., $RF=RF_t+RF_v+RF_s$). The guidelines (CLADPW, 2021) indicate that the RF_t is applied to account for variations in the direction of flow during the test and the reliability of the different test methods and ranges from 1 to 3. We recommend using an RF_t value of 2 for the small dimeter boring test method used in this evaluation. The RF_v value is applied to account for site variability, number of tests, and thoroughness of the subsurface investigation and ranges from 1 to 3. Based on our explorations and the potential for variable site conditions associated with potential faulting at the site, we recommend using an RF_v value of 2. The long-term siltation, plugging, and maintenance value (RF_s) also ranges from 1 to 3 and will generally vary on the level of pre-treatment performed prior to infiltration and the level of future maintenance of the system. For the purposes of this evaluation, we have assumed an RFs value of 1; however, the RF_s value should be provided by the BMP designer. The RF_t, RF_v, RF_s, and resulting RF values used in our analysis are presented in Table 1. The adjusted percolation rates based on these values are also presented in Table 1.

Table 1 – Percolation Test Results

Test Boring	Test Type	Approximate Depth of Tested Zone (feet)	Field Percolation Rate (inches/hour)	Reduction Factor				Adjusted Percolation Rate (inches/hour)
				RF_t	RF_v	RF_s	RF	
P-1A	Falling Head	8.0-10.2	13.7	2	2	1	5	2.8
P-2A	Falling Head	8.0-10.1	15.4	2	2	1	5	3.1
P-3A	Falling Head	8.0-10.1	14.1	2	2	1	5	2.8

Notes:
RF_t – Test Specific Reduction Factor
RF_v – Site Variability Reduction Factor
RF_s – Long-Term Siltation, Plugging, and Maintenance Reduction Factor (To be adjusted by the BMP designer)
RF – Total Reduction Factor

Based on our evaluation, we recommend that an adjusted percolation rate of 2.8 inches per hour, following adjustments by the BMP designer for RF_s, be used for project design.

In addition, we recommend that new or existing buildings be set-back from the proposed infiltration facility a minimum of 15 feet or a distance where the bottom of the lowest foundation element of the structure is at least 10 horizontal feet outside of an imaginary 1:1 (horizontal to vertical) plane projected downward and outward from the zone of infiltration.

9 FLOOD HAZARDS

Based on our review of flood insurance rate maps for the project area (Federal Emergency Management Agency [FEMA], 2008), the project site is not located in the 100-year Flood Hazard Area. The site is located within “Other Flood Areas – Zone X,” which includes areas potentially subject to 500-year floods, areas of 100-year floods with average depths of less than one foot, and areas protected by levees.

10 FAULTING AND SEISMICITY

The site is in a seismically active area, as is the majority of southern California, and the potential for strong ground motion in the project area is considered significant during the design life of the proposed project. Figure 5 shows the approximate site location relative to the major faults in the region. The site is located within a State of California Earthquake Fault Zone (EFZ) (formerly known as an Alquist-Priolo Special Studies Zone) (Hart and Bryant, 2018) associated with the Raymond fault (Figures 4, 6 and 7).

The principal seismic hazards evaluated at the subject site are surface fault rupture, ground motion, and liquefaction. A brief description of these principal seismic hazards is discussed in the following sections.

10.1 Surface Fault Rupture

Surface fault rupture is the offset or rupturing of the ground surface by relative displacement across a fault during an earthquake. As discussed, the project is located with the EFZ associated with the Raymond fault and is possibly underlain by one or more active splays of the fault. According to the State of California Fault Evaluation Report (FER)(CGS, 2017) prepared for the Raymond fault, the fault is buried by the younger alluvial deposits where it crosses Arroyo Seco. Previous studies discussed in the FER map potential (inferred) locations of the fault beneath Arroyo Seco. Many of these inferred locations cross beneath the southern end and/or middle section of the site (Figure 7). Accordingly, the potential for surface rupture at the site during an earthquake along this section of the Raymond fault is considered high. Lurching or cracking of the ground surface as a result of seismic events on other nearby faults, or deeper earthquakes along the Raymond fault, is also possible.

Since the project does not involve the construction of structures for human occupancy, as defined by the AP fault act of 1972, additional fault studies, including subsurface and/or geophysical techniques, detailed review of the FER and previous fault studies by others, and detailed review of other geotechnical/geologic documents, were not performed as a part of this evaluation. However, our subsurface exploration suggests that a fault may be present at the southern end of the site, between borings B-3A and B-4A, as suggested the deeper depth to bedrock (29 feet in boring B-3A compared to 9 ½ to 14 feet in the other borings) and the section of older alluvium that was encountered in boring B-3A. An alternative explanation of the differences could be a steep formational contact between borings B-3A and B-4A. Additional studies would need to be performed in order to further evaluate these materials and their relationships.

10.2 Ground Motion

Considering the proximity of the site to active faults capable of producing a maximum moment magnitude of 6.0 or more, the project area has a high potential for experiencing strong ground motion. The 2019 California Building Code (CBC) specifies that the risk-targeted maximum considered earthquake (MCE_R) ground motion response accelerations be used to evaluate seismic loads for design of buildings and other structures. The MCE_R ground motion response accelerations are based on the spectral response accelerations for 5 percent damping in the direction of maximum horizontal response and incorporate a target risk for structural collapse equivalent to 1 percent in 50 years with deterministic limits for near-source effects. The average shear wave velocity (V_S) for the upper 30 meters of soil (V_{S30}) is approximately 468 meters per second (m/s) (CGS, 2017). Accordingly, the site is considered to be a Site Class C. The horizontal peak ground acceleration that corresponds to the MCE_R for the project area was calculated as 0.92g using the 2019 Structural Engineers Association of California (SEAOC)/Office of Statewide Health Planning and Development (OSHPD) seismic design tool (web-based). Spectral response acceleration parameters, consistent with the 2019 CBC, are also provided in Section 12.3 of the report.

The 2019 CBC specifies that the potential for liquefaction and soil strength loss be evaluated, where applicable, for the mapped maximum considered earthquake geometric mean (MCE_G) peak ground acceleration (PGA_M) with adjustment for site class effects in accordance with the American Society of Civil Engineers (ASCE) 7-16 Standard. The MCE_G PGA is based on the geometric mean PGA with a 2 percent probability of exceedance in 50 years. The PGA_M was calculated as 1.1g using the 2019 SEAOC/OSHPD seismic design tool (web-based).

10.3 Liquefaction

Liquefaction is the phenomenon in which loosely deposited granular soils with silt and clay contents of less than approximately 35 percent and non-plastic silts located below the water table undergo rapid loss of shear strength when subjected to strong earthquake-induced ground shaking. Ground shaking of sufficient duration results in the loss of grain-to-grain contact due to a rapid rise in pore water pressure and causes the soil to behave as a fluid for a brief period of time. Liquefaction is known generally to occur in saturated or near saturated cohesionless soils at depths shallower than 50 feet. Factors known to influence liquefaction potential include composition and thickness of soil layers, grain size, relative density, groundwater level, degree of saturation, and both intensity and duration of ground shaking.

The State of California Hazard Zones map (CGS, 2022) indicates that the subject site is located in an area mapped as being potentially susceptible to liquefaction (Figure 7). However, based on our understanding of the proposed improvements and the fact that the project does not meet the requirements of a “project” per the Seismic Hazards Mapping Act an evaluation of the potential for liquefaction and liquefaction-related risks, including dynamic settlement and lateral spread were not included in our evaluation. In addition, due to the existence of shallow formational material it is our opinion that soil liquefaction is not a design consideration for this project.

11 CONCLUSIONS

Based on the results of our evaluation, it is our opinion that the proposed project and associated improvements for the San Pascual Treatment Wetland are feasible from a geotechnical standpoint provided the recommendations presented in this report are incorporated into the design and construction of the project. However, the following conditions may impact the design and constructability of the project:

Shallow Bedrock Impact to Stormwater Infiltration: The perched groundwater encountered at the contact between the younger alluvium and bedrock in borings B-1A, B-2A, and P-4A suggests that the site bedrock will significantly reduce the effectiveness of on-site stormwater infiltration. It is anticipated that the general fine-grained and dense nature of the bedrock will impede the downward infiltration of water. It is our opinion that the stormwater will infiltrate through the younger alluvial deposits and migrate laterally along the bedrock/alluvial contact.

Soft, Wet Materials in the Existing Wetland: Based on our subsurface exploration and site observations, the upper materials within the existing wetland area are anticipated to be very soft and saturated and may not support heavy earthmoving equipment. Mudcats, other light track equipment or specialized methods will be involved to work on the wetland bottom. Planned excavations and other earthwork within the existing wetland area should anticipate very soft, saturated soil conditions. Additional evaluation may be warranted to further evaluate the conditions of the wetland area after it has been drained and allowed to dry, such as test pits to observe and sample the existing soils for material type, moisture content, density, and organic content in order to provide appropriate remedial measures and evaluate whether the material can be reused as fill at the site.

Additional conclusions for the project, based on our geotechnical evaluation, are as follows:

- The subject site is generally underlain by undocumented fill over younger alluvial deposits consisting of moist, loose to very dense, poorly graded sand with silt, silty sand, and sandy silt with variable amounts of gravel, cobbles, and possible boulders. The fill materials are considered to be potentially compressible. The younger alluvial deposits are underlain by older alluvium consisting of interbedded hard clay and very dense silty sand with gravel, cobbles, and boulders and Topanga Formation bedrock of interbedded weakly to strongly cemented sandstone and weakly indurated siltstone and claystone.

- In general, excavations in the existing fill soil, young and old alluvium, and Topanga Formation bedrock should be feasible with earthmoving equipment in good working condition.

- We anticipate that the on-site excavated materials should be suitable for re-use as engineered fill and trench backfill provided, they are free of trash, debris, roots, contamination, deleterious materials, and cobbles or hard lumps of material in excess of 4 inches in diameter. Oversize and wet materials will be encountered during site excavations and should be anticipated by the contactor. Processing of the materials to bring them near the laboratory optimum moisture content (i.e., drying and/or wetting) prior to use as fill should be planned by the contractor.

- The on-site soils are generally granular and will be prone to caving during excavation. The on-site soils should be considered as Type C soils in accordance with United States Department of Labor Occupational Safety and Health Administration (OSHA) regulations. Accordingly, temporary excavations deeper than 4 feet in depth should be shored or laid back at inclinations of 1½ to 1 (horizontal to vertical) or flatter.

- Where excavations cannot be laid back, temporary shoring is anticipated. Shoring should be designed by the contractor to support the excavation sidewalls and to reduce the potential for settlement of adjacent structures, roadways and other site improvements. Shoring should be designed in accordance with OSHA regulations.

- Our percolation testing indicates that the younger alluvial deposits at the approximate invert depth of the infiltration facility have an adjusted percolation rate of 2.8 inches per hour. We recommend using this value for design of the project; however, this rate should be adjusted as needed in accordance with the 2021 LACDPW guidelines.

- Seepage was encountered in our exploratory borings along the contact between the underlaying younger alluvium and bedrock at depths of approximately 8½ to 10 feet and a groundwater surface was encountered at depths of approximately 20 to 25 feet. The historic high depth to groundwater is mapped as being approximately 20 feet (CDMG, 1998). Fluctuations in amount and depths of seepage, and the level of the groundwater surface, will occur due to variations in ground surface topography, subsurface stratification, rainfall, irrigation practices, groundwater pumping, the distance from the existing wetland, and other factors that were not evident at the time of our field evaluation.

- The site is located within a mapped Seismic Hazards Zone considered susceptible to liquefaction (CGS, 2022). However, due to the shallow depth to bedrock as well as the dense nature of alluvium soil liquefaction is not a design consideration for this project.

- The site is located within an EFZ and previous studies by others have mapped inferred fault spays across the site. with the potential for fault rupture as defined by the Alquist-Priolo Earthquake Fault Zoning Act (Hart and Bryant, 2018). The potential for surface fault rupture at the site is relatively high. Differenced in material types and bedrock depths encountered during our subsurface exploration suggest that a fault splay may be present between borings B-3A and B-4A.

- Based on the results of our laboratory testing (relatively dense and moist materials), hydro-collapse of the on-site alluvial soils resulting from on-site infiltration is not considered a design issue.

- The site is not located within a designated flood inundation zone from the 100-year flood event (FEMA, 2008).

- Based on our laboratory corrosion testing, the on-site soil can be classified as non-corrosive per the 2021 Caltrans Corrosion Guidelines.

12 RECOMMENDATIONS

The following sections present our geotechnical recommendations for design and construction of the project. This project is in preliminary design phase and some aspects of the design will be subject to change. Ninyo & Moore should review the final plans and develop additional geotechnical recommendations as appropriate. These recommendations are based on our evaluation of the site geotechnical conditions, our understanding of the planned construction, and experience in the vicinity of the project. The work should be performed in conformance with the recommendations presented in this report, project specifications, and appropriate agency standards.

12.1 Earthwork

We anticipate that earthwork at the site will consist of cuts and fills associated with reconstruction of the treatment wetland, installation of associated structures (i.e., new drop structure, actuated valves, pump station, hydrodynamic separators, stormwater harvesting unit, and infiltration unit), preparation of subgrades for at-grade improvements, including new permeable pavement/pavers in the north parking lot area, and trenching and backfilling of underground utilities and pipelines. Based on our understanding of the project, we anticipate that excavations for the project will vary from approximately 2 to 15 feet in depth. Earthwork operations should be performed in accordance with the requirements of applicable governing agencies and the recommendations presented in the following sections.

12.1.1 Pre-Construction Conference

We recommend that grading and foundation plans be submitted to Ninyo & Moore for review to check for conformance to the recommendations provided in this report. We further recommend that a pre-construction conference be held to discuss the grading recommendations presented in this report. The owner and/or their representative, the governing agencies' representatives, the civil engineer, Ninyo & Moore, and the contractor should be in attendance to discuss the work plan, project schedule, and earthwork requirements.

12.1.2 Clearing and Site Preparation

Prior to performing excavations or other earthwork, the site should be cleared of existing site improvements and foundations, gravel, debris, vegetation, and loose or otherwise unsuitable soils. Materials generated from the clearing/demolition operations should be removed from the project site and disposed of at a legal dump site. Existing utilities to remain in-place should be located and protected from damage by construction activities. Excavations resulting from the removal of foundations, underground utilities, and/or other underground improvements, should be backfilled with compacted fill in general accordance with the fill and compaction recommendations presented below.

12.1.3 Excavation Characteristics

We anticipate that excavations in the undocumented fill, younger and older alluvial deposits, and bedrock should be feasible with earthmoving equipment in good working order. The undocumented fill and young alluvial materials generally consisted of moist to wet, loose to very dense, poorly graded sand with silt and silty sand with varying amounts of gravel, cobbles, and possible boulders. The older alluvium generally consists of interbedded hard clay and very dense silty sand with gravel, cobbles, and boulders and the Topanga Formation bedrock consists of interbedded weakly to strongly cemented sandstone and weakly indurated siltstone and claystone. As discussed, very soft to soft, saturated soils are anticipated along the bottom of the existing wetland that may not be able to support heavy equipment. Mudcats or other light track-mounted equipment should be anticipated to work on the wetland bottom. Oversize material is not considered suitable for use as backfill. In the event that oversize material, including cobbles, boulders, and/or construction debris, is encountered during excavation operations, the oversized material should be disposed of off-site. Processing of the excavated materials to bring them near the laboratory optimum moisture content (i.e., drying and/or wetting) prior to use as fill should be planned by the contractor. Contractors should make their own independent evaluation of the excavatability of the on-site materials prior to submitting their bids, including allowances for processing the soils.

We anticipate that temporary excavations in wet soils will not be stable at inclinations steeper than approximately 3 to 1 (horizontal to vertical). Seepage should be anticipated from excavations in the wetland bottom sediments and in excavations that approach or exceed the depth of the younger alluvium and bedrock contact. Temporary excavations should be evaluated in the field at the time of construction by our representative.

12.1.4 Subgrade Preparation for the Treatment Wetland

Based on our exploratory borings, younger alluvial deposits are anticipated to be encountered at the bottom of the planned treatment wetland that should be suitable for its intended purpose. The excavation bottoms should be evaluated by our representative during the excavation work. In the event that unsuitable material is encountered along the bottom of the excavation, including undocumented fill, the unsuitable material should be removed and replaced with loosely packed clean sand or gravel, such as drainage rock. The actual recommendations for removal and replacement should be based on our field observations. We recommend that minimal compaction be performed on the exposed subgrade and materials used to replace unsuitable materials (if needed). Compaction of the subgrade could potentially reduce the infiltration rate of the wetland. If the subgrade of the wetland is compacted, we recommend that additional percolation testing be performed. Side slopes for the new treatment wetland should be constructed at inclinations of approximately 3 to 1 (horizontal to vertical) or flatter. If new fills will be placed along the bottom or sides of the wetland, we recommend that the new fill materials be placed on relatively dense alluvial deposits and/or bedrock material. The areas to receive new fill should be observed by our representative during the excavation work. The upper approximately 8 inches of exposed bottom beneath areas to receive fill should be scarified, moisture-conditioned and recompacted to a relative compaction of 90 percent as evaluated by ASTM International (ASTM) D 1557

12.1.5 Treatment of Near-Surface Soils for Buried Structures

In order to provide suitable support and reduce the potential for settlement of proposed buried structures (i.e., the drop structure, pump station, hydro-dynamic separators, filtration unit, harvesting unit, valves, etc.), we recommend that the existing undocumented fill, upper loose alluvial deposits, and/or upper soft/loose bedrock should be removed and recompacted from beneath the footprints of these structures. The excavations should extend deep enough to provide 2 feet or more of newly compacted fill material beneath the proposed foundations. The overexcavation should expose relatively dense alluvial deposits and/or bedrock. Additional overexcavation of loose, soft, and/or wet areas may be appropriate. The excavation bottoms should be evaluated by our representative during the excavation work and additional recommendations, if needed, be based on field observations. The limits of removal should extend approximately 5 feet beyond the footprint of the foundations for the buried structures or a distance equal to the depth of the overexcavations beneath the foundations, whichever is farther. If drainage rock is placed beneath the foundations for the buried structures, the rock can be considered part of the 2-foot-thick layer of compacted fill beneath the foundations. Prior to placing compacted fill and/or drainage rock, the upper approximately 8 inches of the exposed bottom should be scarified, moisture-conditioned to near optimum moisture content, and recompacted to a relative compaction of 90 percent as evaluated by ASTM D 1557.

12.1.6 Treatment of Near-Surface Soils for Parking Lot

In order to provide suitable support and reduce the potential for settlement of new pavements subject to vehicular traffic (i.e., the permeable paver parking lot at the north end of the site), we recommend that the subgrade beneath the pavement section be overexcavated and recompacted to a depth of approximately 2 feet beneath the existing ground surface or a depth that provides approximately 2 feet of compacted fill beneath the pavement section, whichever is deeper. The limits of the excavations should extend laterally so that the bottoms of the excavations are approximately 2 feet beyond the outside edges of the pavement, or a distance equal to the depth of the overexcavation, whichever is farther. In general, the overexcavations should remove existing undocumented fill and loose alluvial deposits. Accordingly, we recommend that the excavation bottoms expose relatively dense granular alluvial deposits. The excavation bottoms should be evaluated by our representative during the excavation work. Additional overexcavation of loose, soft, clayey, and/or wet areas may be appropriate depending on our observations during construction. The excavation bottom should be scarified to a depth of approximately 8 inches, moisture-conditioned, and compacted to a relative compaction of 90 percent as evaluated by ASTM D 1557 prior to the placement of fill.

12.1.7 Treatment of Near-Surface Soils for Hardscape

In order to provide suitable support and reduce the potential for settlement of new hardscape (i.e., sidewalks, curbs and gutters, etc.), we recommend that the upper approximately 12 inches of material beneath the existing ground surface be removed and recompacted from beneath the improvements or a depth that provides approximately 1 feet of compacted fill beneath the improvements, whichever is deeper. The limits of the excavations should extend laterally so that the bottoms of the excavations are approximately 1 foot beyond the outside edges of the hardscape, or a distance equal to the depth of the overexcavation, whichever is farther. In general, the overexcavations should expose relatively dense undocumented fill or alluvial deposits. The excavation bottoms should be evaluated by our representative during the excavation work. Additional overexcavation of loose, soft, and/or wet areas may be appropriate depending on our observations during construction. The excavation bottom should be scarified to a depth of approximately 8 inches, moisture-conditioned, and compacted to a relative compaction of 90 percent as evaluated by ASTM D 1557 prior to the placement of fill.

12.1.8 Temporary Excavations

We recommend that excavations be designed and constructed in accordance with OSHA regulations. These regulations provide shoring design parameters for excavations and trenches up to 20 feet deep based on the soil types encountered. Trenches over 20 feet deep should be designed by the contractor's engineer based on site-specific geotechnical analyses. For planning purposes, we recommend that the undocumented fill and alluvial soils be considered as OSHA Type C soil and the bedrock be considered as OSHA Type B soil.

For trench or other excavations, OSHA requirements regarding personnel safety should be met by using appropriate shoring or by laying back the slopes no steeper than 1½:1 (horizontal to vertical) for Type C soils and 1:1 (horizontal to vertical) for Type B soils. Temporary excavations that encounter seepage may need shoring or may be mitigated by placing sandbags or gravel along the base of the seepage zone. Excavations encountering seepage should be evaluated on a case-by-case basis. On-site safety of personnel is the responsibility of the contractor.

Care should be taken by the contractor to avoid undermining adjacent existing foundations and improvements. New excavations should not extend within the “zone of influence” of existing foundations, if present, which is defined as a 1:1 (horizontal to vertical) plane projecting out from the bottom outside edge of the foundations. In the event that excavations will extend within the “zone of influence” of existing foundations, our office should be notified, and appropriate recommendations provided, such as temporary underpinning of impacted foundations and/or temporary shoring.

12.1.9 Shoring

Where temporary slopes are not possible, shoring will be appropriate. The design of the shoring system should consider the excavation characteristics of the onsite soil, temporary excavation stability, and the impact of construction on existing structures.

Shoring systems will be constructed through fill, alluvial deposits, and bedrock. We anticipate that braced driven sheet pile shoring systems will be appropriate for the project to depths up to approximately 30 feet. Cantilevered shoring systems (if used) should be limited to heights of up to 10 feet. Braced and cantilevered shoring systems should be designed using the lateral earth pressure values presented on Figures 8 and 9, respectively. The recommended design pressures are based on the assumptions that the shoring system is constructed without raising the ground surface elevation behind the shoring wall, that there are no surcharge loads, such as soil stockpiles and construction materials, and that no loads act above a 1:1 (horizontal to vertical) plane extending up and back from the base of the shoring system. For shoring walls subjected to the above-mentioned surcharge loads, the contractor should include the effect of these loads on the lateral pressures against the shoring system. The shoring systems planned for the project should be reviewed by our office to evaluate the design considerations and geotechnical parameters used. Ground settlement may occur behind the shoring system wall during excavation. The amount of settlement depends on the type of shoring system, the contractor’s workmanship, and soil conditions. We recommend that structures/improvements in the vicinity of the planned shoring installation be reviewed with regard to foundation support and tolerance to settlement. To reduce the potential for distress to adjacent structures, we recommend that the shoring system be designed to limit the ground settlement behind the shoring system to ½ inch or less, which would equal approximately ½ inch of deflection. Potential causes of settlement that should be addressed include settlement during installation of the shoring, excavation for structure construction, construction vibrations, and removal of the support system. The vibrations from the driving of sheet piles, if used, may result in some dynamic settlement of granular soils that may affect the adjacent structures. We recommend that shoring installation be evaluated carefully by the contractor prior to construction and that ground vibration and settlement monitoring be performed during construction. Vibration and settlement monitoring should be performed during sheet pile driving, if used. If settlement is detected or peak particle velocities of approximately 0.4 inch per second or more are measured adjacent to existing improvements, the sheet pile driving should be stopped and evaluated. The evaluation may include changing the hammer vibration frequency and monitoring for settlement and vibrations. To reduce the potential for settlement associated with sheet pile removal, sheet piles may be left in place. In the event excessive settlement or other damage occurs associated with the pile driving operations, it may be appropriate to perform grouting beneath nearby structure(s) to mitigate the pile driving effects. We recommend that shoring installation be evaluated carefully by the contractor prior to construction.

The contractor should retain a licensed, qualified and experienced engineer to design the shoring system. The shoring parameters presented in this report are minimum requirements, and the contractor should evaluate the adequacy of these parameters and make the modifications as needed for their design. We recommend that the contractor take appropriate measures to protect workers. OSHA requirements pertaining to worker safety should be observed.

12.1.10 Fill Material

In general, the on-site soils should be suitable for reuse as fill materials, provided they are free of trash, debris, oversize material, organic material, or other deleterious materials. Fill should generally be free of rocks or lumps of material in excess of 4 inches in diameter. Rocks or hard lumps larger than approximately 4 inches in diameter should be broken into smaller pieces or should be removed from the site.

Fill used as backfill buried structures should consist of free-draining, granular, non-expansive soil that conforms with the latest edition of Greenbook for structure backfill. “Non-expansive” can be defined as soil having an EI of 20 or less in accordance with ASTM Test Method D 4829 (CBC, 2019). The on-site granular soils are anticipated to meet this requirement.

Imported fill material should consist of clean, non-expansive, granular material which also conforms to the latest addition of Greenbook for structure backfill. The soil should also be tested for corrosive properties prior to importing. We recommend that the imported materials meet the 2021 Caltrans criteria for non-corrosive soils (i.e., soils having a chloride concentration of 500 parts per million [ppm] or less, a soluble sulfate content of approximately 0.15 percent (1,500 ppm) or less, a pH value of 5.5 or higher, or an electrical resistivity of 1,500 ohm-centimeters or more). Materials for use as fill should be evaluated by Ninyo & Moore prior to importing. The contractor should be responsible for the uniformity of import material brought to the site.

12.1.11 Fill Placement and Compaction

In general, fill material, including structure and trench backfill, fill placed beneath foundations and pavements, should be moisture-conditioned and compacted in horizontal lifts to a relative compaction of 90 percent or more as evaluated by ASTM D 1557. Fill material with less than 15 percent fines (passing No. 200 sieve) should be compacted to 95 percent relative compaction as evaluated by ASTM D 1557. Fill material should be moisture-conditioned to slightly above the laboratory optimum moisture content. The lift thickness for fill soils will depend on the type of compaction equipment used but generally should not exceed 8 inches in loose thickness. Special care should be exercised to avoid damaging pipes during compaction of trench backfill. Placement and compaction of the fill soils should be in general accordance with local grading ordinances and good construction practice.

12.2 Underground Utilities

We anticipate that underground pipelines will be supported on native alluvial deposits. Based on the preliminary plans, pipeline inverts may be up to approximately 15 feet in depth.

12.2.1 Pipe Bedding

We recommend that pipes be supported on 6 inches or more of granular bedding material, such as sand, with a sand equivalent value of 30 or more. Bedding material should be placed around the pipe and 12 inches or more above the top of the pipe in accordance with the current Greenbook. Special care should be taken not to allow voids beneath the pipe. Compaction of the bedding material and backfill should proceed up both sides of the pipe.

Trench backfill, including bedding material, should be placed in accordance with the recommendations presented in the Earthwork section of this report.

12.2.2 Trench Backfill

Based on our subsurface evaluation, the on-site soils should generally be suitable for re-use as trench backfill provided, they are free of organic material, clay lumps, debris, and rocks more than approximately 4 inches in diameter. We recommend that trench backfilling be in general conformance with the Greenbook standard specifications for structure backfill. Fill should be moisture-conditioned to at or slightly above the laboratory optimum. Wet soils should be allowed to dry to a moisture content near the optimum prior to their placement as trench backfill. Trench backfill should be compacted to a relative compaction of 90 percent or more as evaluated by ASTM D 1557. Lift thickness for trench backfill will depend on the type of compaction equipment utilized but should generally be placed in horizontal lifts not exceeding 8 inches in loose thickness. Special care should be exercised to avoid damaging the pipelines during compaction of the backfill.

12.2.3 Modulus of Soil Reaction for Pipe Design

The modulus of soil reaction is used to characterize the stiffness of soil backfill placed along the sides of buried flexible pipelines for the purpose of evaluating deflection caused by the weight of the backfill above the pipe. We recommend that a modulus of soil reaction of 1,000 pounds per square inch be used for design, provided that granular bedding material is placed adjacent to the pipe, as recommended in the previous section.

12.3 Site-Specific Seismic Design Considerations

Design of the proposed improvements should be performed in accordance with the requirements of governing jurisdictions and applicable building codes. Table 2 presents the site-specific spectral response acceleration parameters in accordance with the CBC (2019) guidelines.

Table 2 – 2019 California Building Code Seismic Design Criteria

Site Coefficients and Spectral Response Acceleration Parameters	Values
Site Class	C
Mapped Spectral Response Acceleration at 0.2-second Period, S_s	2.108g
Mapped Spectral Response Acceleration at 1.0-second Period, S_1	0.737g
Site-modified Spectral Response Acceleration at 0.2-second Period, S_{MS}	2.529g
Site-modified Spectral Response Acceleration at 1.0-second Period, S_{M1}	1.031g
Site Design Spectral Response Acceleration at 0.2-second Period, S_{DS}	1.686g
Site Design Spectral Response Acceleration at 1.0-second Period, S_{D1}	0.687g
Site- modified Peak Ground Acceleration, PGA_M	1.1g

12.4 Mat Foundations

Our evaluation indicated that proposed structures (i.e., drop structure, hydrodynamic separators, pump station, valves, filtration unit, etc.) may be supported by mat foundations. The mat foundations should be supported on compacted fill in accordance with the recommendations presented in the Earthwork section of this report and should be designed in accordance with structural considerations and the following recommendations. In addition, requirements of the appropriate governing jurisdictions and applicable building codes should be considered in the design of the structures.

The mat foundations may be designed using a net allowable bearing capacity of 4,000 psf. The total and differential settlement corresponding to this allowable bearing load are estimated to be less than approximately 1 inch and ½ inch over a horizontal span of 40 feet, respectively.

Mat foundations typically experience some deflection due to loads placed on the mat and the reaction of the soils directly underlying the mat. A design modulus of subgrade reaction (K) of 50 tons per cubic foot may be used for the subgrade soils in evaluating such deflections.

12.5 Lateral Earth Pressures for Underground Structures

Walls for below-grade structures when constructed as recommended above may be designed for lateral pressures represented by the pressure diagram on Figure 10. To reduce the potential for pipe-to-wall differential settlement, which could cause pipe shearing, we recommend that a flexible pipe joint be located close to the exterior of the wall. The type of joint should be such that minor relative movement can be accommodated without distress. The pipe connections should be sufficiently flexible to withstand differential settlement of approximately ¾ inch.

12.6 Exterior Flatwork

We recommend that new exterior concrete sidewalks and flatwork (hardscape) have a thickness of 4 inches and be reinforced with No. 3 steel reinforcing bars placed 24 inches on-center (each way) near the mid-height of the slab. The hardscape should be underlain by 4 inches of clean sand and installed with crack-control joints at an appropriate spacing as designed by the structural engineer to reduce the potential for shrinkage cracking. Positive drainage should be established and maintained adjacent to flatwork. To reduce the potential for differential offset, joints between the new hardscape and adjacent curbs, existing hardscape, building walls, and/or other structures, and between sections of new hardscape, should be doweled.

12.7 Permeable Pavers

We understand that a new parking lot with permeable pavers will be constructed at the north end of the site. We recommend that the new pavers be underlain by newly compacted fill as discussed above in the Earthwork section. The new fill material should consist of granular deposits compacted to a relative compaction of 90 percent or more as evaluated by ASTM D 1557, or as recommended by the paver manufacturer. The pavers, including base/subbase materials, should conform to the compaction and material requirements of the manufacturer.

12.8 Corrosivity

Laboratory testing was performed on a representative soil sample collected from boring P-2A (sample depth of approximately 0 to 5 feet) to evaluate soil pH, electrical resistivity, water-soluble chloride content, and water-soluble sulfate content. The soil pH and electrical resistivity tests were performed in general accordance with CT 643. Chloride content tests were performed in general accordance with CT 422. Sulfate testing was performed in general accordance with CT 417. The soil pH of the sample tested was measured to be 5.8 and the electrical resistivity was measured to be 6,950 ohm-centimeters. The chloride content of the sample was measured to be 85 ppm. The sulfate content of the sample was measured to be 0.001 percent by weight (i.e., 10 ppm). Based on the laboratory test results and 2021 Caltrans corrosion criteria, the soils at the project site can be classified as non-corrosive, which is defined as having earth materials with less than 500 ppm chlorides, less than 0.15 percent sulfates (i.e., 1,500 ppm), a pH of 5.5 or more, or an electrical resistivity of 1,500 ohm-cm or more. The corrosivity test results are presented in Appendix B.

12.9 Concrete Placement

Concrete in contact with soil or water that contains high concentrations of water-soluble sulfates can be subject to premature chemical and/or physical deterioration. Based on the CBC (2019), the potential for sulfate attack is negligible for water-soluble sulfate contents in soil ranging from 0.00 to 0.10 percent by weight, moderate for water-soluble sulfate contents ranging from 0.10 to 0.20 percent by weight, severe for water-soluble sulfate contents ranging from 0.20 to 2.00 percent by weight, and very severe for water-soluble sulfate contents over 2.00 percent by weight. The soil sample tested for this evaluation, using CT 417, had a water-soluble sulfate content of approximately 0.001 percent by weight (i.e., 10 ppm). Accordingly, the on-site soils are considered to have a negligible potential for sulfate attack. Per ACI (2019b), Type II cement is appropriate for the site improvements. However, due to the potential variability of the soils on site, consideration should be given to using Type II/V cement for the project.

To reduce the potential for shrinkage cracks in the concrete during curing, we recommend that the concrete for the proposed improvements be placed with a slump of 4 inches based on ASTM C 143. The slump should be checked periodically at the site prior to concrete placement. We further recommend that concrete cover over reinforcing steel for foundations be provided in accordance with CBC (2019). The structural engineer should be consulted for additional concrete specifications.

12.10 Stormwater Infiltration Wetland and Reservoir

Based on our subsurface evaluation, the site is generally underlain by undocumented fill and alluvial deposits consisting of poorly graded sand with silt and silty sand with variable amounts of gravel, cobbles, and possible boulders. We recommend that an infiltration rate of 2.8 inches per hour, following adjustments by the BMP designer for RF_s, be used for the site alluvial soils. As previously discussed, we anticipate that stormwater will mound/perch on top of the bedrock encountered at depths of approximately 9 to 14 feet across the majority of the site (29 feet at the southernmost end at boring B-3A). It is anticipated that infiltrated stormwater will move laterally along this contact. We recommend that the bottoms of the wetland be further evaluated during construction. Additional recommendations may be provided at that time if fine-grained materials are present within the alluvial deposits exposed at the bottom of the wetland, such as removing the fine-grained material and replacing it with granular material.

Based on our evaluation, the potential for hydro-collapse settlement associated with infiltration is generally low due to the proposed depth of infiltration. However, we generally recommend a setback of 15 feet or more between settlement sensitive

structures and proposed infiltration areas.

12.11 Drainage

Proper surface drainage is imperative for satisfactory site performance. Positive drainage should be provided and maintained to direct surface water away from existing foundations. Positive drainage is defined as a slope of 2 percent or more for a distance of 5 feet or more away from foundations and tops of slopes. Runoff should then be directed by the use of swales or pipes into a collective drainage system. Area drains for landscaped and paved areas are recommended. Surface waters should not be allowed to pond adjacent to footings. We recommend that above-ground structures, if constructed, have roof drains and downspouts installed to collect runoff.

12.12 Landscaping

Project landscaping should consist of drought tolerant plants. Landscape irrigation should be kept to a level just sufficient to maintain plant vigor. Overwatering should not be permitted.

13 CONSTRUCTION OBSERVATION

The recommendations provided in this report are based on our understanding of the proposed project and our evaluation of the data collected based on subsurface conditions disclosed by widely spaced exploratory borings. It is imperative that the geotechnical consultant checks the interpolated subsurface conditions during construction. We recommend that Ninyo & Moore review the project plans and specifications prior to construction. It should be noted that, upon review of these documents, some recommendations presented in this report may be revised or modified.

During construction we recommend that the duties of the geotechnical consultant include, but not be limited to:

- Observing site clearing, grubbing, and removals.
- Observing excavation bottoms, including the bottom of the proposed wetland.
- Observing preparation of pavement and foundation subgrades.
- Observing placement and compaction of fill, including trench and structure backfill.
- Evaluating imported materials prior to their use as fill (if used).
- Performing field tests to evaluate fill compaction.
- Observing foundation excavations for bearing materials and cleaning prior to placement of reinforcing steel or concrete.
- Performing material testing services including concrete compressive strength and steel tensile strength tests and inspections.

The recommendations provided in this report assume that Ninyo & Moore will be retained as the geotechnical consultant during the construction phase of this project. If another geotechnical consultant is selected, we request that the selected consultant indicate to the owner and to our firm in writing that our recommendations are understood and that they are in full agreement with our recommendations.

14 LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analysis presented in this geotechnical report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Please also note that our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified, and additional recommendations, if warranted, will be provided upon request. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

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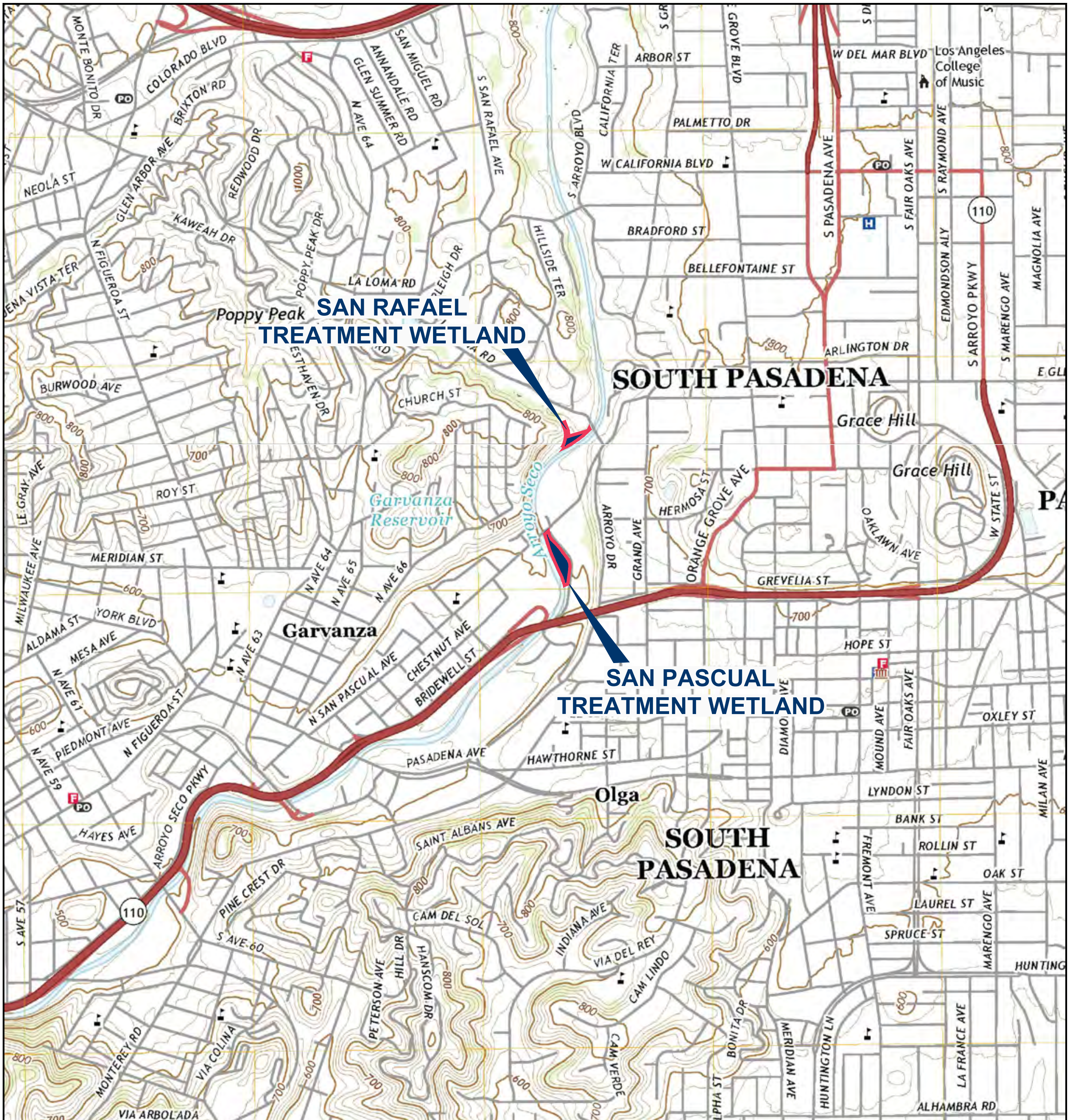
FIGURES



NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: USGS, 2022.

N

FEET

0 2,000 4,000

FIGURE 1

SITE LOCATION

SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

211880001 I 6/22

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LEGEND

B-3A TD=31.5 — BORING; TD=TOTAL DEPTH IN FEET

P-4A TD=10.1 — PERCOLATION TEST; TD=TOTAL DEPTH IN FEET

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: GOOGLE EARTH, 2022.

FEET
0 100 200

2_211880001_SAP.dwg (San Pascual) 06/15/2022 JDP, GK

FIGURE 2

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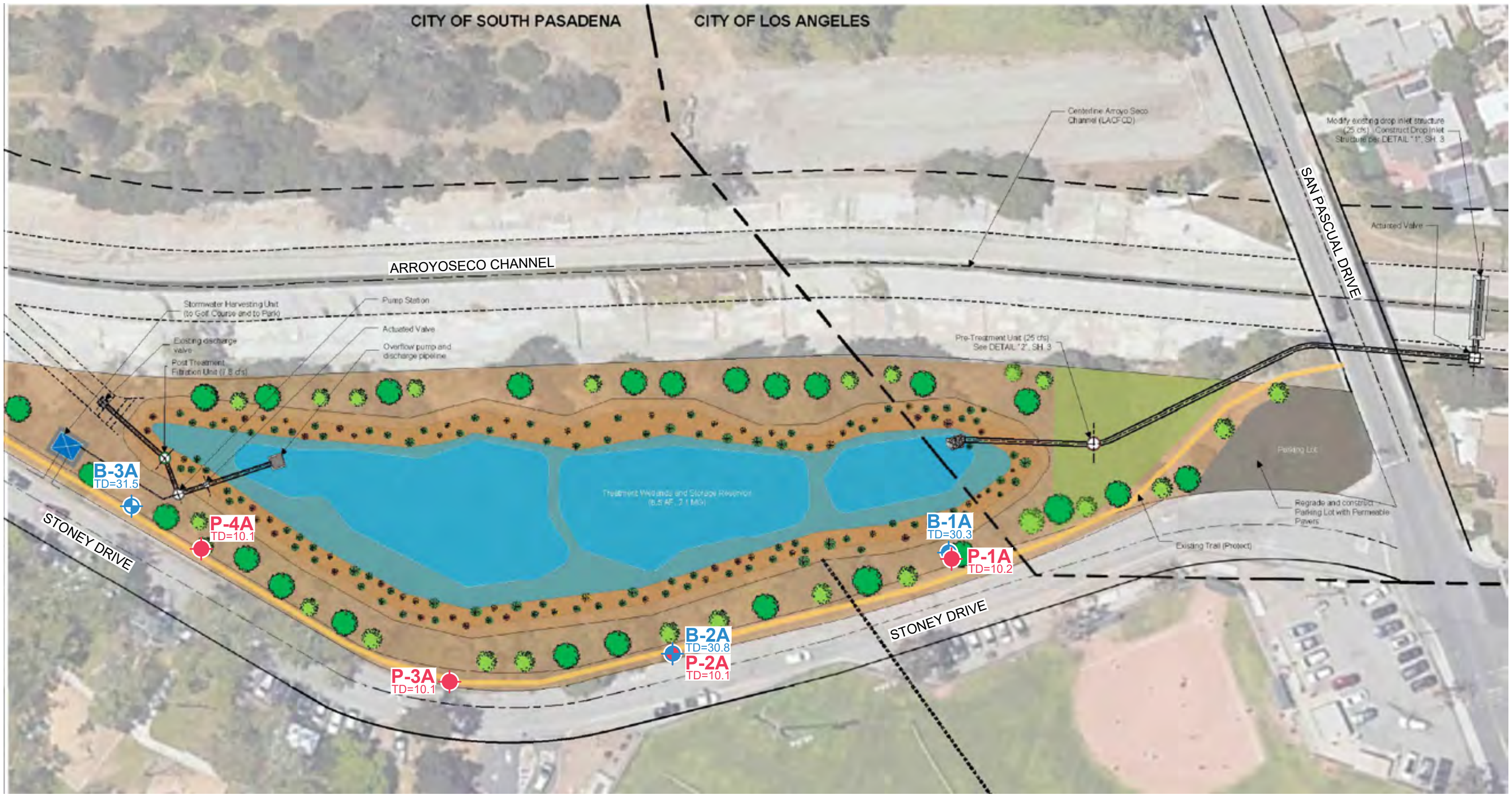
SITE AERIAL PHOTOGRAPH

SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

211880001 I 6/22



LEGEND

B-3A TD=31.5	BORING; TD=TOTAL DEPTH IN FEET
P-4A TD=10.1	PERCOLATION TEST; TD=TOTAL DEPTH IN FEET

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: GOOGLE EARTH, 2022; CRAFTWATER ENGINEERING, INC., 2020.

FEET
0 100 200

FIGURE 3

SITE PLAN

SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

211880001 I 6/22

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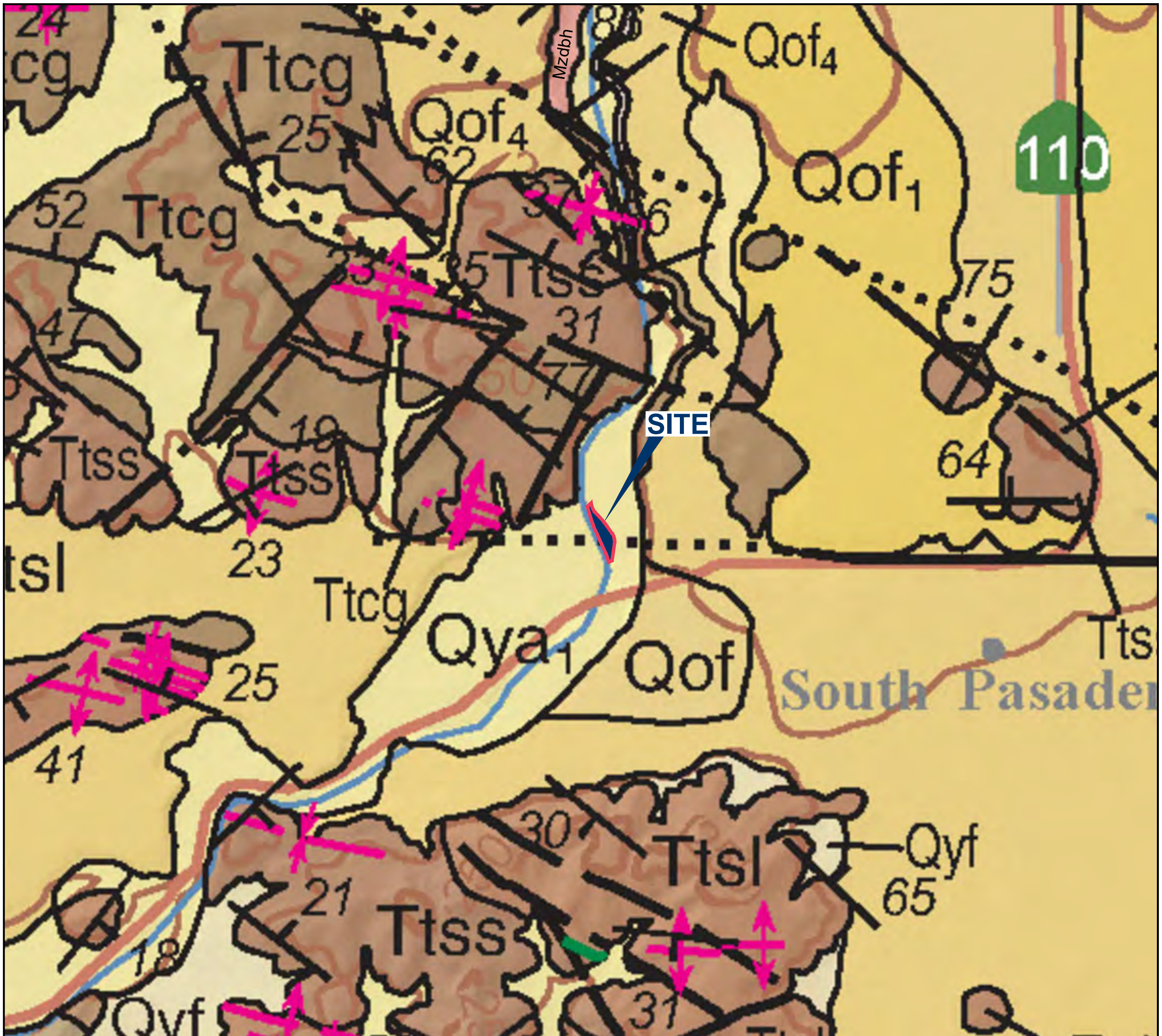
3_211880001_SP.dwg (San Pascual) 06/08/2022 JDP, GK



LEGEND

Qya	YOUNG ALLUVIUM
Qyf	YOUNG ALLUVIAL FAN DEPOSITS
Qof	OLD ALLUVIAL FAN DEPOSITS
Ttss	TOPANGA GROUP - SANDSTONE
Ttsl	TOPANGA GROUP - SILTSTONE
Ttcg	TOPANGA GROUP - CONGLOMERATE
Mzdbh	BIOTITE - HORNBLENDE DIORITE

GEOLOGIC CONTACT

FAULT; DASHED WHERE INFERRED; DOTTED WHERE CONCEALED

SYNCLINE; DASHED WHERE INFERRED

ANTICLINE; DASHED WHERE INFERRED

N

FEET

0 2,000 4,000

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: CAMPBELL, R.H., ET AL., 2014.

4_211880001_RG.dwg (San Pascual) 06/08/2022 JDP

FIGURE 4

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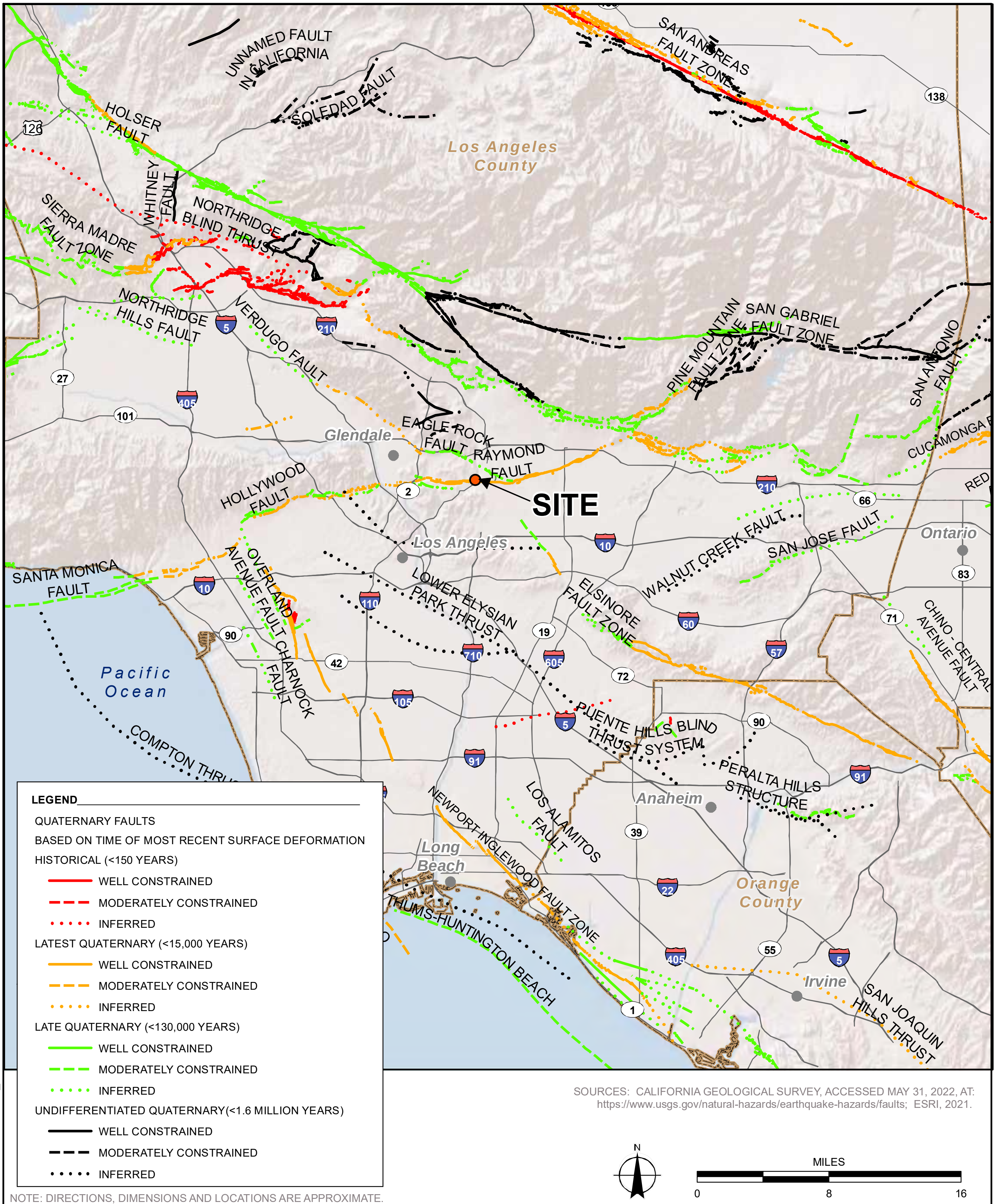
REGIONAL GEOLOGY

SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

211880001 I 6/22



SOURCES: CALIFORNIA GEOLOGICAL SURVEY, ACCESSED MAY 31, 2022, AT: https://www.usgs.gov/natural-hazards/earthquake-hazards/faults; ESRI, 2021.

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

211880001-San Pascual_FL.mxd 5/31/2022 JDP

FIGURE 5

FAULT LOCATIONS

SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

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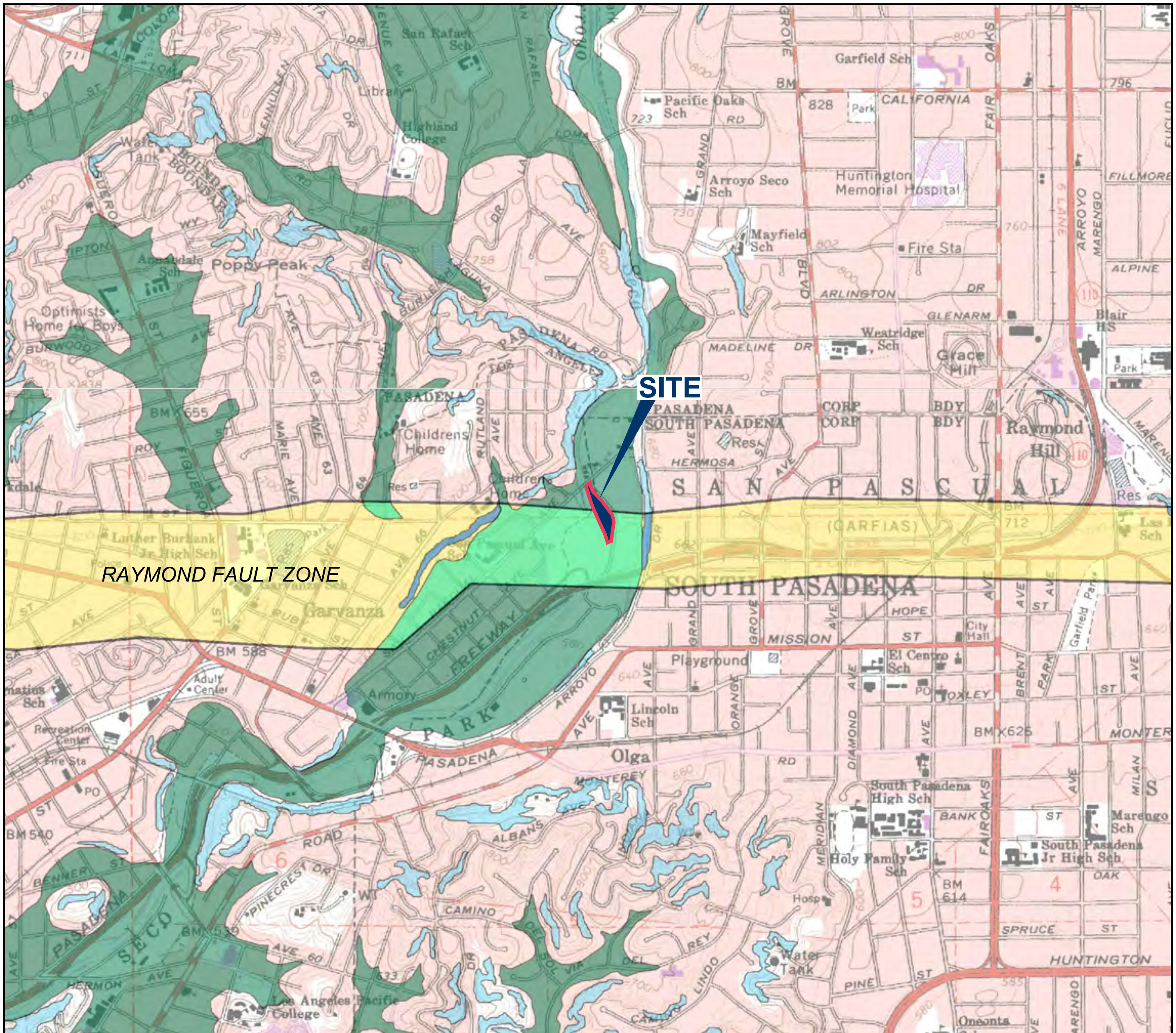
211880001 | 6/22



LEGEND

EARTHQUAKE-INDUCED LANDSLIDES
Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

LIQUEFACTION
Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

EARTHQUAKE FAULT ZONES
Zone boundaries are delineated by straight-line segments; the boundaries define the zone encompassing active faults that constitute a potential hazard to structures from surface faulting or fault creep such that avoidance as described in Public Resources Code Section 2621.5(a) would be required.

OVERLAPPING EARTHQUAKE FAULT AND SEISMIC HAZARD ZONES

Overlap of Earthquake Fault Zone and Liquefaction Zone
Areas that are covered by both Earthquake Fault Zone and Liquefaction Induced Landslide Zone.

Overlap of Earthquake Fault Zone and Earthquake-Induced Landslide Zone
Areas that are covered by both Earthquake Fault Zone and Earthquake-Induced Landslide Zone.

N

FEET
0 2,000 4,000

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: CGS, 1999, REVISED 2017.

6_211880001_SHZ.dwg (San Pascual) 06/08/2022 JDP

FIGURE 6

SEISMIC HAZARD ZONES

SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

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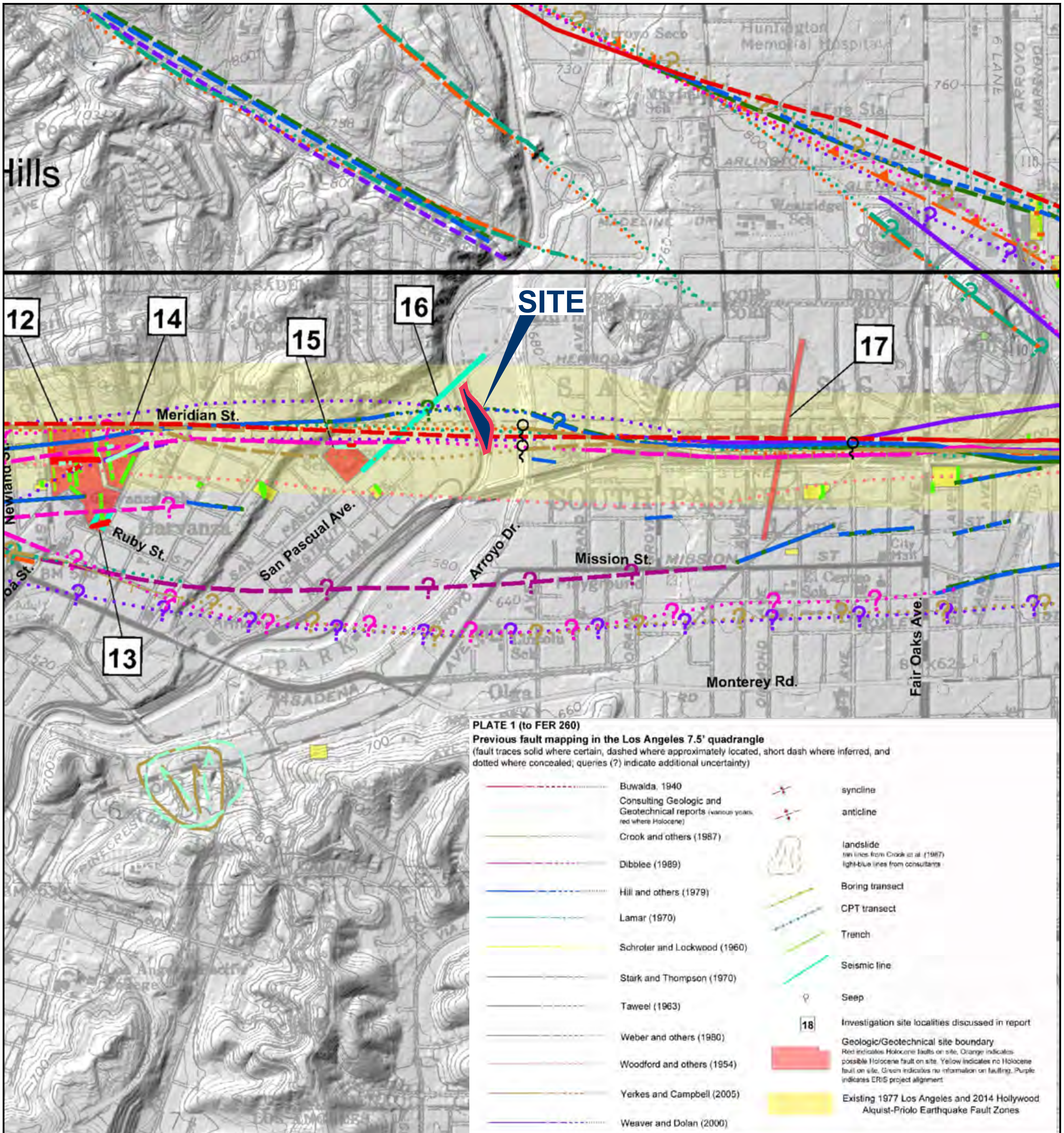

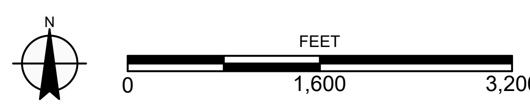

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: USGS, 2022.

7_211880001_RFZ.dwg (San Pascual) 06/08/2022 JDP

FIGURE 7

RAYMOND FAULT ZONE

SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

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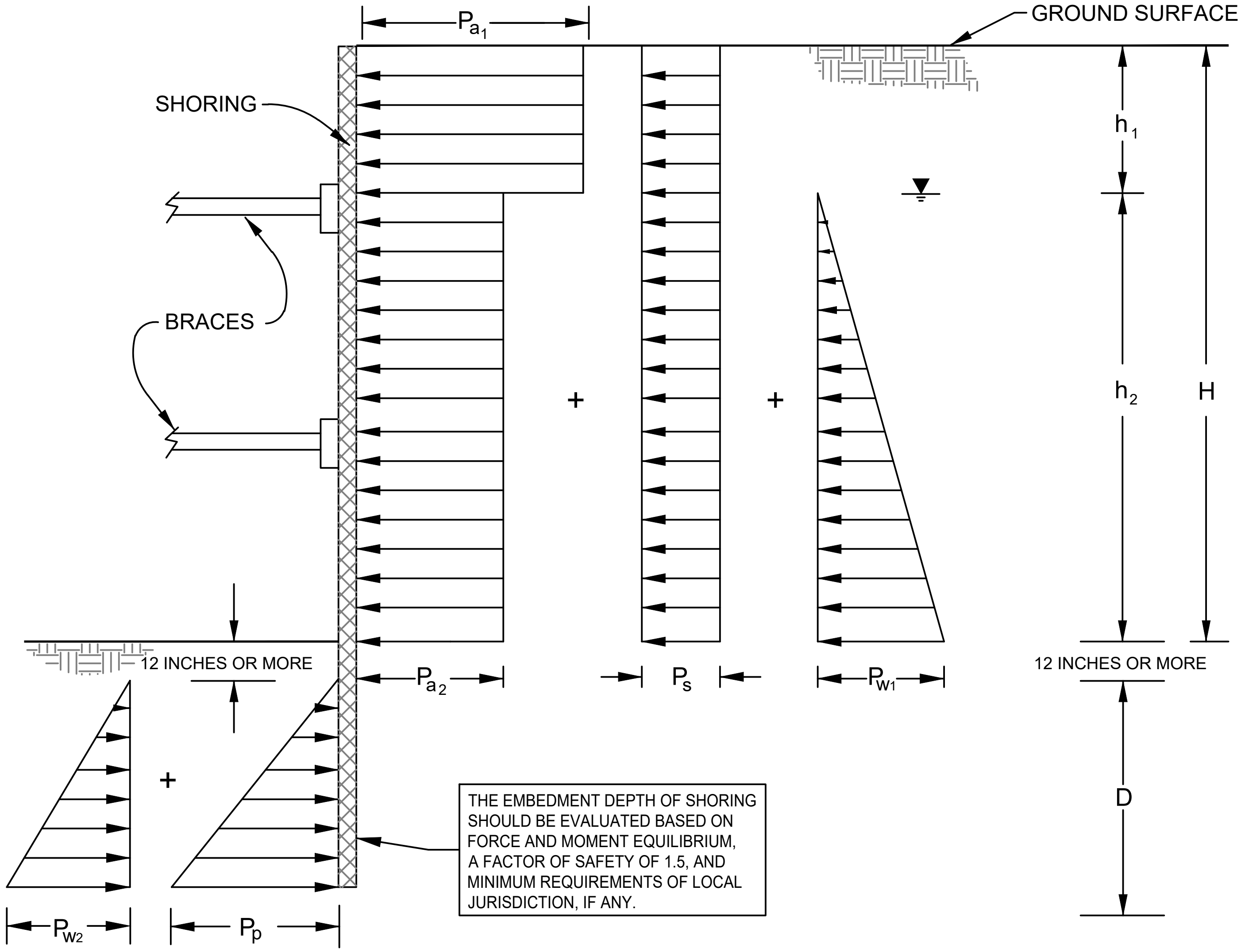


NOTES:

1. APPARENT LATERAL EARTH PRESSURES, P_{a1} AND P_{a2}
   $P_{a1} = 25h_1$ psf
   $P_{a2} = 12h_2$ psf
2. CONSTRUCTION TRAFFIC INDUCED SURCHARGE PRESSURE, P_s
   $P_s = 120$ psf
3. HYDROSTATIC PRESSURE, P_{w1} & P_{w2}
   $P_{w1} = 62.4(H - h)$ psf
   $P_{w2} = 62.4D$ psf
4. PASSIVE PRESSURE, P_p
   $P_p = 200D$ psf
5. SURCHARGES FROM EXCAVATED SOIL OR CONSTRUCTION MATERIALS ARE NOT INCLUDED
6. H, h_1, h_2 AND D ARE IN FEET
7. ▼ GROUNDWATER TABLE
8. P_{w2} IS APPLICABLE WHEN DEWATERING IS TO BE PERFORMED FROM INSIDE OR OUTSIDE OF THE EXCAVATION

NOT TO SCALE

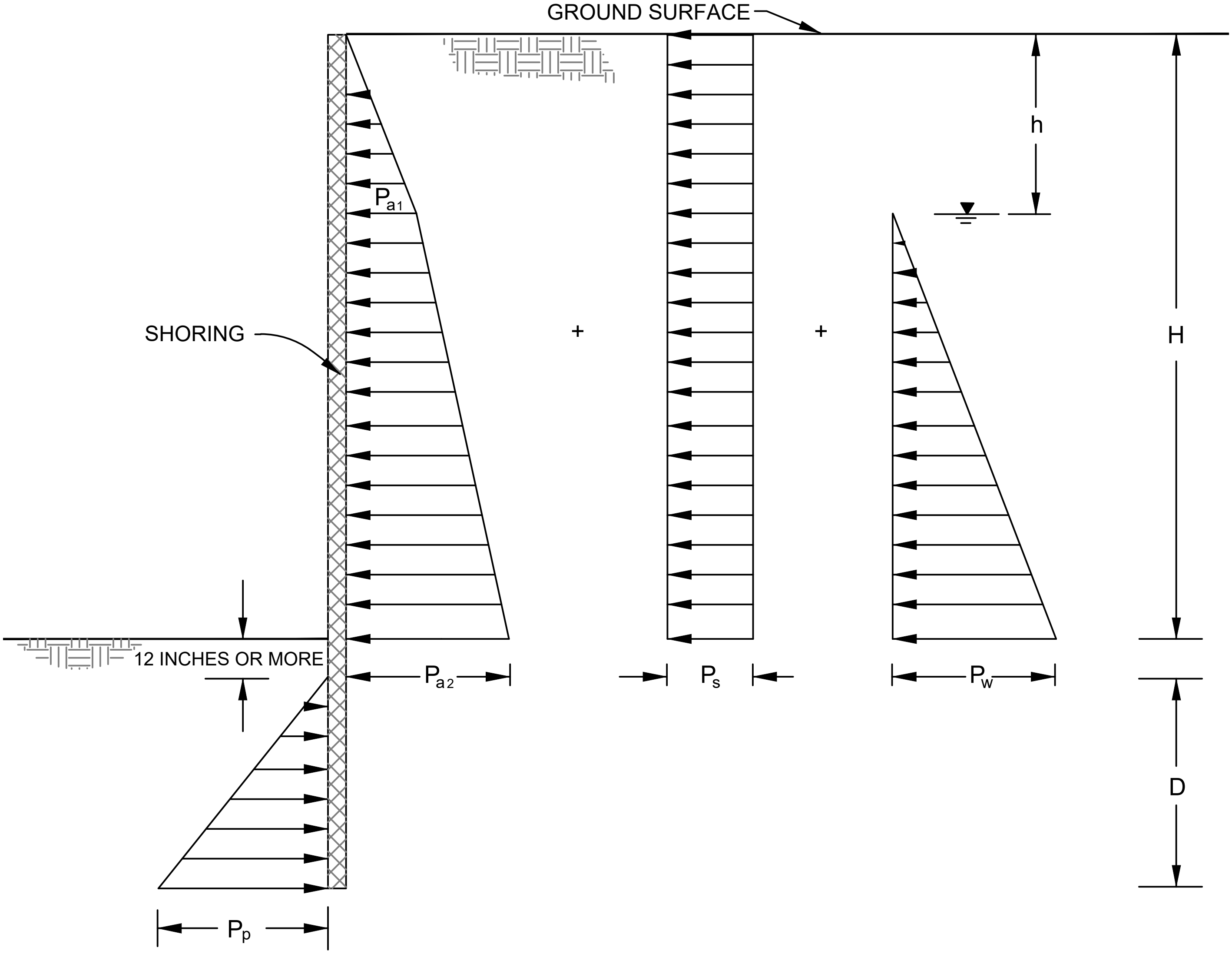
8_211880001_LEP-BEBG(GS).dwg (San Pascual) 06/08/2022 JDP, GK

FIGURE 8

LATERAL EARTH PRESSURES FOR BRACED EXCAVATION

SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants



NOTES:

1. ACTIVE LATERAL EARTH PRESSURE, P_a
   P_{a1} = 37h psf; P_{a2} = P_{a1} + 18(H - h) psf
2. CONSTRUCTION TRAFFIC INDUCED SURCHARGE PRESSURE, P_s
   P_s = 72 psf
3. HYDROSTATIC PRESSURE, P_w
   P_w =62.4(H - h) psf
4. PASSIVE LATERAL EARTH PRESSURE, P_p
   P_p = 200D psf
5. SURCHARGES FROM EXCAVATED SOIL OR CONSTRUCTION MATERIALS ARE NOT INCLUDED
6. H, h AND D ARE IN FEET
7. GROUNDWATER TABLE

NOT TO SCALE

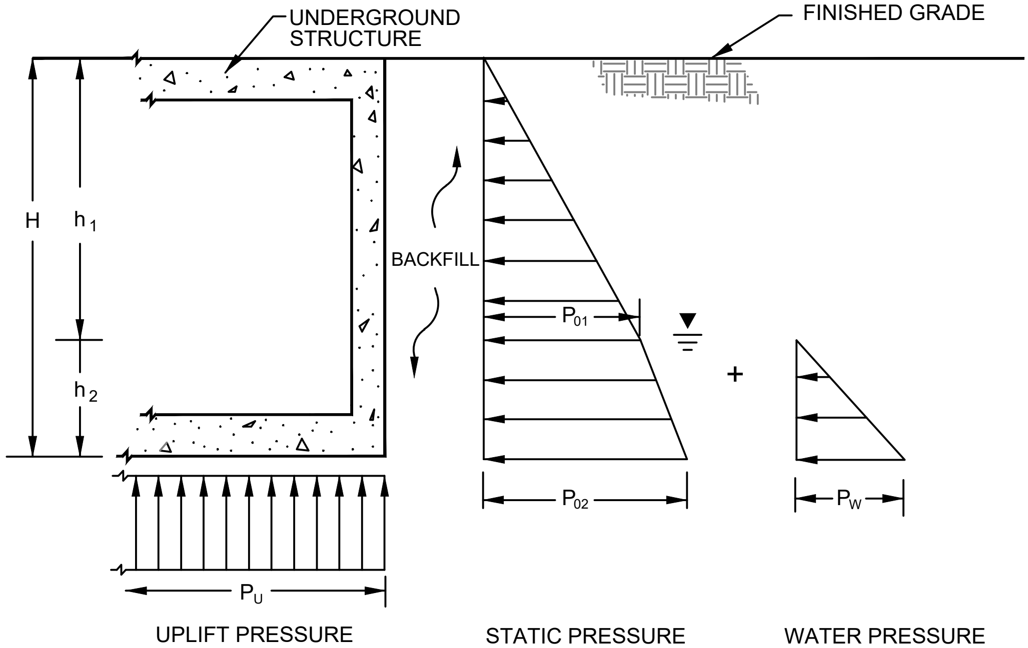
9_211880001_LEP-CSBG.dwg (San Pascual) 06/08/2022 JDP, GK

FIGURE 9

LATERAL EARTH PRESSURES FOR TEMPORARY CANTILEVERED SHORING

SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants



NOTES:

1. APPARENT LATERAL EARTH PRESSURES, P_{01} AND P_{02}
   $P_{01} = 57h_1$ psf
   $P_{02} = 57h_1 + 28h_2$ psf
2. HYDROSTATIC PRESSURE, P_w
   $P_w = 62.4h_2$ psf
3. UPLIFT PRESSURE, P_u
   $P_u = 62.4h_2$ psf
4. SURCHARGE PRESSURES CAUSED BY VEHICLES OR NEARBY STRUCTURES ARE NOT INCLUDED
5. H, h_1 AND h_2 ARE IN FEET
6. ▼ GROUNDWATER TABLE

NOT TO SCALE

10_211880001_LEP-US.dwg (San Pascual) 06/08/2022 JDP, GK

FIGURE 10

LATERAL EARTH PRESSURES FOR UNDERGROUND STRUCTURES

SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

Ninyo & Moore
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211880001 I 6/22

APPENDIX A

Boring Logs

APPENDIX A

BORING LOGS

Field Procedure for the Collection of Disturbed Samples

Disturbed soil samples were obtained in the field using the following method.

Bulk Samples

Bulk samples of representative earth materials were obtained from the exploratory borings. The samples were bagged and transported to the laboratory for testing.

The Standard Penetration Test (SPT) Sampler

Disturbed drive samples of earth materials were obtained by means of a Standard Penetration Test sampler. The sampler is composed of a split barrel with an external diameter of 2 inches and an unlined internal diameter of $1^3/_8$ inches. The sampler was driven into the ground 12 to 18 inches with a 140-pound hammer falling freely from a height of 30 inches in general accordance with ASTM D 1586. The blow counts were recorded for every 6 inches of penetration; the blow counts reported on the logs are those for the last 12 inches of penetration. Soil samples were observed and removed from the sampler, bagged, sealed and transported to the laboratory for testing.

Field Procedure for the Collection of Relatively Undisturbed Samples

Relatively undisturbed soil samples were obtained in the field using the following method.

The Modified Split-Barrel Drive Sampler

The sampler, with an external diameter of 3 inches, was lined with 1-inch-long, thin brass rings with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with the weight of a hammer in general accordance with ASTM D 3550. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the hammer, and the number of blows per foot of driving are presented on the boring logs as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

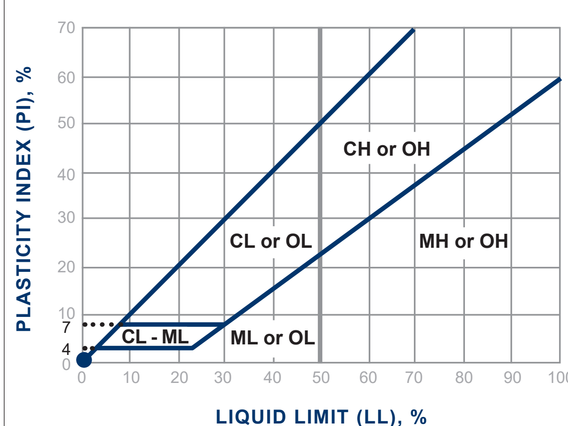
Soil Classification Chart Per ASTM D 2488

Primary Divisions			Group Symbol	Group Name
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	**GRAVEL** more than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVEL less than 5% fines	GW	well-graded GRAVEL
			GP	poorly graded GRAVEL
		GRAVEL with DUAL CLASSIFICATIONS 5% to 12% fines	GW-GM	well-graded GRAVEL with silt
			GP-GM	poorly graded GRAVEL with silt
			GW-GC	well-graded GRAVEL with clay
			GP-GC	poorly graded GRAVEL with clay
		GRAVEL with FINES more than 12% fines	GM	silty GRAVEL
			GC	clayey GRAVEL
			GC-GM	silty, clayey GRAVEL
	SAND 50% or more of coarse fraction passes No. 4 sieve	CLEAN SAND less than 5% fines	SW	well-graded SAND
			SP	poorly graded SAND
		SAND with DUAL CLASSIFICATIONS 5% to 12% fines	SW-SM	well-graded SAND with silt
			SP-SM	poorly graded SAND with silt
			SW-SC	well-graded SAND with clay
			SP-SC	poorly graded SAND with clay
		SAND with FINES more than 12% fines	SM	silty SAND
			SC	clayey SAND
			SC-SM	silty, clayey SAND
FINE-GRAINED SOILS 50% or more passes No. 200 sieve	**SILT and CLAY** liquid limit less than 50%	INORGANIC	CL	lean CLAY
			ML	SILT
			CL-ML	silty CLAY
		ORGANIC	OL (PI > 4)	organic CLAY
			OL (PI < 4)	organic SILT
	SILT and CLAY liquid limit 50% or more	INORGANIC	CH	fat CLAY
			MH	elastic SILT
		ORGANIC	OH (plots on or above "A"-line)	organic CLAY
			OH (plots below "A"-line)	organic SILT
	Highly Organic Soils		PT	Peat

Grain Size

Description		Sieve Size	Grain Size	Approximate Size
Boulders		> 12"	> 12"	Larger than basketball-sized
Cobbles		3 - 12"	3 - 12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4 - 3"	3/4 - 3"	Thumb-sized to fist-sized
	Fine	#4 - 3/4"	0.19 - 0.75"	Pea-sized to thumb-sized
Sand	Coarse	#10 - #4	0.079 - 0.19"	Rock-salt-sized to pea-sized
	Medium	#40 - #10	0.017 - 0.079"	Sugar-sized to rock-salt-sized
	Fine	#200 - #40	0.0029 - 0.017"	Flour-sized to sugar-sized
Fines		Passing #200	< 0.0029"	Flour-sized and smaller

Plasticity Chart



Apparent Density - Coarse-Grained Soil

Apparent Density	Spooling Cable or Cathead		Automatic Trip Hammer	
	SPT (blows/foot)	Modified Split Barrel (blows/foot)	SPT (blows/foot)	Modified Split Barrel (blows/foot)
Very Loose	≤ 4	≤ 8	≤ 3	≤ 5
Loose	5 - 10	9 - 21	4 - 7	6 - 14
Medium Dense	11 - 30	22 - 63	8 - 20	15 - 42
Dense	31 - 50	64 - 105	21 - 33	43 - 70
Very Dense	> 50	> 105	> 33	> 70

Consistency - Fine-Grained Soil

Consistency	Spooling Cable or Cathead		Automatic Trip Hammer	
	SPT (blows/foot)	Modified Split Barrel (blows/foot)	SPT (blows/foot)	Modified Split Barrel (blows/foot)
Very Soft	< 2	< 3	< 1	< 2
Soft	2 - 4	3 - 5	1 - 3	2 - 3
Firm	5 - 8	6 - 10	4 - 5	4 - 6
Stiff	9 - 15	11 - 20	6 - 10	7 - 13
Very Stiff	16 - 30	21 - 39	11 - 20	14 - 26
Hard	> 30	> 39	> 20	> 26

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USCS METHOD OF SOIL CLASSIFICATION

BORING LOG EXPLANATION SHEET

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	
0								Bulk sample.
								Modified split-barrel drive sampler.
								No recovery with modified split-barrel drive sampler.
								Sample retained by others.
								Standard Penetration Test (SPT).
5								No recovery with a SPT.
			XX/XX					Shelby tube sample. Distance pushed in inches/length of sample recovered in inches.
								No recovery with Shelby tube sampler.
								Continuous Push Sample.
								Seepage.
10								Groundwater encountered during drilling.
								Groundwater measured after drilling.
							SM	MAJOR MATERIAL TYPE (SOIL): Solid line denotes unit change.
							CL	Dashed line denotes material change. Attitudes: Strike/Dip b: Bedding c: Contact j: Joint f: Fracture F: Fault cs: Clay Seam s: Shear bss: Basal Slide Surface sf: Shear Fracture sz: Shear Zone sbs: Shear Bedding Surface
15								
								The total depth line is a solid line that is drawn at the bottom of the boring.
20								

DATE DRILLED	4/28/22	BORING NO.	B-1A
GROUND ELEVATION	604' ± (MSL)	SHEET 1 OF 1	
METHOD OF DRILLING	8" Hollow-Stem Auger (MR Drilling)		
DRIVE WEIGHT	140 lbs (Auto. Trip Hammer)	DROP	30"
SAMPLED BY	ANP	LOGGED BY ANP	REVIEWED BY GMC

DEPTH (feet)	SAMPLES Bulk / Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0	Bulk					ML	FILL: Brown, moist, medium dense, sandy SILT; trace gravel; cobbles.
						SM	ALLUVIUM: Light brown, medium dense, silty SAND with gravel and cobbles; possible boulders; interbeds of poorly graded sand with silt; roots.
	Driven	6	9.8	100.9			Brown; loose.
	Driven	49					Very dense.
10							@ 10.3' Seepage; wet. Increase in cobbles and/or boulders between approximately 11 and 15 feet.
	Driven	50/5"	11.7	121.0			
							TOPANGA FORMATION: Gray, wet, moderately soft, weakly cemented, SANDSTONE; interbedded with thin to thick laminations of dark brown indurated siltstone; trace gravel.
	Driven	18					
20	Driven	50/5"	10.3	127.9			@20': Groundwater encountered during drilling.
	Driven	46					
30	Driven	50/4"	14.3	112.0			Total Depth - 30.3 feet.
40							

Total Depth - 30.3 feet.
Seepage was encountered at approximately 10.3 feet. The groundwater table was encountered at approximately 20 feet during drilling. The boring infilled with water to approximately 10.3 feet 65 minutes after completion of drilling.
Backfilled with cement-bentonite grout on 4/28/22.

Notes:
Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ML	FILL: Brown, moist, medium dense, sandy SILT; trace gravel; cobbles.
							SM	ALLUVIUM: Light brown, moist, dense, silty SAND with gravel and cobbles.
			20				SP-SM	Light grayish brown, moist, medium dense, poorly graded SAND with silt, gravel, and cobbles.
			49	4.1	120.7			Increase in cobbles and/or boulders from approximately 8 to 10 feet.
10								
			61					TOPANGA FORMATION: Dark gray, moist, soft, weakly indurated, SILTSTONE; weathered (residual soil). @ 12': Seepage; wet.
			50/5" 42					Gray, moist, soft, weakly cemented, SANDSTONE; weathered; interbedded with thin to thick laminations of dark brown, weakly indurated SILTSTONE; few gravel.
20			77	9.0	132.0			Dark gray, moist, soft, moderately indurated, sandy CLAYSTONE; weathered; interbedded with thin laminations of light gray, weakly cemented, SANDSTONE.
			25					@25.5': Groundwater measured 3 hours after drilling; wet.
30			50/4"	8.5	121.5			Gray, wet, hard, strongly cemented, SANDSTONE; fine-grained.
								Total Depth - 30.8 feet. Seepage was encountered at approximately 12 feet during drilling. The groundwater table was measured at approximately 25.5 feet after completion of drilling. Backfilled with cement grout on 4/28/22. Notes: Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
40								

DATE DRILLED 4/28/22 BORING NO. B-2A

GROUND ELEVATION 603' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Hollow-Stem Auger (MR Drilling)

DRIVE WEIGHT 140 lbs (Auto. Trip Hammer) DROP 30"

SAMPLED BY ANP LOGGED BY ANP REVIEWED BY GMC

DATE DRILLED 4/28/22	BORING NO. B-3A	
GROUND ELEVATION 600' ± (MSL)	SHEET 1 OF 1	
METHOD OF DRILLING 8" Hollow-Stem Auger (MR Drilling)		
DRIVE WEIGHT 140 lbs (Auto. Trip Hammer)	DROP 30"	
SAMPLED BY ANP	LOGGED BY ANP	REVIEWED BY GMC

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	FILL: Brown, moist, medium dense, sandy SILT; trace gravel; cobbles.
			29	1.5	129.5		SP-SM	ALLUVIUM: Light brown, moist, medium dense, poorly graded SAND with silt and gravel.
10			28				CL	OLDER ALLUVIUM: Reddish brown, moist, hard, sandy lean CLAY.
			50/4" 68				SM	Yellowish brown, moist, very dense, silty SAND with gravel; cobbles and possible boulders between approximately 13 and 15 feet.
20			50/2"	14.2	110.6			Intermixed with clasts of sandstone and siltstone.
			34				CL	Brown, moist, soft, hard, sandy lean CLAY; few to little gravel.
30			71	13.4	120.6			TOPANGA FORMATION: Dark brown, moist, soft, weakly indurated, CLAYSTONE; weathered; interbedded with light gray, weakly cemented, SANDSTONE.
40								Total Depth = 31.5 feet. Groundwater was not encountered during drilling. Backfilled with on-site soil on 4/28/22. Note: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

FIGURE A- 3

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
								DATE DRILLED 4/26/22 - 4/27/22 BORING NO. P-1A GROUND ELEVATION 604' ± (MSL) SHEET 1 OF 1 METHOD OF DRILLING 8" Hollow-Stem Auger (MR Drilling) DRIVE WEIGHT 140 lbs (Auto. Trip Hammer) DROP 30" SAMPLED BY ANP LOGGED BY ANP REVIEWED BY GMC
0							ML	FILL: Brown, moist, medium dense, sandy SILT; trace gravel; cobbles.
							SM	ALLUVIUM: Light brown, moist, medium dense, silty SAND with gravel and cobbles; possible boulders; interbeds of poorly graded sand with silt; roots.
			6	9.8	100.9			Brown; loose.
			49					Very dense.
10								Total Depth - 10.2 feet. Groundwater was not encountered during drilling. In-situ percolation test performed on 4/27/22. Backfilled with on-site soil on 4/27/22. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20								
30								
40								

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SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA
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DATE DRILLED 4/26/22 BORING NO. P-2A

GROUND ELEVATION 603' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Hollow-Stem Auger (MR Drilling)

DRIVE WEIGHT 140 lbs (Auto. Trip Hammer) DROP 30"

SAMPLED BY ANP LOGGED BY ANP REVIEWED BY GMC

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0	Bulk						ML	FILL: Brown, moist, medium dense, sandy SILT; trace gravel; cobbles.
	Bulk						SM	ALLUVIUM: Light brown, moist, medium dense, silty SAND with gravel and cobbles.
		Driven	20				SP-SM	Light grayish brown, moist, medium dense, poorly graded SAND with silt, gravel, and cobbles.
10		Driven	49	4.1	120.7			Increase in cobbles and/or possible boulders from approximately 8 to 10 feet.
								Total Depth - 10.1 feet. Groundwater was not encountered during drilling. In-situ percolation test performed on 4/26/22. Backfilled with on-site soil on 4/26/22. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20								
30								
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DATE DRILLED 4/26/22 BORING NO. P-3A

GROUND ELEVATION 603' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Hollow-Stem Auger (MR Drilling)

DRIVE WEIGHT 140 lbs (Auto. Trip Hammer) DROP 30"

SAMPLED BY ANP LOGGED BY ANP REVIEWED BY GMC

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	FILL: Light brown, moist, medium dense, sandy SILT; trace gravel and cobbles.
			20	1.5	119.1		SP-SM	ALLUVIUM: Light brown, moist, medium dense, poorly graded SAND with silt and gravel.
			26					Increase in moisture; dense.
10								Total Depth - 10.1 feet. Groundwater was not encountered during drilling. In-situ percolation test performed on 4/26/22. Backfilled with on-site soil on 4/26/22. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20								
30								
40								

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	FILL: Light brown, moist, medium dense, sandy SILT; trace gravel; cobbles.
			14				SP-SM	ALLUVIUM: Gray brown, moist, medium dense, poorly graded SAND with silt and gravel.
								@8.5': Seepage/groundwater encountered during drilling; wet.
			26	8.0	124.3			@9.3': Seepage/groundwater measured 6 hours after drilling.
10								TOPANGA FORMATION: Yellowish brown, moist, soft, weakly indurated, CLAYSTONE; weathered; interbedded with thin to thick lamination of brown, weakly cemented SANDSTONE.
								Total Depth - 10.1 feet. Seepage/groundwater was encountered at approximately 8.5 during drilling. Seepage/groundwater was measured at approximately 9.3 feet 6 hours after completion of drilling. Backfilled with 1 foot of bentonite chips and 8 feet of on-site soils on 4/26/22. Notes: Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20								
30								
40								

DATE DRILLED 4/26/22 BORING NO. P-4A

GROUND ELEVATION 599' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Hollow-Stem Auger (MR Drilling)

DRIVE WEIGHT 140 lbs (Auto. Trip Hammer) DROP 30"

SAMPLED BY ANP LOGGED BY ANP REVIEWED BY GMC

APPENDIX B

Laboratory Testing

APPENDIX B

LABORATORY TESTING

Classification
Soils were visually and texturally classified in accordance with the Unified Soil Classification System (USCS) in general accordance with ASTM D 2488. Soil classifications are indicated on the logs of the exploratory borings in Appendix A.

In-Place Moisture and Density Tests
The moisture content and dry density of relatively undisturbed samples obtained from the exploratory borings were evaluated in general accordance with ASTM D 2937. The test results are presented on the logs of the exploratory borings in Appendix A.

Gradation Analysis
Gradation analysis tests were performed on selected representative soil samples in general accordance with ASTM D 422. The grain-size distribution curves are shown on Figures B-1 through B-3. These test results were utilized in evaluating the soil classifications in accordance with the USCS.

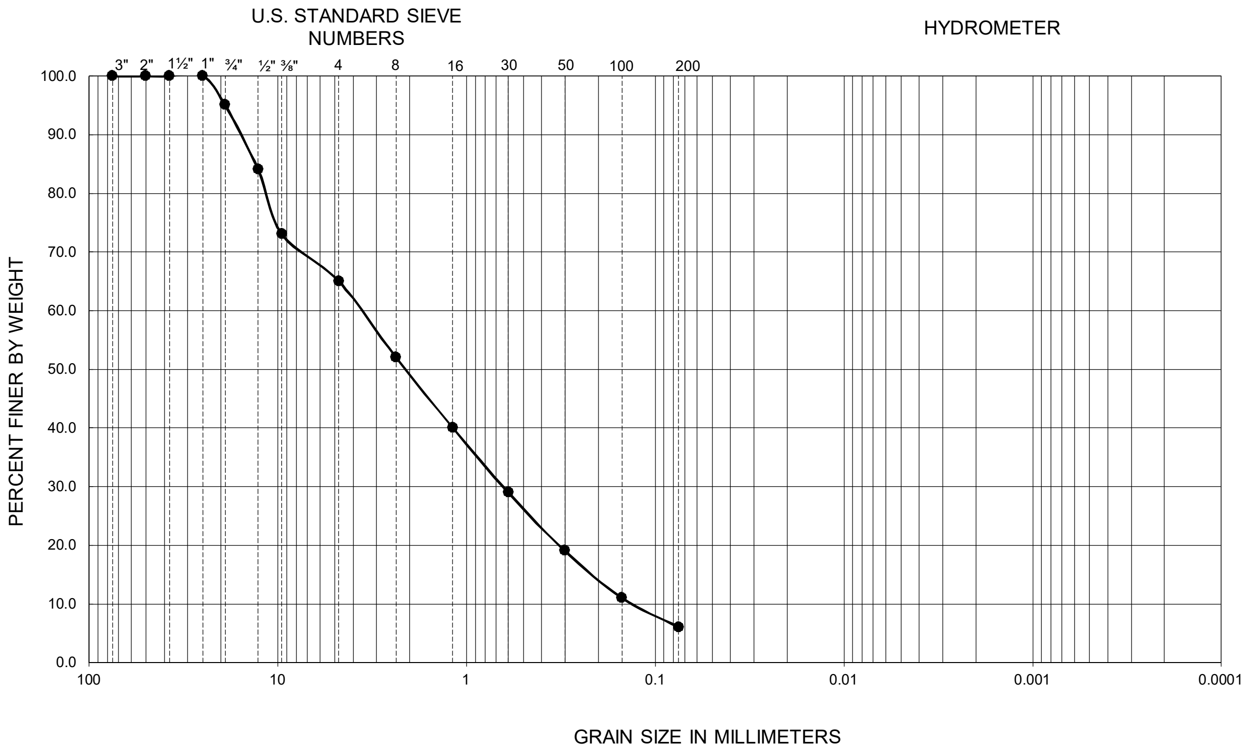
200 Wash
An evaluation of the percentage of particles finer than the No. 200 sieve in selected soil samples was performed in general accordance with ASTM D 1140. The results of the tests are presented on Figure B-4.

Atterberg Limits
Tests were performed on selected representative fine-grained soil samples to evaluate the liquid limit, plastic limit, and plasticity index in general accordance with ASTM D 4318. These test results were utilized to evaluate the soil classification in accordance with the USCS. The test results and classifications are shown on Figure B-5.

Direct Shear Tests
Direct shear tests were performed on relatively undisturbed samples in general accordance with ASTM D 3080 to evaluate the shear strength characteristics of selected materials. The samples were inundated during shearing to represent adverse field conditions. The results are shown on Figures B-6 and B-7.

Soil Corrosivity Tests
Soil pH and resistivity tests were performed on representative samples in general accordance with CT 643. The soluble sulfate and chloride content of the selected samples were evaluated in general accordance with CT 417 and CT 422, respectively. The test results are presented on Figure B-8.

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	P-2A	8.5-10.0	--	--	--	0.14	0.64	3.50	25.0	0.8	6	SP-SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 6913

FIGURE B-1

GRADATION TEST RESULTS

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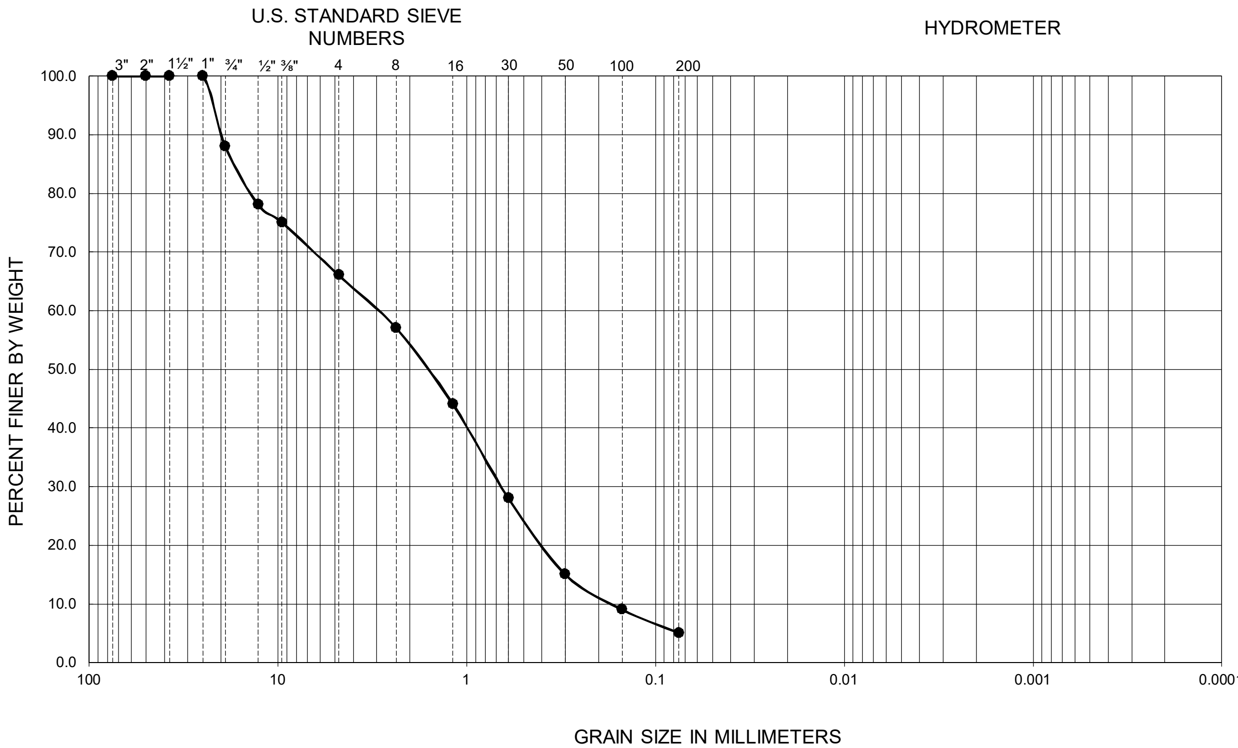
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	P-3A	8.5-10.0	--	--	--	0.17	0.65	2.85	16.8	0.9	5	SP-SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 6913

FIGURE B-2

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GRADATION TEST RESULTS

SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

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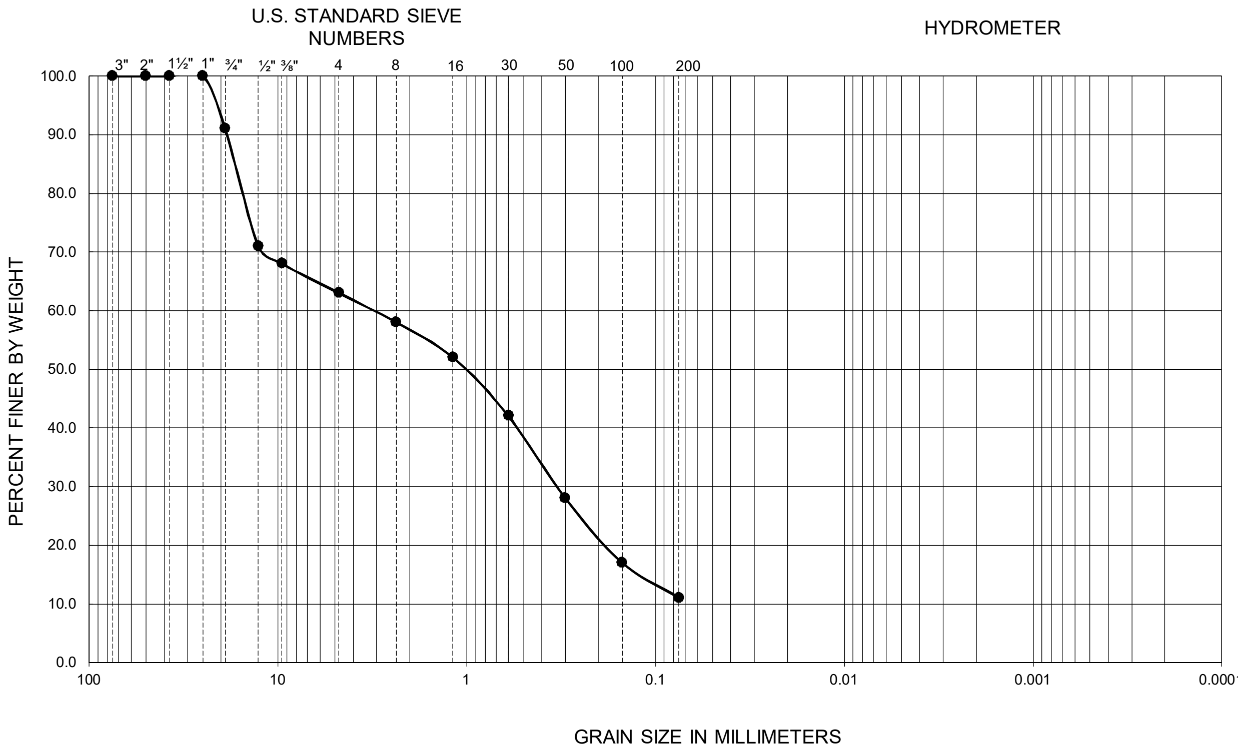
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	P-4A	8.5-9.5	--	--	--		0.33	3.00			11	SP-SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 6913

FIGURE B-3

GRADATION TEST RESULTS

SAN PASCUAL TREATMENT WETLAND
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SAMPLE LOCATION	SAMPLE DEPTH (ft)	DESCRIPTION	PERCENT PASSING NO. 4	PERCENT PASSING NO. 200	USCS OR EQUIVALENT (TOTAL SAMPLE)
B-1A	12.0-13.0	SILTY SAND WITH GRAVEL	73	18	SM
B-1A	25.0-26.5	SILTY SAND	97	46	SM
B-2A	15.0-16.5	SILTY SAND	90	46	SM
B-3A	5.0-6.5	POORLY GRADED SAND WITH SILT AND GRAVEL	54	6	SP-SM
B-3A	15.0-16.5	SILTY SAND WITH GRAVEL	82	29	SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 1140

FIGURE B-4

NO. 200 SIEVE ANALYSIS TEST RESULTS

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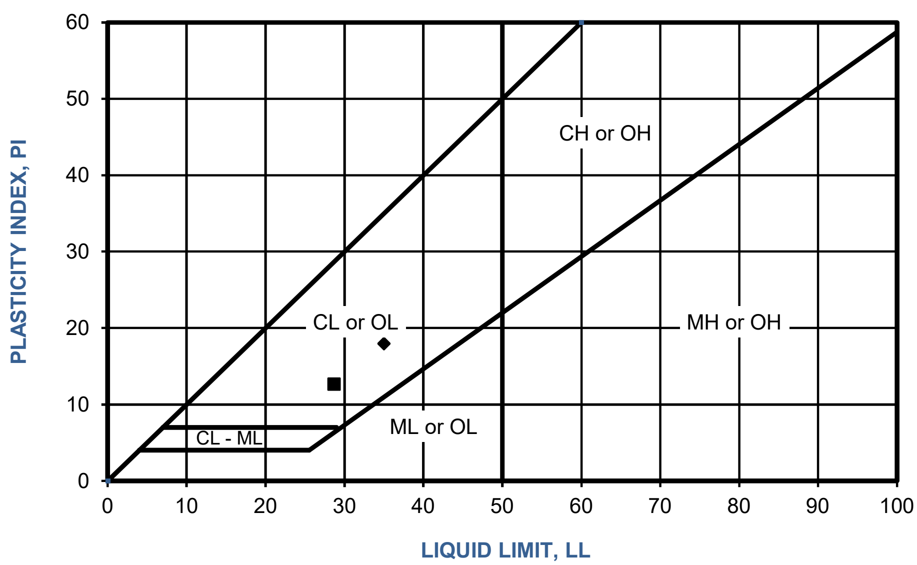
SYMBOL	LOCATION	DEPTH (ft)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	USCS CLASSIFICATION (Fraction Finer Than No. 40 Sieve)	USCS OR EQUIVALENT
■	B-2A	20.0 - 21.5	29	16	13	CL	CL
◆	B-3A	10.0 - 11.5	35	17	18	CL	CL
○	P-1A	5.0 - 6.5	-	-	NP	ML	SM

NP - INDICATES NON-PLASTIC



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4318

FIGURE B-5

ATTERBERG LIMITS TEST RESULTS

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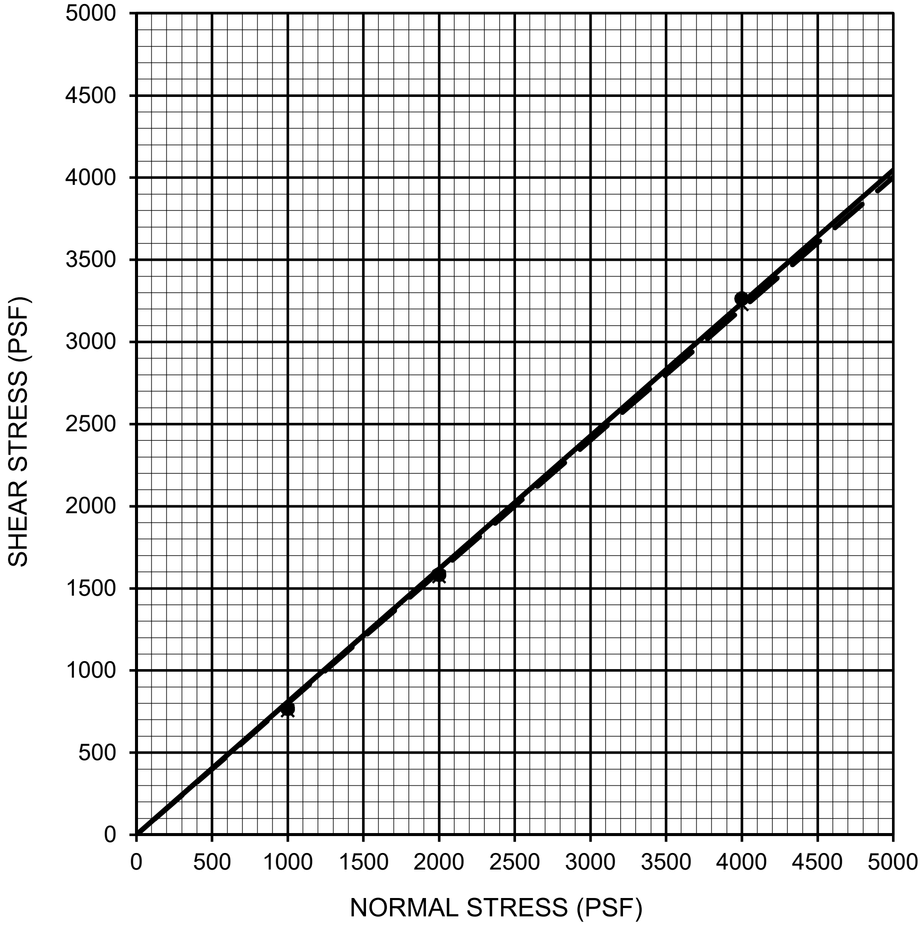

Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion (psf)	Friction Angle (degrees)	Soil Type
SILTY SAND	——●——	P-1A	5.0-6.5	Peak	0	40	SM
SILTY SAND	– – X – –	P-1A	5.0-6.5	Ultimate	0	40	SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080

FIGURE B-6

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DIRECT SHEAR TEST RESULTS

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SOUTH PASADENA, CALIFORNIA

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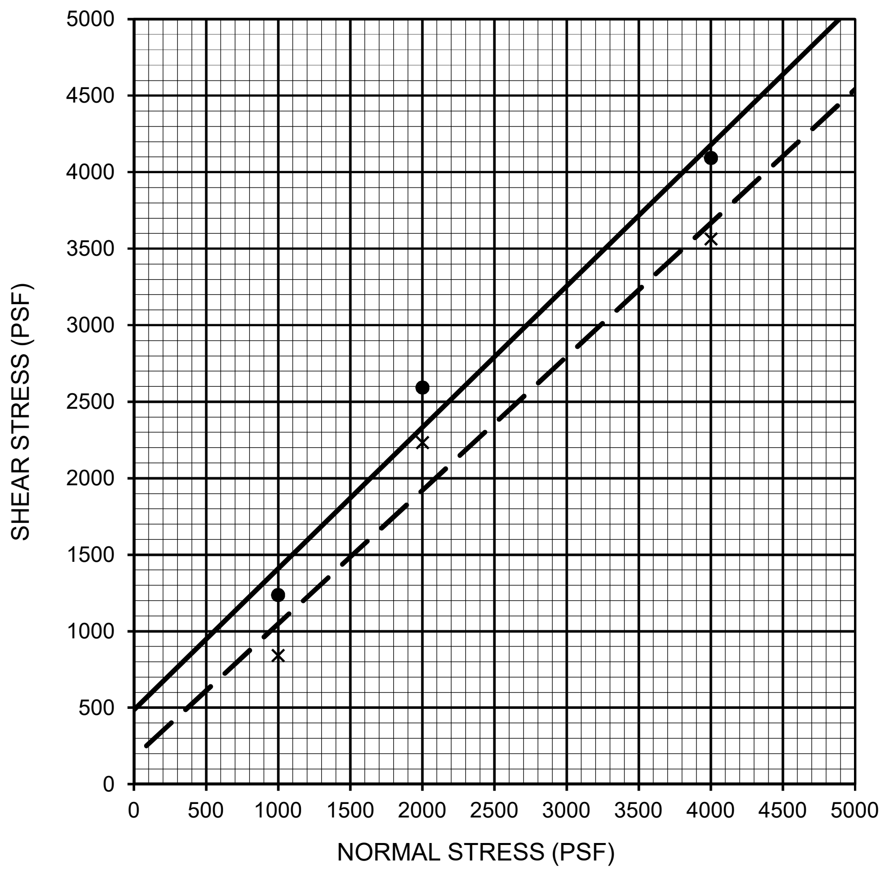

Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion (psf)	Friction Angle (degrees)	Soil Type
POORLY GRADED SAND WITH SILT AND GRAVEL	—●—	P-4A	8.5-9.5	Peak	486	43	SP-SM
POORLY GRADED SAND WITH SILT AND GRAVEL	– – X – –	P-4A	8.5-9.5	Ultimate	174	41	SP-SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080

FIGURE B-7

DIRECT SHEAR TEST RESULTS

SAN PASCUAL TREATMENT WETLAND
SOUTH PASADENA, CALIFORNIA

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SAMPLE LOCATION	SAMPLE DEPTH (ft)	pH [1]	RESISTIVITY [1] (ohm-cm)	SULFATE CONTENT [2]		CHLORIDE CONTENT [3] (ppm)
				(ppm)	(%)	
P-2A	0.0-5.0	5.8	6,950	10	0.001	85

[1] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 643
[2] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 417
[3] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 422

FIGURE B-8

CORROSIVITY TEST RESULTS

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SOUTH PASADENA, CALIFORNIA

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APPENDIX C

Analytical Test Results (Drum Characterization)

SunStar Laboratories, Inc.

PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

09 May 2022

Aura Scharf
Ninyo & Moore
475 Goddard, Ste. 200
Irvine, CA 92618

RE: Arroyo Seco - San Rafael Water Reuse 2 Natural

Enclosed are the results of analyses for samples received by the laboratory on 04/29/22 16:55. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Joann Marroquin For Taili Iinuma
Project Manager

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Drum #1_B-3	T221276-01	Soil	04/27/22 15:10	04/29/22 16:55
Composite 2:1 Drum#2_B-2A - Drum #1_B-1A	T221276-04	Soil	04/28/22 11:30	04/29/22 16:55

SunStar Laboratories, Inc.

Joann Marroquin

Joann Marroquin For Taili Iinuma, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

DETECTIONS SUMMARY

Sample ID: Drum #1_B-3 **Laboratory ID:** T221276-01

Analyte	Result	Reporting Limit	Units	Method	Notes
Barium	**57**	1.0	mg/kg	EPA 6010b	
Chromium	**26**	2.0	mg/kg	EPA 6010b	
Cobalt	**4.1**	2.0	mg/kg	EPA 6010b	
Copper	**5.4**	1.0	mg/kg	EPA 6010b	
Nickel	**2.8**	2.0	mg/kg	EPA 6010b	
Vanadium	**25**	5.0	mg/kg	EPA 6010b	
Zinc	**22**	1.0	mg/kg	EPA 6010b	

Sample ID: Composite 2:1 Drum#2_B-2A - Drum **Laboratory ID:** T221276-04

Analyte	Result	Reporting Limit	Units	Method	Notes
Barium	**45**	1.0	mg/kg	EPA 6010b	
Chromium	**26**	2.0	mg/kg	EPA 6010b	
Cobalt	**6.2**	2.0	mg/kg	EPA 6010b	
Copper	**8.3**	1.0	mg/kg	EPA 6010b	
Nickel	**8.3**	2.0	mg/kg	EPA 6010b	
Vanadium	**45**	5.0	mg/kg	EPA 6010b	
Zinc	**38**	1.0	mg/kg	EPA 6010b	
Mercury	**0.13**	0.10	mg/kg	EPA 7471A Soil	

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949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Drum #1_B-3

T221276-01 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Extractable Petroleum Hydrocarbons by 8015B									
C6-C12 (GRO)	ND	10	mg/kg	1	22E0008	05/02/22	05/06/22	EPA 8015B	
C13-C28 (DRO)	ND	10	"	"	"	"	"	"	
C29-C40 (MORO)	ND	10	"	"	"	"	"	"	
Surrogate: p-Terphenyl		*90.3 %*	*65-135*		"	"	"	"	
Metals by EPA 6010B									
Antimony	ND	3.0	mg/kg	1	22E0004	05/02/22	05/03/22	EPA 6010b	
Silver	ND	2.0	"	"	"	"	"	"	
Arsenic	ND	5.0	"	"	"	"	"	"	
Barium	**57**	1.0	"	"	"	"	"	"	
Beryllium	ND	1.0	"	"	"	"	05/03/22	"	
Cadmium	ND	2.0	"	"	"	"	05/03/22	"	
Chromium	**26**	2.0	"	"	"	"	"	"	
Cobalt	**4.1**	2.0	"	"	"	"	"	"	
Copper	**5.4**	1.0	"	"	"	"	"	"	
Lead	ND	3.0	"	"	"	"	"	"	
Molybdenum	ND	5.0	"	"	"	"	"	"	
Nickel	**2.8**	2.0	"	"	"	"	"	"	
Selenium	ND	5.0	"	"	"	"	"	"	
Thallium	ND	5.0	"	"	"	"	"	"	
Vanadium	**25**	5.0	"	"	"	"	"	"	
Zinc	**22**	1.0	"	"	"	"	"	"	
Cold Vapor Extraction EPA 7470/7471									
Mercury	ND	0.10	mg/kg	1	22E0005	05/02/22	05/03/22	EPA 7471A Soil	

SunStar Laboratories, Inc.
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Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Drum #1_B-3

T221276-01 (Soil)

SunStar Laboratories, Inc.

Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bromobenzene	ND	2.5	ug/kg	1	22E0023	05/02/22	05/03/22	EPA 8260B	
Bromochloromethane	ND	2.5	"	"	"	"	"	"	
Bromodichloromethane	ND	2.5	"	"	"	"	"	"	
Bromoform	ND	2.5	"	"	"	"	"	"	
Bromomethane	ND	2.5	"	"	"	"	"	"	
n-Butylbenzene	ND	2.5	"	"	"	"	"	"	
sec-Butylbenzene	ND	2.5	"	"	"	"	"	"	
tert-Butylbenzene	ND	2.5	"	"	"	"	"	"	
Carbon tetrachloride	ND	2.5	"	"	"	"	"	"	
Chlorobenzene	ND	2.5	"	"	"	"	"	"	
Chloroethane	ND	2.5	"	"	"	"	"	"	
Chloroform	ND	2.5	"	"	"	"	"	"	
Chloromethane	ND	2.5	"	"	"	"	"	"	
2-Chlorotoluene	ND	2.5	"	"	"	"	"	"	
4-Chlorotoluene	ND	2.5	"	"	"	"	"	"	
Dibromochloromethane	ND	2.5	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.0	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	2.5	"	"	"	"	"	"	
Dibromomethane	ND	2.5	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloroethane	ND	2.5	"	"	"	"	"	"	
1,2-Dichloroethane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloroethene	ND	2.5	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	2.5	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	2.5	"	"	"	"	"	"	
1,2-Dichloropropane	ND	2.5	"	"	"	"	"	"	
1,3-Dichloropropane	ND	2.5	"	"	"	"	"	"	
2,2-Dichloropropane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloropropene	ND	2.5	"	"	"	"	"	"	

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Joann Marroquin

Joann Marroquin For Taili Iinuma, Project Manager

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25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Drum #1_B-3

T221276-01 (Soil)

SunStar Laboratories, Inc.

Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	2.5	ug/kg	1	22E0023	05/02/22	05/03/22	EPA 8260B	
trans-1,3-Dichloropropene	ND	2.5	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.5	"	"	"	"	"	"	
Isopropylbenzene	ND	2.5	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.5	"	"	"	"	"	"	
Methylene chloride	ND	10	"	"	"	"	"	"	
Naphthalene	ND	2.5	"	"	"	"	"	"	
n-Propylbenzene	ND	2.5	"	"	"	"	"	"	
Styrene	ND	2.5	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	2.5	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	2.5	"	"	"	"	"	"	
Tetrachloroethene	ND	2.5	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	2.5	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	2.5	"	"	"	"	"	"	
Trichloroethene	ND	2.5	"	"	"	"	"	"	
Trichlorofluoromethane	ND	2.5	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	2.5	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	2.5	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	2.5	"	"	"	"	"	"	
Vinyl chloride	ND	2.5	"	"	"	"	"	"	
Benzene	ND	2.5	"	"	"	"	"	"	
Toluene	ND	2.5	"	"	"	"	"	"	
Ethylbenzene	ND	2.5	"	"	"	"	"	"	
m,p-Xylene	ND	5.0	"	"	"	"	"	"	
o-Xylene	ND	2.5	"	"	"	"	"	"	
Acetone	ND	5.0	"	"	"	"	"	"	
Methyl ethyl ketone	ND	5.0	"	"	"	"	"	"	
Methyl isobutyl ketone	ND	5.0	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	5.0	"	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*104 %*	*75.4-139*		*"*	*"*	*"*	*"*	

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Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

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475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Drum #1_B-3

T221276-01 (Soil)

SunStar Laboratories, Inc.

Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: Dibromofluoromethane		*91.8 %*	*73.1-125*		*22E0023*	*05/02/22*	*05/03/22*	*EPA 8260B*	
Surrogate: Toluene-d8		*97.8 %*	*82.6-117*		*"*	*"*	*"*	*"*	

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949.297.5020 Phone
949.297.5027 Fax

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475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Composite 2:1 Drum#2_B-2A - Drum #1_B-1A

T221276-04 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Extractable Petroleum Hydrocarbons by 8015B									
C6-C12 (GRO)	ND	10	mg/kg	1	22E0008	05/02/22	05/06/22	EPA 8015B	
C13-C28 (DRO)	ND	10	"	"	"	"	"	"	
C29-C40 (MORO)	ND	10	"	"	"	"	"	"	
Surrogate: p-Terphenyl		*93.0 %*	*65-135*		*"*	*"*	*"*	*"*	
Metals by EPA 6010B									
Antimony	ND	3.0	mg/kg	1	22E0004	05/02/22	05/03/22	EPA 6010b	
Silver	ND	2.0	"	"	"	"	"	"	
Arsenic	ND	5.0	"	"	"	"	"	"	
Barium	**45**	1.0	"	"	"	"	"	"	
Beryllium	ND	1.0	"	"	"	"	05/03/22	"	
Cadmium	ND	2.0	"	"	"	"	05/03/22	"	
Chromium	**26**	2.0	"	"	"	"	"	"	
Cobalt	**6.2**	2.0	"	"	"	"	"	"	
Copper	**8.3**	1.0	"	"	"	"	"	"	
Lead	ND	3.0	"	"	"	"	"	"	
Molybdenum	ND	5.0	"	"	"	"	"	"	
Nickel	**8.3**	2.0	"	"	"	"	"	"	
Selenium	ND	5.0	"	"	"	"	"	"	
Thallium	ND	5.0	"	"	"	"	"	"	
Vanadium	**45**	5.0	"	"	"	"	"	"	
Zinc	**38**	1.0	"	"	"	"	"	"	
Cold Vapor Extraction EPA 7470/7471									
Mercury	**0.13**	0.10	mg/kg	1	22E0005	05/02/22	05/03/22	EPA 7471A Soil	

SunStar Laboratories, Inc.

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25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	Reported:
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Composite 2:1 Drum#2_B-2A - Drum #1_B-1A
T221276-04 (Soil)

SunStar Laboratories, Inc.

Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bromobenzene	ND	2.5	ug/kg	1	22E0023	05/02/22	05/03/22	EPA 8260B	
Bromochloromethane	ND	2.5	"	"	"	"	"	"	
Bromodichloromethane	ND	2.5	"	"	"	"	"	"	
Bromoform	ND	2.5	"	"	"	"	"	"	
Bromomethane	ND	2.5	"	"	"	"	"	"	
n-Butylbenzene	ND	2.5	"	"	"	"	"	"	
sec-Butylbenzene	ND	2.5	"	"	"	"	"	"	
tert-Butylbenzene	ND	2.5	"	"	"	"	"	"	
Carbon tetrachloride	ND	2.5	"	"	"	"	"	"	
Chlorobenzene	ND	2.5	"	"	"	"	"	"	
Chloroethane	ND	2.5	"	"	"	"	"	"	
Chloroform	ND	2.5	"	"	"	"	"	"	
Chloromethane	ND	2.5	"	"	"	"	"	"	
2-Chlorotoluene	ND	2.5	"	"	"	"	"	"	
4-Chlorotoluene	ND	2.5	"	"	"	"	"	"	
Dibromochloromethane	ND	2.5	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.0	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	2.5	"	"	"	"	"	"	
Dibromomethane	ND	2.5	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloroethane	ND	2.5	"	"	"	"	"	"	
1,2-Dichloroethane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloroethene	ND	2.5	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	2.5	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	2.5	"	"	"	"	"	"	
1,2-Dichloropropane	ND	2.5	"	"	"	"	"	"	
1,3-Dichloropropane	ND	2.5	"	"	"	"	"	"	
2,2-Dichloropropane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloropropene	ND	2.5	"	"	"	"	"	"	

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Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

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475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Composite 2:1 Drum#2_B-2A - Drum #1_B-1A

T221276-04 (Soil)

SunStar Laboratories, Inc.

Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	2.5	ug/kg	1	22E0023	05/02/22	05/03/22	EPA 8260B	
trans-1,3-Dichloropropene	ND	2.5	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.5	"	"	"	"	"	"	
Isopropylbenzene	ND	2.5	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.5	"	"	"	"	"	"	
Methylene chloride	ND	10	"	"	"	"	"	"	
Naphthalene	ND	2.5	"	"	"	"	"	"	
n-Propylbenzene	ND	2.5	"	"	"	"	"	"	
Styrene	ND	2.5	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	2.5	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	2.5	"	"	"	"	"	"	
Tetrachloroethene	ND	2.5	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	2.5	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	2.5	"	"	"	"	"	"	
Trichloroethene	ND	2.5	"	"	"	"	"	"	
Trichlorofluoromethane	ND	2.5	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	2.5	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	2.5	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	2.5	"	"	"	"	"	"	
Vinyl chloride	ND	2.5	"	"	"	"	"	"	
Benzene	ND	2.5	"	"	"	"	"	"	
Toluene	ND	2.5	"	"	"	"	"	"	
Ethylbenzene	ND	2.5	"	"	"	"	"	"	
m,p-Xylene	ND	5.0	"	"	"	"	"	"	
o-Xylene	ND	2.5	"	"	"	"	"	"	
Acetone	ND	5.0	"	"	"	"	"	"	
Methyl ethyl ketone	ND	5.0	"	"	"	"	"	"	
Methyl isobutyl ketone	ND	5.0	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	5.0	"	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*98.8 %*	*75.4-139*		*"*	*"*	*"*	*"*	

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Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

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Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Composite 2:1 Drum#2_B-2A - Drum #1_B-1A

T221276-04 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by EPA Method 8260B									
Surrogate: Dibromofluoromethane		*96.4 %*	*73.1-125*		*22E0023*	*05/02/22*	*05/03/22*	*EPA 8260B*	
Surrogate: Toluene-d8		*95.2 %*	*82.6-117*		*"*	*"*	*"*	*"*	

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Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

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475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Extractable Petroleum Hydrocarbons by 8015B - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0008 - EPA 3550B GC										
Blank (22E0008-BLK1)				Prepared: 05/02/22 Analyzed: 05/06/22						
C6-C12 (GRO)	ND	10	mg/kg							
C13-C28 (DRO)	ND	10	"							
C29-C40 (MORO)	ND	10	"							
Surrogate: p-Terphenyl	*91.7*		*"*	*100*		*91.7*	*65-135*			
LCS (22E0008-BS1)				Prepared: 05/02/22 Analyzed: 05/06/22						
C13-C28 (DRO)	400	10	mg/kg	500		80.9	75-125			
Surrogate: p-Terphenyl	*91.7*		*"*	*100*		*91.7*	*65-135*			
LCS Dup (22E0008-BSD1)				Prepared: 05/02/22 Analyzed: 05/06/22						
C13-C28 (DRO)	410	10	mg/kg	500		82.3	75-125	1.76	20	
Surrogate: p-Terphenyl	*91.9*		*"*	*100*		*91.9*	*65-135*			

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475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Metals by EPA 6010B - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0004 - EPA 3050B										
Blank (22E0004-BLK1)				Prepared: 05/02/22 Analyzed: 05/03/22						
Antimony	ND	3.0	mg/kg							
Silver	ND	2.0	"							
Arsenic	ND	5.0	"							
Barium	ND	1.0	"							
Beryllium	ND	1.0	"							
Cadmium	ND	2.0	"							
Chromium	ND	2.0	"							
Cobalt	ND	2.0	"							
Copper	ND	1.0	"							
Lead	ND	3.0	"							
Molybdenum	ND	5.0	"							
Nickel	ND	2.0	"							
Selenium	ND	5.0	"							
Thallium	ND	5.0	"							
Vanadium	ND	5.0	"							
Zinc	ND	1.0	"							
LCS (22E0004-BS1)				Prepared: 05/02/22 Analyzed: 05/03/22						
Arsenic	102	5.0	mg/kg	100		102	75-125			
Barium	99.9	1.0	"	100		99.9	75-125			
Cadmium	99.0	2.0	"	100		99.0	75-125			
Chromium	99.8	2.0	"	100		99.8	75-125			
Lead	102	3.0	"	100		102	75-125			
Matrix Spike (22E0004-MS1)	**Source: T221266-01**			Prepared: 05/02/22 Analyzed: 05/03/22						
Arsenic	81.2	5.0	mg/kg	100	0.812	80.4	75-125			
Barium	106	1.0	"	100	27.1	78.9	75-125			
Cadmium	80.6	2.0	"	100	0.153	80.5	75-125			
Chromium	86.7	2.0	"	100	7.24	79.5	75-125			
Lead	75.1	3.0	"	100	2.48	72.6	75-125			QM-05

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949.297.5020 Phone
949.297.5027 Fax

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Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Metals by EPA 6010B - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0004 - EPA 3050B										
Matrix Spike Dup (22E0004-MSD1)		**Source: T221266-01**		Prepared: 05/02/22 Analyzed: 05/03/22						
Arsenic	78.7	5.0	mg/kg	100	0.812	77.9	75-125	3.03	20	
Barium	113	1.0	"	100	27.1	86.0	75-125	6.41	20	
Cadmium	75.1	2.0	"	100	0.153	74.9	75-125	7.15	20	QM-05
Chromium	84.2	2.0	"	100	7.24	76.9	75-125	2.99	20	
Lead	75.9	3.0	"	100	2.48	73.4	75-125	1.07	20	QM-05

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949.297.5020 Phone
949.297.5027 Fax

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475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Cold Vapor Extraction EPA 7470/7471 - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0005 - EPA 7471A Soil										
Blank (22E0005-BLK1)				Prepared: 05/02/22 Analyzed: 05/03/22						
Mercury	ND	0.10	mg/kg							
LCS (22E0005-BS1)				Prepared: 05/02/22 Analyzed: 05/03/22						
Mercury	0.347	0.10	mg/kg	0.410		84.8	80-120			
Matrix Spike (22E0005-MS1)	**Source: T221266-01**			Prepared: 05/02/22 Analyzed: 05/03/22						
Mercury	0.329	0.10	mg/kg	0.385	ND	85.6	75-125			
Matrix Spike Dup (22E0005-MSD1)	**Source: T221266-01**			Prepared: 05/02/22 Analyzed: 05/03/22						
Mercury	0.279	0.10	mg/kg	0.397	ND	70.3	75-125	16.6	20	QM-05

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25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

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475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Volatile Organic Compounds by EPA Method 8260B - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0023 - EPA 5030 GCMS										
Blank (22E0023-BLK1)				Prepared & Analyzed: 05/02/22						
Bromobenzene	ND	2.5	ug/kg							
Bromochloromethane	ND	2.5	"							
Bromodichloromethane	ND	2.5	"							
Bromoform	ND	2.5	"							
Bromomethane	ND	2.5	"							
n-Butylbenzene	ND	2.5	"							
sec-Butylbenzene	ND	2.5	"							
tert-Butylbenzene	ND	2.5	"							
Carbon tetrachloride	ND	2.5	"							
Chlorobenzene	ND	2.5	"							
Chloroethane	ND	2.5	"							
Chloroform	ND	2.5	"							
Chloromethane	ND	2.5	"							
2-Chlorotoluene	ND	2.5	"							
4-Chlorotoluene	ND	2.5	"							
Dibromochloromethane	ND	2.5	"							
1,2-Dibromo-3-chloropropane	ND	5.0	"							
1,2-Dibromoethane (EDB)	ND	2.5	"							
Dibromomethane	ND	2.5	"							
1,2-Dichlorobenzene	ND	2.5	"							
1,3-Dichlorobenzene	ND	2.5	"							
1,4-Dichlorobenzene	ND	2.5	"							
Dichlorodifluoromethane	ND	2.5	"							
1,1-Dichloroethane	ND	2.5	"							
1,2-Dichloroethane	ND	2.5	"							
1,1-Dichloroethene	ND	2.5	"							
cis-1,2-Dichloroethene	ND	2.5	"							
trans-1,2-Dichloroethene	ND	2.5	"							
1,2-Dichloropropane	ND	2.5	"							
1,3-Dichloropropane	ND	2.5	"							
2,2-Dichloropropane	ND	2.5	"							
1,1-Dichloropropene	ND	2.5	"							
cis-1,3-Dichloropropene	ND	2.5	"							
trans-1,3-Dichloropropene	ND	2.5	"							
Hexachlorobutadiene	ND	2.5	"							
Isopropylbenzene	ND	2.5	"							

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Joann Marroquin

Joann Marroquin For Taili Iinuma, Project Manager

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25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Volatile Organic Compounds by EPA Method 8260B - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0023 - EPA 5030 GCMS										
Blank (22E0023-BLK1)				Prepared & Analyzed: 05/02/22						
p-Isopropyltoluene	ND	2.5	ug/kg							
Methylene chloride	ND	10	"							
Naphthalene	ND	2.5	"							
n-Propylbenzene	ND	2.5	"							
Styrene	ND	2.5	"							
1,1,2,2-Tetrachloroethane	ND	2.5	"							
1,1,1,2-Tetrachloroethane	ND	2.5	"							
Tetrachloroethene	ND	2.5	"							
1,2,3-Trichlorobenzene	ND	2.5	"							
1,2,4-Trichlorobenzene	ND	2.5	"							
1,1,2-Trichloroethane	ND	2.5	"							
1,1,1-Trichloroethane	ND	2.5	"							
Trichloroethene	ND	2.5	"							
Trichlorofluoromethane	ND	2.5	"							
1,2,3-Trichloropropane	ND	2.5	"							
1,3,5-Trimethylbenzene	ND	2.5	"							
1,2,4-Trimethylbenzene	ND	2.5	"							
Vinyl chloride	ND	2.5	"							
Benzene	ND	2.5	"							
Toluene	ND	2.5	"							
Ethylbenzene	ND	2.5	"							
m,p-Xylene	ND	5.0	"							
o-Xylene	ND	2.5	"							
Acetone	ND	5.0	"							
Methyl ethyl ketone	ND	5.0	"							
Methyl isobutyl ketone	ND	5.0	"							
2-Hexanone (MBK)	ND	5.0	"							
Surrogate: 4-Bromofluorobenzene	*52.6*		*"*	*50.0*		*105*	*75.4-139*			
Surrogate: Dibromofluoromethane	*46.4*		*"*	*50.0*		*92.7*	*73.1-125*			
Surrogate: Toluene-d8	*49.3*		*"*	*50.0*		*98.6*	*82.6-117*			

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25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
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475 Goddard, Ste. 200	Project Number: 211880001	Reported:
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Volatile Organic Compounds by EPA Method 8260B - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 22E0023 - EPA 5030 GCMS										
LCS (22E0023-BS1)				Prepared & Analyzed: 05/02/22						
Chlorobenzene	53.0	2.5	ug/kg	50.0		106	65.2-124			
1,1-Dichloroethene	52.1	2.5	"	50.0		104	60.9-131			
Trichloroethene	53.7	2.5	"	50.0		107	62.1-126			
Benzene	49.9	2.5	"	50.0		99.8	65.3-127			
Toluene	49.7	2.5	"	50.0		99.4	64.3-122			
Surrogate: 4-Bromofluorobenzene	*48.9*		*"*	*50.0*		*97.9*	*75.4-139*			
Surrogate: Dibromofluoromethane	*47.0*		*"*	*50.0*		*94.1*	*73.1-125*			
Surrogate: Toluene-d8	*49.6*		*"*	*50.0*		*99.3*	*82.6-117*			
Matrix Spike (22E0023-MS1)	**Source: T221277-02**			Prepared & Analyzed: 05/02/22						
Chlorobenzene	46.0	2.5	ug/kg	50.0	ND	92.0	65.2-125			
1,1-Dichloroethene	41.2	2.5	"	50.0	ND	82.5	60.9-131			
Trichloroethene	44.8	2.5	"	50.0	ND	89.6	62.1-126			
Benzene	41.6	2.5	"	50.0	ND	83.2	65.3-127			
Toluene	42.8	2.5	"	50.0	ND	85.7	64.3-125			
Surrogate: 4-Bromofluorobenzene	*48.9*		*"*	*50.0*		*97.9*	*75.4-139*			
Surrogate: Dibromofluoromethane	*45.6*		*"*	*50.0*		*91.2*	*73.1-125*			
Surrogate: Toluene-d8	*49.3*		*"*	*50.0*		*98.7*	*82.6-117*			
Matrix Spike Dup (22E0023-MSD1)	**Source: T221277-02**			Prepared & Analyzed: 05/02/22						
Chlorobenzene	48.0	2.5	ug/kg	50.0	ND	95.9	65.2-125	4.13	20	
1,1-Dichloroethene	47.0	2.5	"	50.0	ND	94.1	60.9-131	13.1	20	
Trichloroethene	47.7	2.5	"	50.0	ND	95.3	62.1-126	6.25	20	
Benzene	44.8	2.5	"	50.0	ND	89.5	65.3-127	7.34	20	
Toluene	44.6	2.5	"	50.0	ND	89.2	64.3-125	4.02	20	
Surrogate: 4-Bromofluorobenzene	*49.1*		*"*	*50.0*		*98.1*	*75.4-139*			
Surrogate: Dibromofluoromethane	*47.3*		*"*	*50.0*		*94.7*	*73.1-125*			
Surrogate: Toluene-d8	*49.3*		*"*	*50.0*		*98.6*	*82.6-117*			

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Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Ninyo & Moore	Project: Arroyo Seco - San Rafael Water Reuse 2 Natural	
475 Goddard, Ste. 200	Project Number: 211880001	**Reported:**
Irvine CA, 92618	Project Manager: Aura Scharf	05/09/22 16:51

Notes and Definitions

QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to possible matrix interference. The LCS was within acceptance criteria. The data is acceptable as no negative impact on data is expected.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

SunStar Laboratories, Inc.
25712 Commercentre Dr
Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: Ninyo & Moore
Address: 475 Goddard, Suite 200
Phone: 949-753-7070 Fax:
Project Manager: Avra Scharf ascharf@ninyoandmoore.com

Date: 4/29/22 Page: 1 Of 1
Project Name: Arroyo Seco - San Rafael Water Reuse & Natural Stream Restoration Project
Collector: Allison Pritzlaw (ANP) Client Project #: 211880001
Batch #: T221276 EDF #:

Sample ID	Date Sampled	Time	Sample Type	Container Type	8260 (VOCs)	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	6010/7000 Title 22 Metals					Laboratory ID #	Comments/Preservative	Total # of containers
DRUM#1_B-3	4/27/22	3:10	Soil	4oz Jar	X							X	X					1	one test	
DRUM#2_B-2A	4/28/22	11:30	Soil	4oz Jar	X							X	X					2	composite 2 JARS (one test)	
DRUM#1_B-1A	4/28/22	3:35	Soil	4oz Jar	X							X	X					3		

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
[illegible]	4/29/22; 2:59	[illegible]	4/29/22; 2:59
[illegible]	4/29/22 4:30	[illegible]	4/29/22 16:30
[illegible]	4/29/22 16:55	[illegible]	4.29.22 1655

Total # of containers:
Chain of Custody seals Y/N/NA
Seals intact? Y/N/NA
Received good condition/cold 2.7°C

Turn around time: STD

Notes
2 tests total

Sample disposal Instructions: Disposal @ $2.00 each ____ Return to client ____ Pickup ____

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

SAMPLE RECEIVING REVIEW SHEET

Batch/Work Order #: T221276

Client Name: NINYO & MOORE

Project: ARROYO SECO - SAN RAFAEL WATER REUSE 2 NATURAL STREAM RESTORATION

Delivered by: ☐ Client ☑ SunStar Courier ☐ GLS ☐ FedEx ☐ UPS

If Courier, Received by: MARVIN

Date/Time Courier Received: 4-29-22 16:30

Lab Received by: DAVE

Date/Time Lab Received: 4-29-22 16:55

Total number of coolers received: 1 Thermometer ID: SC-1 Calibration due: 8/24/22

Temperature: Cooler #1 2.6	°C +/- the CF (+0.1 °C) = 2.7	°C corrected temperature	
Temperature: Cooler #2	°C +/- the CF (+0.1 °C) =	°C corrected temperature	
Temperature: Cooler #3	°C +/- the CF (+0.1 °C) =	°C corrected temperature	
Temperature criteria = ≤ 6°C (no frozen containers)	Within criteria?	☑ Yes ☐ No ☐ N/A	
If NO:			
Samples received on ice?	☐ Yes	☐ No → **Complete Non-Conformance Sheet**	
If on ice, samples received same day collected?	☐ Yes → Acceptable	☐ No → **Complete Non-Conformance Sheet**	

Custody seals intact on cooler/sample	☐ Yes	☐ No*	☑ N/A
Sample containers intact	☑ Yes	☐ No*	
Sample labels match Chain of Custody IDs	☑ Yes	☐ No*	
Total number of containers received match COC	☑ Yes	☐ No*	
Proper containers received for analyses requested on COC	☑ Yes	☐ No*	
Proper preservative indicated on COC/containers for analyses requested	☐ Yes	☐ No*	☒ N/A
Complete shipment received in good condition with correct temperatures, containers, labels, volumes preservatives and within method specified holding times	☑ **Yes**	☐ **No***	

* Complete Non-Conformance Receiving Sheet if checked

Cooler/Sample Review - Initials and date: MV 4-29-22

Comments:

Page 1 of 1

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T221276

Client:	**Ninyo & Moore**	**Project Manager:**	**Taili Iinuma**
Project:	**Arroyo Seco - San Rafael Water Reuse 2 Natural**	**Project Number:**	**211880001**

Report To:
Ninyo & Moore
Aura Scharf
475 Goddard, Ste. 200
Irvine, CA 92618

Date Due:	05/09/22 17:00 (5 day TAT)		
Received By:	Dave Berner	Date Received:	04/29/22 16:55
Logged In By:	Jennifer Berger	Date Logged In:	05/02/22 11:31

Samples Received at:	**2.7°C**		
Custody Seals	No	Received On Ice	Yes
Containers Intact	Yes		
COC/Labels Agree	Yes		
Preservation Confir	No		

Analysis	Due	TAT	Expires	Comments
T221276-01 Drum #1_B-3 [Soil] Sampled 04/27/22 15:10 (GMT-08:00) Pacific Time (US &				
6010 Title 22	05/09/22 15:00	5	10/24/22 15:10	
8015 Carbon Chain	05/09/22 15:00	5	05/11/22 15:10	
8260	05/09/22 15:00	5	05/11/22 15:10	
T221276-02 Drum #2_B-2A [Soil] Sampled 04/28/22 11:30 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T221276-03 Drum #1_B-1A [Soil] Sampled 04/28/22 15:35 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T221276-04 Composite 2:1 Drum#2_B-2A - Drum #1_B-1A [Soil] Sampled 04/28/22 11:30 (GMT-08:00) Pacific Time (US &				**Composite samples Drum#2_B-2A, Drum#1_B-1A # 2,3**
6010 Title 22	05/09/22 15:00	5	10/25/22 11:30	
8015 Carbon Chain	05/09/22 15:00	5	05/12/22 11:30	
8260	05/09/22 15:00	5	05/12/22 11:30	

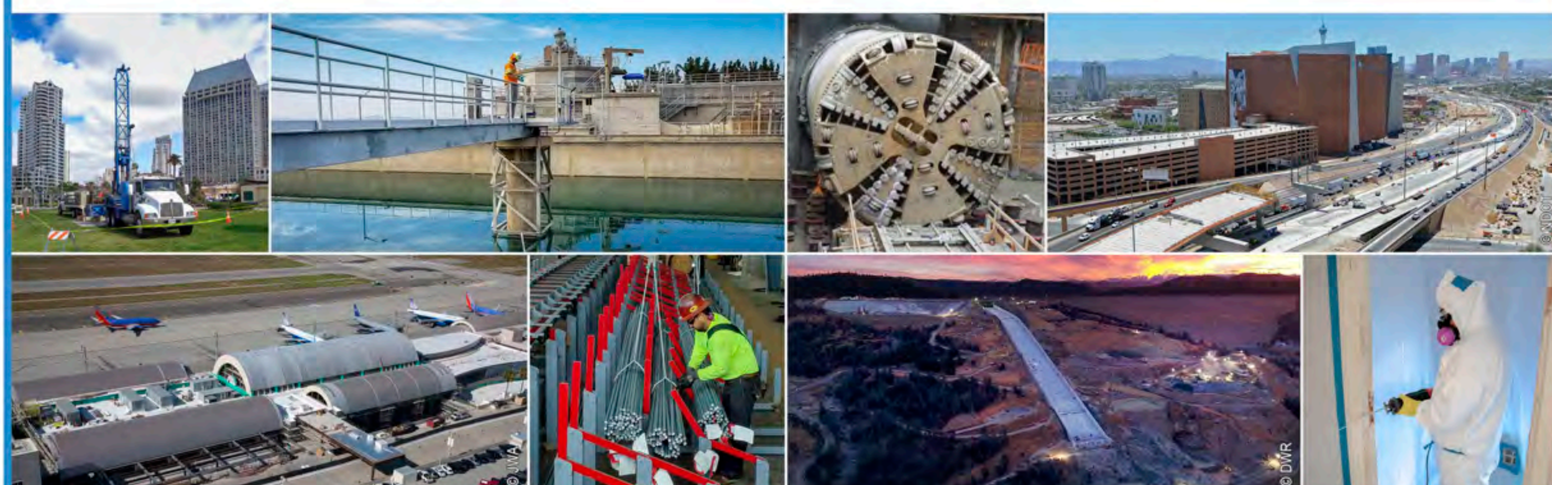
Analysis groups included in this work order

6010 Title 22

subgroup 6010B T22	7470/71 Hg

Reviewed By

Date



475 Goddard, Suite 200 | Irvine, California 92618 | p. 949.753.7070

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ninyoandmoore.com

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

Appendix F-1

San Rafael Hydrology Study

HYDROLOGY AND HYDRAULICS REPORT
SAN RAFAEL TREATMENT BASIN STORMWATER CAPTURE PROJECT

January 10, 2023

PRESENTED BY

Craftwater Engineering, Inc.
San Diego | Los Angeles
Tel 805.729.0943
www.craftwaterinc.com

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1.0 INTRODUCTION

The Upper Los Angeles River Watershed is a largely built-out, urbanized watershed of approximately 485 square miles, or 310,400 acres. Runoff from this watershed drains to over 50 linear miles of the LA River. One major tributary to the Upper Los Angeles River is the Arroyo Seco River, which makes up about 46.7 square miles of the total ULAR drainage area. The city of Pasadena and South Pasadena make up about 20% of the area tributary to the Arroyo Seco. The development of the San Rafael Treatment Basin Stormwater Capture Study in the City of Pasadena represents another major opportunity to continue the regional scale progress to achieve pollutant load reductions for the Upper Los Angeles River Watershed Management Program. Towards this goal, this report presents the analytical results evaluating the potential stormwater capture alternatives for a particular basin design. The practical infiltration basin design is specified as part of the creation of 60% design level documents for the project.

This project is intended to intercept a sizeable portion of the stormwater flows from the adjacent storm drain to the San Rafael Creek to the proposed project site. Stormwater will be diverted immediately downstream from the outfall of the 72” reinforced concrete pipe (RCP; Project No. BI 0562, Line F) managed by the Los Angeles County Flood Control District (LACFCD) at San Rafael Creek. A surface treatment infiltration and filtration basin best management practice (BMP) is proposed at the San Rafael site to capture and infiltrate stormwater from the diverted drainage channel (***Figure 1***). Project performance will be detailed in this report to demonstrate how the proposed design can contribute to both water quality goals as well as other important project considerations and desired outcomes. These options can then be considered and weighed before proceeding with the ultimate design of the project by identifying the project configuration that best meets the desired outcome and contributes to water quality benefits in a cost-effective manner.

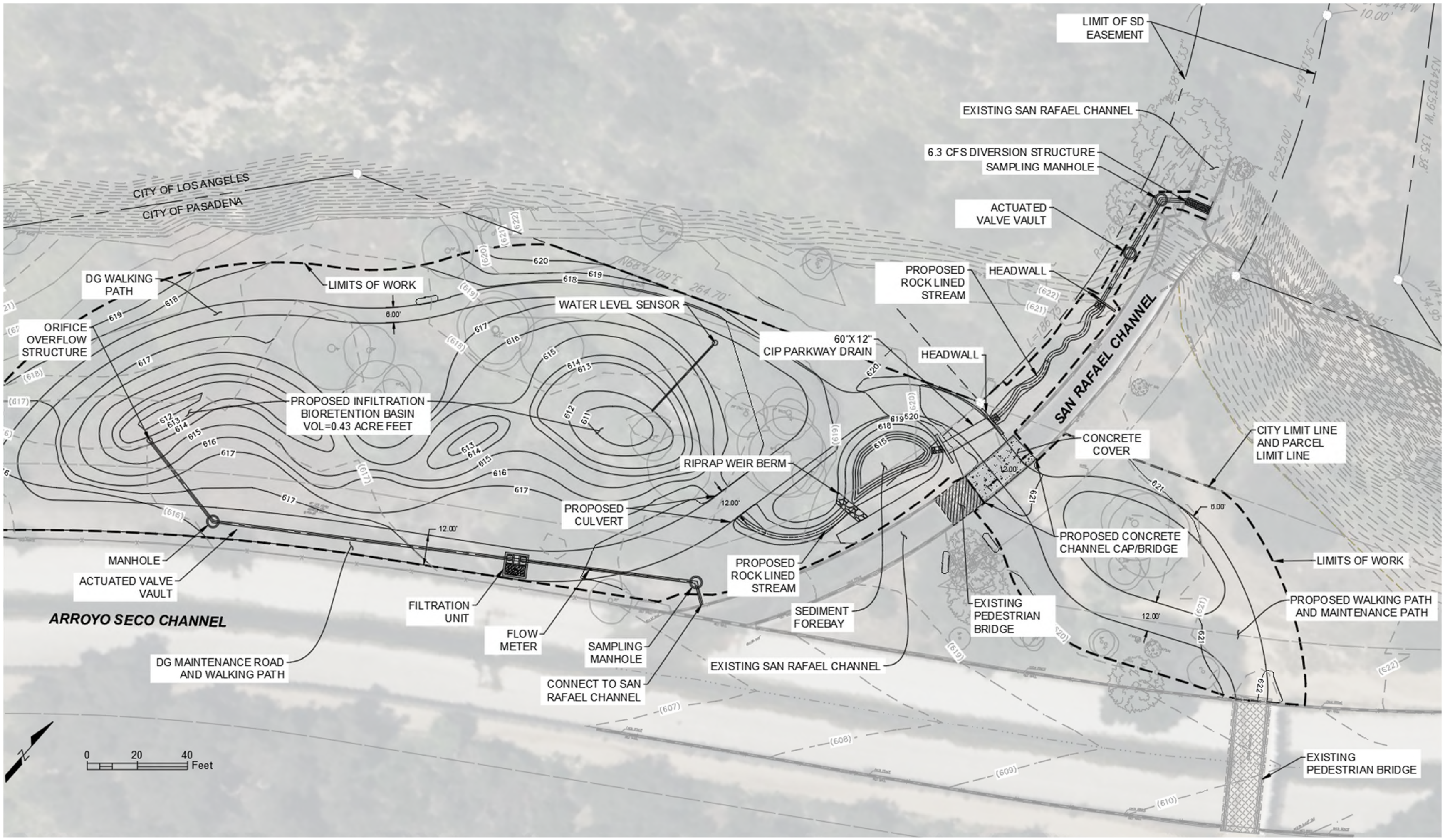


Figure 1. 60% Design Site Layout for San Rafael Treatment Basin

2.0 OBJECTIVES

To identify the most effective stormwater capture configuration at the project site, decision support modeling has been conducted to identify the optimal BMP configuration using a balanced approach that incorporates design storm hydrologic targets as well as long-term water quality considerations. BMP configuration recommendations will be made for the San Rafael site for the following key design criteria:

Diversion Rates

A range of feasible diversion flowrates were simulated to develop cost-effectiveness curves and to determine the optimal flowrate to be diverted to the capture facility that will provide the greatest water quality benefit without surpassing the point of declining returns. Flowrates will range in values grounded in construction feasibility and subject to other project constraints identified in the initial project concept development.

BMP Storage

Multiple Project conditions and constraints informed the final BMP size and footprint to be used at the site. The primary factors influencing BMP size included preserving native plant species, ensuring maintenance road access, and avoiding a nearby hillside and property boundary lines. Final BMP dimensions were determined prior to the creation of this report as part of the 60% design level documents. **The final BMP size has a total volume of approximately 0.437 ac-ft and total footprint of 0.248 acres.** The following analysis will demonstrate how this configuration can provide multiple benefits and treat the project tributary area.

Discharge –Water Use and Flowrate

Different routes exist for the outflows from the BMP, and each entails differing requirements, infrastructure, and constraints that impact the overall performance of the stormwater capture system and project cost. Also, these options represent different contributions to other local water supply efforts, of which stormwater is a growing component. Infiltration to local groundwater can be utilized to dewater the BMP. Infiltration feasibility has been determined by geotechnical analysis and will be discussed. While the design infiltration rate is set by geotechnical analysis, the infiltration outflow rate will vary because the wetted footprint available for infiltration varies with water depths. Additionally, the potential to filter stormwater and return it to the channel was assessed. Filtration throughflow rates for commonly available systems were evaluated to ensure that these discharge options are right sized to the baseline water quality for the drainage area and other system configuration options.

3.0 BASELINE SITE CONDITIONS AND CONSTRAINTS

The following subsections summarize the baseline watershed, hydrologic, and on-site conditions and constraints that were accounted for in the BMP configuration and optimization analysis for the San Rafael site.

3.1 Watershed Characterization

For this study, the Loading Simulation Program C++ (LSPC) software was used to simulate the contaminant loading, runoff volume, and flow rate associated with a long-term, 10-year continuous time series (Water Year 2009 to Water Year 2018) as well as the 85th percentile storm. The LSPC model used is part of the Los Angeles County Watershed Management Modeling System (WMMS 2.0), which is accepted by the Los Angeles Water Quality Control Board for performance of compliance analyses in the context of EWMP/WMP development.

The drainage area delineations for the project site (***Figure 2***) were developed using geospatial data associated with the WMMS modeling subwatersheds and verified/corrected slightly using further GIS analysis where full subwatersheds did not coincide with project locations and where subsurface storm drains overlapped. Digital stormwater pipe inventories and high-resolution Light Detection and Ranging (LiDAR) elevation data were used to accomplish subwatershed splitting. Developed drainage areas were used to model runoff and water quality baseline time series. These were then incorporated into BMP models to optimize the BMP decision variables. The overall area and impervious fraction are summarized in ***Table 1***.

Table 1. Summary of watershed and hydrologic conditions for the San Rafael Project drainage area

Total Tributary Area (ac)	Impervious Tributary Area (ac)	Average Annual Runoff (ac-ft)	Average Annual Zn Loading (lbs)	85^{th} Percentile Surface Runoff (ac-ft)	85^{th} Percentile Peak Flow (cfs)
442	**54.9 (12%)**	**58.0**	**21.3**	**3.4**	**6.3**

3.2 Hydrologic Considerations

Existing water quality and long-term baseline runoff stats were presented in ***Table 1***. During wet weather events, modeled hourly flow rates for the drainage area range from less than 200 cfs to nearly 1,200 cfs. The total loadings presented represent the maximum possible reductions that could be achieved by control measures at the project site. However, pragmatic diversion limitations, space constraints, and subsequent treatment mechanisms will ultimately limit how much runoff and pollutant mass can be potentially diverted into the BMP. Peak flow rate and total runoff for the 85^{th} percentile, 24-hour design storm (0.78 in, taken from isohyetal data for the centroid of the drainage areas) are found in ***Table 1*** as well.

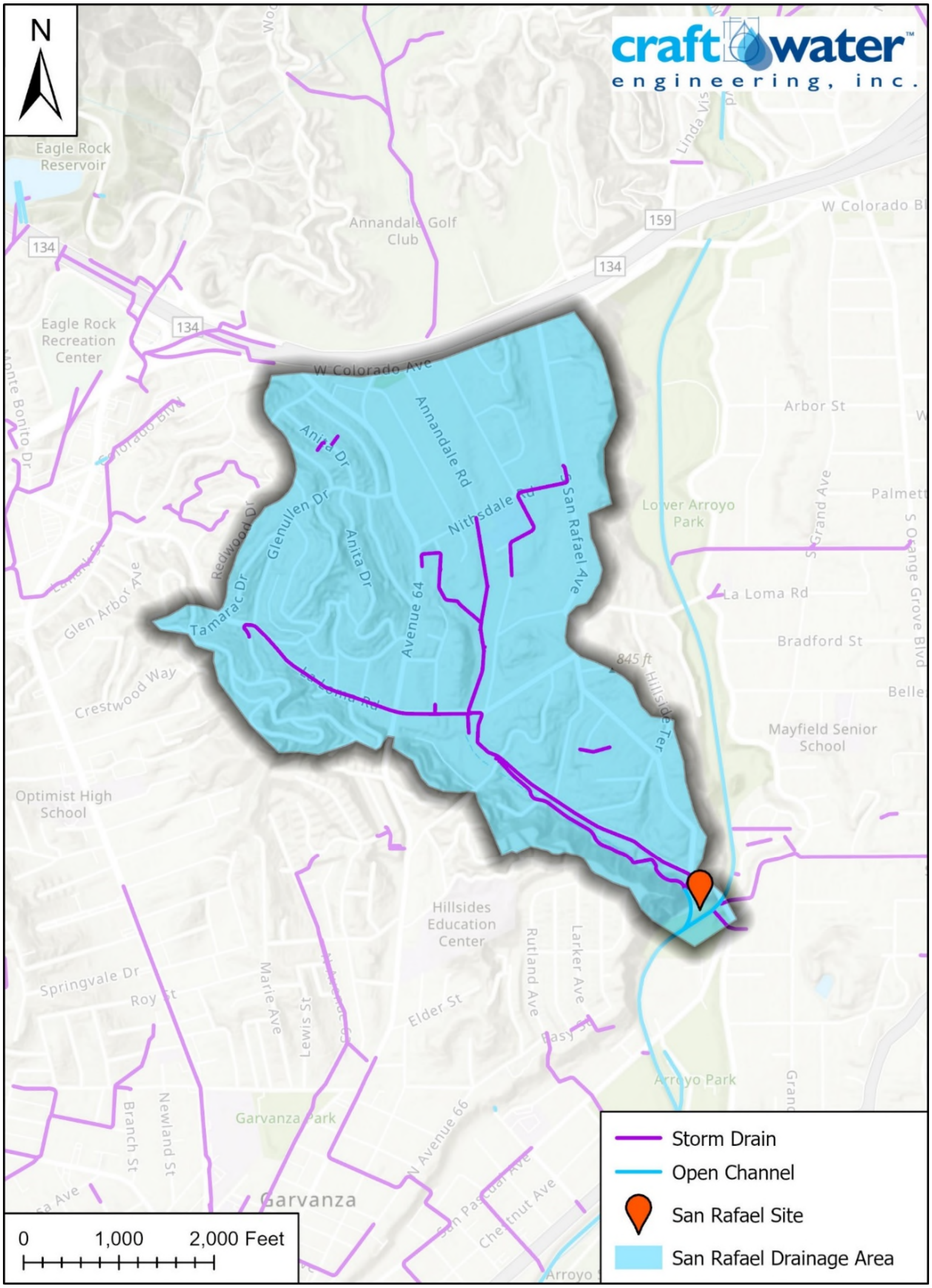


Figure 2. Drainage area to San Rafael Treatment Basin.

3.3 Hydraulic Analysis of Channel

As the project proposes to divert 6.3 cfs from the San Rafael Channel, the hydraulic impacts to the channel must be analyzed. To accomplish this, a Water Surface Pressure Gradient (WSPG) model was created to compute the existing and proposed water surface profile within the channel. The diversion structure is intended to be a drop inlet at the channel bottom. The channel design flow provided by LACFCD is 1560 cfs. The 1560 cfs flow model output for the existing channel conditions can be seen below in ***Figure 3***. The proposed channel diversion structure was modeled for a design storm flow (1560 cfs) and the resulting model output can be seen in ***Figure 4***. See ***Figure 5*** for the water surface elevation associated with both existing and proposed conditions. See ***Figure 6*** for the diagrams of the WSPG models for both existing and proposed conditions.

```
************************************
Water Surface Profile Gradient (WSPG)
XP WSPG
Engine Version 3.1          19/04/2012
Innovyze               www.innovyze.com
************************************

INPUT FILE
************************************
C:\Users\YulunWu\OneDrive - revWater\Documents\[L] Projects\[L] ArroyoSeco_20220401\H&H Report\San Rafael WSPG\SAN_RAFAEL_EX.wsx
Computed  08/26/22  14:30:15

TITLE INFORMATION
************************************

WARNING SUMMARY
************************************

RESULTS
************************************


==============================================================
   Main Line
==============================================================

 Composite Profile:

ELEMENT    TYPE       STATION    INVERT   GROUND   W.S.      DEPTH    Q    BARREL VELOC.  VELOC. ENERGY     SUPER  CRITICAL FROUDE  SLOPE    NORMAL  CROSS
NAME                             ELEV     ELEV     ELEV                                   HEAD   GRADE LN   ELEV   DEPTH    NUMBER           DEPTH   SECTION
---------- ---------- ---------- -------- -------- --------  -------- --------- ------- ------ ---------- ------ -------- ------  -------  ------  ---------
###
"Outlet"   Outlet     0.00       611.49   618.90   615.206   3.716    1560.00 1  34.98   19.00  634.21     0.000  8.068    0.000   0.00000  0.000   Rect.open
           "i.p."     28.52      611.79   619.22   615.448   3.653    1560.00 1  35.58   19.66  635.11     0.000  8.068    3.281   0.01068  5.462   Rect.open
           "i.p."     102.93     612.59   620.04   616.073   3.483    1560.00 1  37.32   21.63  637.70     0.000  8.068    3.524   0.01068  5.462   Rect.open
           "i.p."     171.46     613.32   620.80   616.643   3.321    1560.00 1  39.14   23.79  640.43     0.000  8.068    3.785   0.01068  5.462   Rect.open
"BI 0562 " Reach      235.00     614.00   621.50   617.167   3.167    1560.00 1  41.05   26.17  643.34     0.000  8.068    4.066   0.01068  5.462   Rect.open
"Trans.2"  Transition 236.00     614.00   621.50   615.889   1.889    1560.00 1  42.35   27.84  643.73     0.000  5.837    5.429   0.00000  0.000   Rect.open
           "i.p."     237.60     614.82   622.47   616.733   1.914    1560.00 1  41.79   27.12  643.85     0.000  5.837    5.323   0.51282  1.027   Rect.open
           "i.p."     242.91     617.54   625.72   619.551   2.008    1560.00 1  39.84   24.65  644.20     0.000  5.837    4.955   0.51282  1.027   Rect.open
           "i.p."     247.61     619.96   628.59   622.062   2.106    1560.00 1  37.99   22.41  644.47     0.000  5.837    4.613   0.51282  1.027   Rect.open
           "i.p."     251.79     622.10   631.14   624.306   2.209    1560.00 1  36.22   20.37  644.68     0.000  5.837    4.295   0.51282  1.027   Rect.open
"Spillway" Reach      255.50     624.00   633.40   626.316   2.316    1560.00 1  34.54   18.52  644.84     0.000  5.837    3.999   0.51282  1.027   Rect.open
"Trans.1"  Transition 256.50     624.00   633.40   628.818   4.818    1560.00 1  32.38   16.28  645.09     0.000  9.111    2.599   0.00000  0.000   Rect.open
"BI 0562 " Reach      339.50     626.02   634.00   630.840   4.820    1560.00 1  32.37   16.27  647.11     0.000  9.111    2.598   0.02434  4.811   Rect.open
"Headwork" Headwrk    339.50     626.02   634.00   630.840   4.820    1560.00 1  32.37   16.27  647.11     0.000  9.111    0.000   0.00000  0.000   Rect.open
```

Figure 3: Existing Design Wardlow Channel Flow (1560 cfs)

```
************************************
Water Surface Profile Gradient (WSPG)
XP WSPG
Engine Version 3.1         19/04/2012
Innovyze              www.innovyze.com
************************************

INPUT FILE
************************************
C:\Users\YulunWu\OneDrive - revWater\Documents\[L] Projects\[L] ArroyoSeco_20220401\H&H Report\San Rafael WSPG\SAN_RAFAEL_PR.wsx
Computed  09/01/22  12:12:17

TITLE INFORMATION
************************************

WARNING SUMMARY
************************************
 WARNING 06: Upstream channel and downstream channel are the same for transition Div.3. Use a reach instead?
 WARNING 25: Link type element Div.3 has different invert elevation than its upstream node.

RESULTS
************************************


==============================================================
   Main Line
==============================================================

 Composite Profile:
```

ELEMENT NAME	TYPE	STATION	INVERT ELEV	GROUND ELEV	W.S. ELEV	DEPTH	Q	BARREL	VELOC.	VELOC. HEAD	ENERGY GRADE LN	SUPER ELEV	CRITICAL DEPTH	FROUDE NUMBER	SLOPE	NORMAL DEPTH	CROSS SECTION
###																	
"Outlet"	Outlet	0.00	611.49	618.90	615.260	3.770	1553.70	1	34.34	18.31	633.57	0.000	8.047	0.000	0.00000	0.000	Rect.open
	"i.p."	21.06	611.71	619.13	615.440	3.725	1553.70	1	34.76	18.76	634.20	0.000	8.047	3.174	0.01068	5.446	Rect.open
	"i.p."	98.41	612.54	619.99	616.092	3.551	1553.70	1	36.46	20.64	636.73	0.000	8.047	3.409	0.01068	5.446	Rect.open
	"i.p."	169.39	613.30	620.77	616.685	3.386	1553.70	1	38.24	22.70	639.39	0.000	8.047	3.662	0.01068	5.446	Rect.open
"BI 0562 "	Reach	235.00	614.00	621.50	617.228	3.228	1553.70	1	40.10	24.97	642.20	0.000	8.047	3.933	0.01068	5.446	Rect.open
"Trans.2"	Transition	236.00	614.00	621.50	615.922	1.922	1553.70	1	41.45	26.68	642.60	0.000	5.822	5.269	0.00000	0.000	Rect.open
	"i.p."	239.13	615.61	623.41	617.584	1.977	1553.70	1	40.31	25.23	642.81	0.000	5.822	5.052	0.51282	1.024	Rect.open
	"i.p."	243.98	618.09	626.37	620.167	2.073	1553.70	1	38.43	22.93	643.10	0.000	5.822	4.704	0.51282	1.024	Rect.open
	"i.p."	248.28	620.30	629.00	622.473	2.174	1553.70	1	36.64	20.85	643.32	0.000	5.822	4.379	0.51282	1.024	Rect.open
	"i.p."	252.10	622.26	631.33	624.538	2.281	1553.70	1	34.94	18.95	643.49	0.000	5.822	4.077	0.51282	1.024	Rect.open
"Spillway"	Reach	255.50	624.00	633.40	626.392	2.392	1553.70	1	33.31	17.23	643.62	0.000	5.822	3.796	0.51282	1.024	Rect.open
"Trans.1"	Transition	256.50	624.00	633.40	629.021	5.021	1553.70	1	30.94	14.87	643.89	0.000	9.087	0.000	0.00000	0.000	Rect.open
"BI 0562 "	Reach	265.50	624.29	633.40	629.337	5.042	1553.70	1	30.81	14.74	644.08	0.000	9.087	0.000	0.03278	4.296	Rect.open
"Div_Top_"	WallEnt	265.50	624.29	633.40	629.337	5.042	1553.70	1	30.81	14.74	644.08	0.000	9.087	0.000	0.00000	0.000	Rect.open
"Div.3"	Transition	266.50	621.29	633.40	625.699	4.404	1553.70	1	35.28	19.32	645.02	0.000	9.087	2.962	-3.00000	0.000	Rect.open
"Div_Poin"	Junction	266.50	621.29	633.40	625.720	4.425	1560.00	1	35.26	19.30	645.02	0.000	9.111	0.000	0.00000	0.000	Rect.open
"Div.2"	Reach	267.50	621.29	633.40	625.716	4.421	1560.00	1	35.29	19.34	645.05	0.000	9.111	2.958	0.00000	7.000	Rect.open
"Div.1"	Transition	268.50	624.29	633.40	629.114	4.819	1560.00	1	32.37	16.27	645.39	0.000	9.111	2.599	3.00000	0.000	Rect.open
"BI 0562 "	Reach	339.50	626.02	634.00	630.840	4.820	1560.00	1	32.37	16.27	647.11	0.000	9.111	2.598	0.02430	4.814	Rect.open
"Headwork"	Headwrk	339.50	626.02	634.00	630.840	4.820	1560.00	1	32.37	16.27	647.11	0.000	9.111	0.000	0.00000	0.000	Rect.open

Figure 4: Proposed Diversion With Design (1560 cfs) Flow Analysis

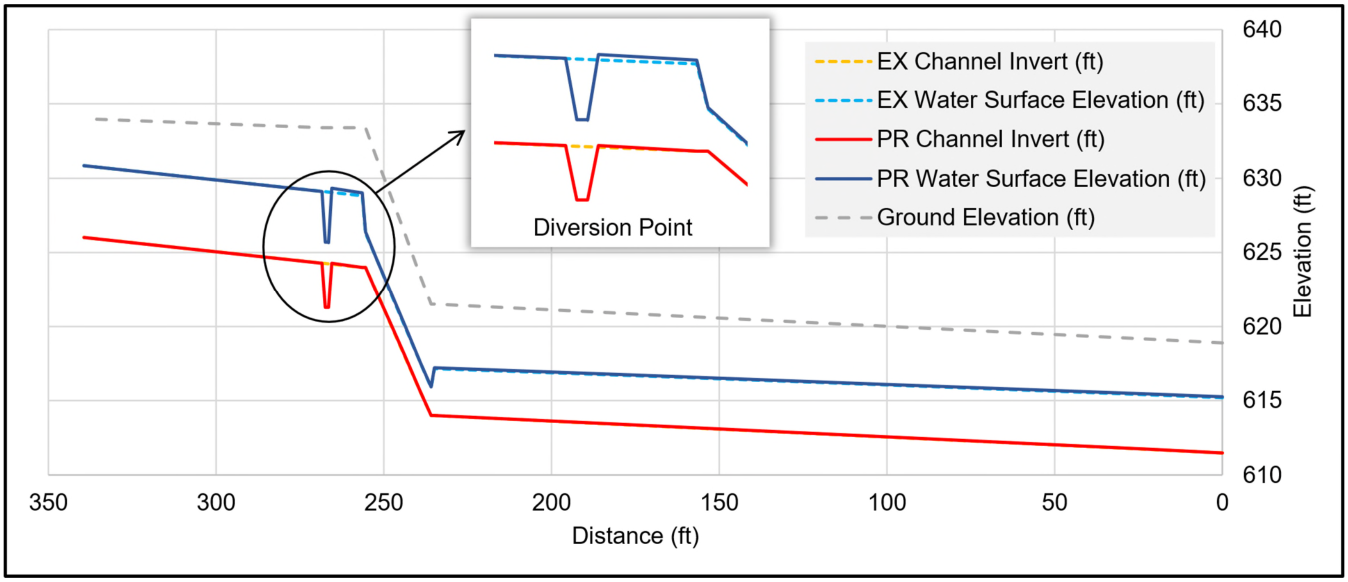


Figure 5: Water Surface Elevation of the Existing (EX) and Proposed (PR) Conditions

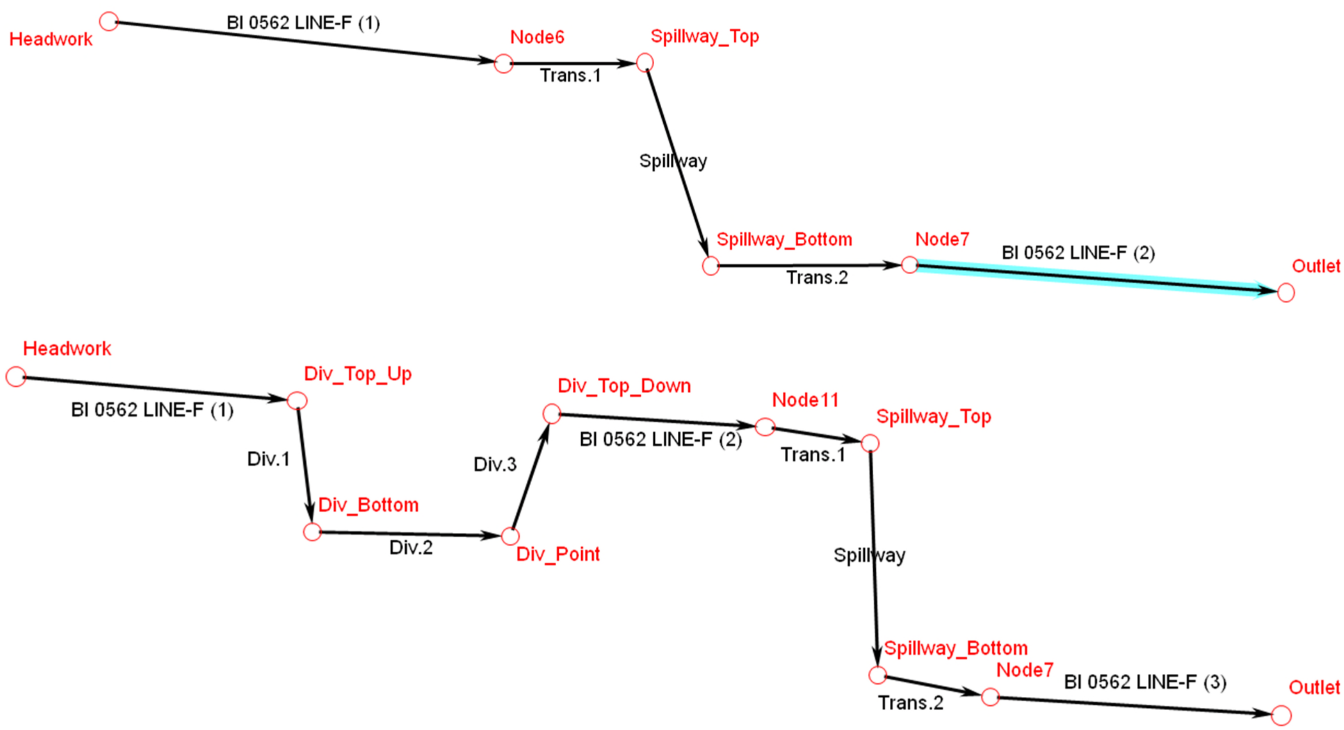


Figure 6: WSPG Models for Existing (Top) and Proposed (Bottom) Conditions

4.0 STORMWATER CAPTURE OPTIMIZATION METHODS

4.1 Water Quality Optimization Strategy

The primary design goal of the San Rafael Treatment Project is to reduce long-term annual loading of pollutants to the ULAR watershed using zinc as the limiting pollutant of interest in the analysis as established by the EWMP for this watershed group. To guarantee the capture of 85th percentile storm peak flow and runoff volume while maximizing the long-term pollutant reduction, optimization modeling was performed.

As mentioned previously, the BMP storage volume and footprint were created as part of the Project's 60% level design documents. Therefore, the purpose of optimization modeling in this memo is to find the combination of diversion rate and discharge options that maximized BMP performance (see ***Figure 7*** at right).

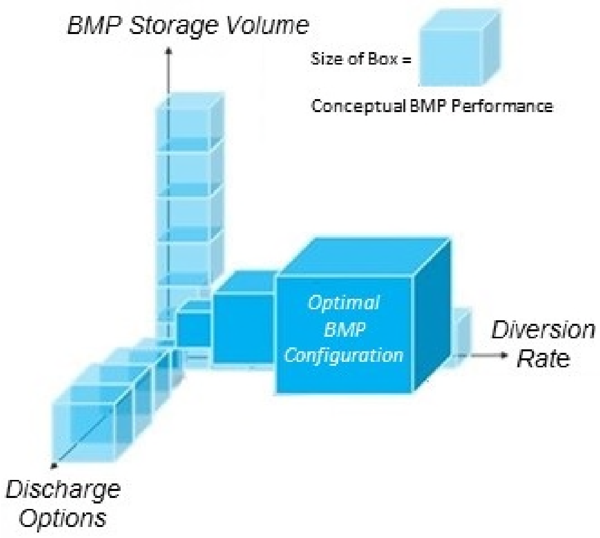


Figure 7. Conceptual illustration of optimization modeling balancing various design components to maximize performance.

The model setup for water quality simulation and optimization is complex, involving several modeling systems and iterative feedback from design engineers. The general methodology is discussed below, and the results are presented thereafter.

4.2 BMP Performance Modeling and Optimization

BMP performance was modeled under two different time frames: 1) during an 85th percentile, 24-hour storm, and 2) during a 10-year period.

The 85th percentile, 24-hour rainfall was read from the LA County Hydrology Map. A spreadsheet model was then used to simulate the diversion flow, storage, and discharge flows of the BMP at an hourly time step. The BMP configurations are designed to fully capture the 85th percentile peak flow and store the 85th percentile 24-hour runoff volume.

To better represent the BMP's long-term performance, a custom BMP model was used to improve upon certain modeling limitations in EPA's System for Urban Stormwater Treatment and Analysis Integration (SUSTAIN). This custom model is grounded in the physical BMP representations used in SUSTAIN, and it provides built-in optimization algorithms to more systematically automate the process of evaluating many different BMP configurations to select a cost-effective solution related to project goals. The model was run using 10 years of runoff and pollutant loading time-series data generated by LSPC at an hourly time step.

Modeling efforts investigated the range of BMP configurations as detailed in the following subsections.

4.2.1 Inflow Structure and Diversion Rates

It was determined based on the surveyed site topography that stormwater diversion through gravity is feasible for the San Rafael BMP. Compared to a pumped diversion, gravity is less costly to construct and easier to operate and maintain. Therefore, only a gravity diversion was modeled.

The diversion rate should be no lower than the 85th percentile storm peak flow to guarantee full 85th percentile storm capture. Smaller and larger diversion rates were also modeled to study the impact of diversion rate on the long-term performance.

4.2.2 Basin Configuration, Storage Volume, and Footprint

Site assessments and discussions with project stakeholders have led to the development of a surface basin BMP. ***Figure 8*** displays the process flow diagram for the BMP. The basin has a maximum storage volume of **0.437 ac-ft** and a water surface area of **10,810 sf** at maximum storage. These storage/footprint configurations were the only ones modeled for this analysis, as it was determined to be the most feasible to construct within the site footprint.

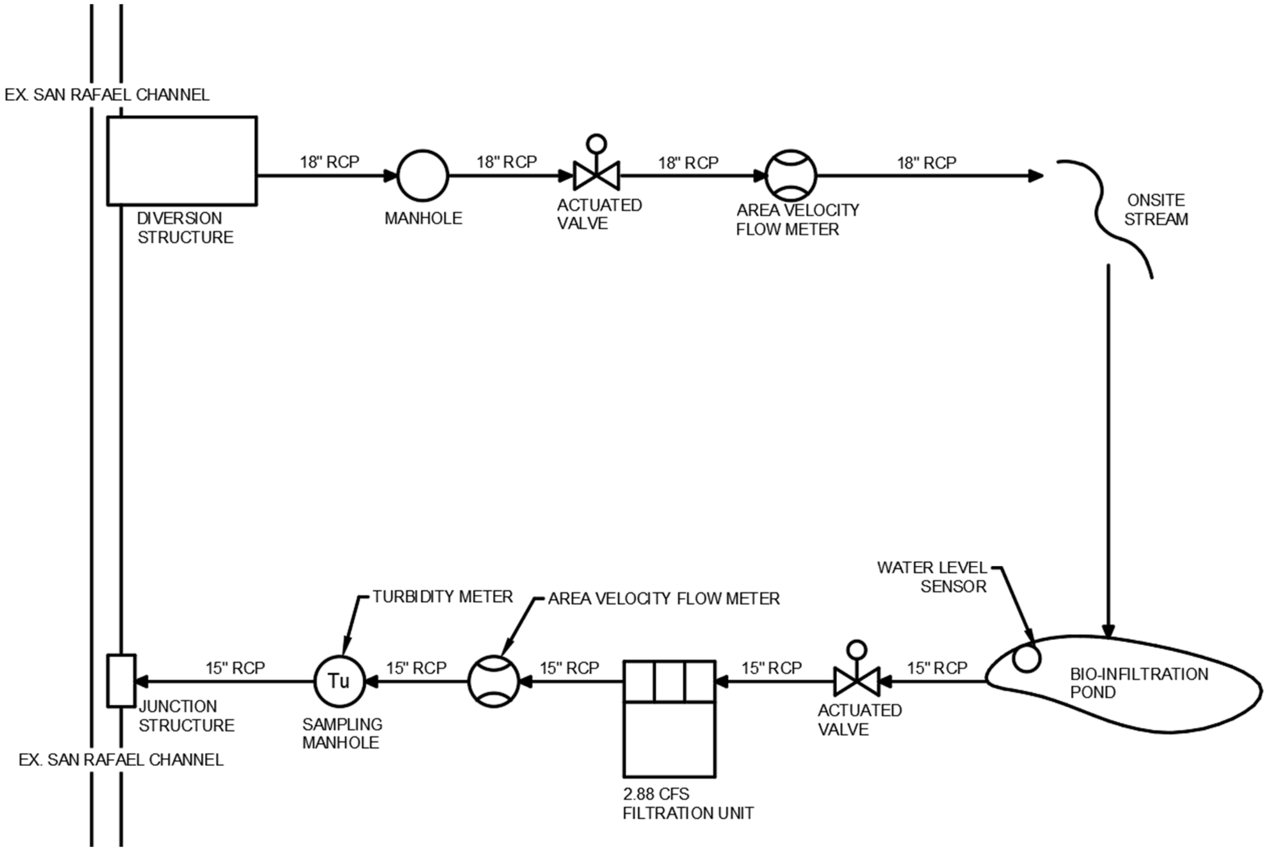


Figure 8. San Rafael BMP Process Flow Diagram

4.2.3 Discharge Alternatives

Different routes exist for the outflows from the BMP, with each entailing differing requirements, infrastructure, and constraints that impact the overall performance of the stormwater capture system and project cost. Additionally, these options represent different contributions to water supply and pollutant removal.

Infiltration Only

Geotechnical investigations indicated substantial infiltration rates at the proposed basin bottom depth (approximately 2.9 in/hr with factors of safety applied). While the infiltration rate is set at 2.9 in/hr, the entire basin footprint will not always be used for infiltration. Because of the shape of the basin, as more water is stored in the basin, a bigger area becomes available for infiltration, which results in a higher infiltration flow rate. The relationship between the volume of stored water and the infiltration area is illustrated in ***Figure 9***. Such effect is represented in the modeling.

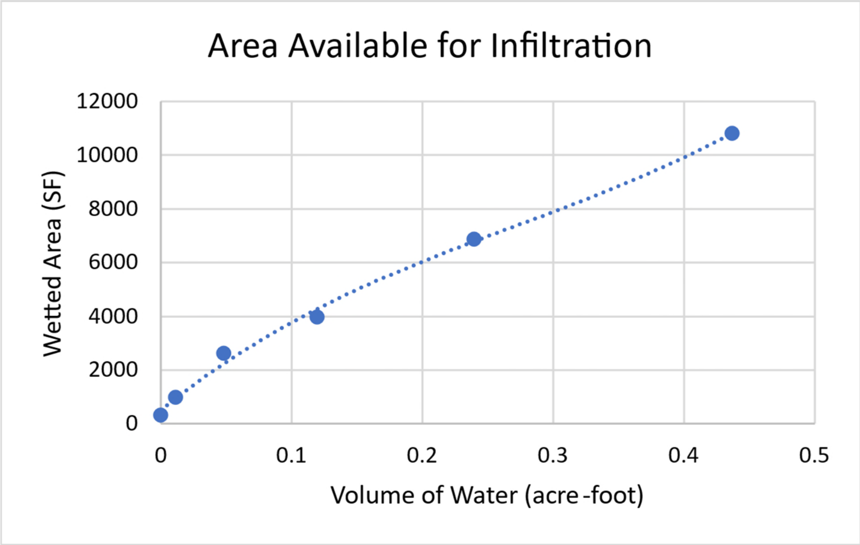


Figure 9. The Volume-Area Relationship for the San Rafael Basin

Infiltration and Filtration

Dual infiltration and filtration treatment was also analyzed for the San Rafael BMP. In the combined treatment configuration, diverted flows would first enter the basin to be treated through infiltration only. When the water level is above the filter outlet, the water will be filtered at the filtration rate. If the diverted flow is larger than the filtered flow, the excess flow would still contribute to filling the basin until the basin is full.

Several commonly available stormwater filtration devices were modeled (at 2.88 cfs, 5.76 cfs, and 7.84 cfs filtration rates). These values were chosen to cover a range of potential outflows common to off-the-shelf proprietary filter products. Because the available volume and footprint are limited, a higher filtration flow rate allows the BMP to treat and discharge more water, therefore accepting more water during bigger storms.

The storage volume reserved for infiltration ("infiltration pool") is also optimized to ensure the full capture of the 85th percentile design storm. If the total basin volume is unchanged and the infiltration pool is smaller, a bigger volume will be available during bigger storms to capture the peak runoff volume. However, to achieve the water supply benefits as part of the project objectives, the infiltration pool should not be too small. During utility design, the infiltration pool is controlled by setting the elevation of the outlet structure to the filter, as illustrated in ***Figure 10***.

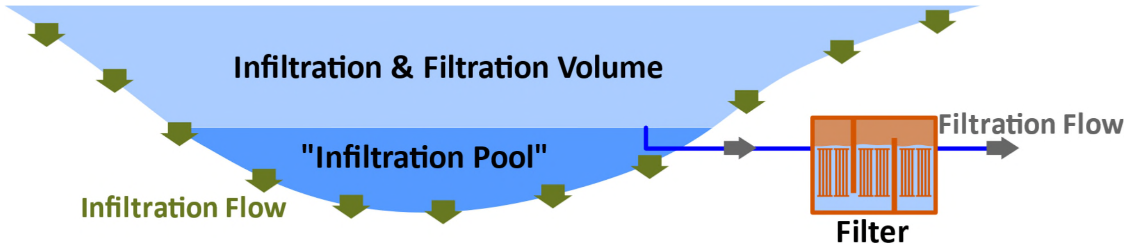


Figure 10. Storage Volume Reserved for Infiltration – "Infiltration Pool"

4.2.4 Safe Clean Water Program (SCWP) Transfer Agreement and O&M Considerations

When comparing treatment options, two performance metrics must be considered.

- **Pollutant Removal** — Filtration devices remove most of the pollutants that enter it; physical limitations prevent complete removal. While the effluent concentration is orders of magnitude smaller than pollutant loads, it still generally results in a small amount of pollutant leaving the BMP. Infiltrative BMPs, on the other hand, fully remove all diverted pollutants that enter it. The pollutant removal of a combined BMP depends on the amount of storage designated for infiltration and filtration.
- **Water Capture** — Filtration devices will usually return treated stormwater to an adjacent storm drain or channel, which may or may not have the potential for reuse. Infiltrative BMPs normally recharge groundwater. *However, previous analysis has determined that runoff infiltrated by the San Rafael BMP will not contribute to groundwater recharge*.

The combined performance of the San Rafael BMP and the San Pascual BMP (detailed in another report) must meet the performance metrics specified in the SCWP transfer agreement (see performance metrics in ***Figure 11***). The modeled performance of the recommended BMP configuration will be compared to the transfer agreement metrics in Section 7.2.

A-2. Consistent with SCW Program Goals

The City acknowledges that the Budget Plan is consistent with the Safe, Clean Water Program Goals as described in Chapter 18.04 of the Code. The following is a summary of the goals, projected targets, and metrics for reporting performance.

Table A-2. Program Goals and Anticipated Performance Metrics

No.	Goal	Summary	Target		Unit
1	Improve water quality and attainment of water-quality requirements	The stormwater capture and treatment facility will provide water quality improvements to address water quality requirements described in the Upper Los Angeles River Enhanced Watershed Management Program	Runoff Treated (average annual)	27.0	Acre-Feet
			Zinc Reduction (% Reduction)	65%	
2	Increase drought preparedness by capturing more stormwater and/or urban runoff to store, clean, reuse, and/or recharge groundwater basins	The facility will capture and treat urban runoff and stormwater runoff from the San Rafael Creek and Arroyo Seco Channel.	Average annual water captured and used for irrigation (average annual)	100	Acre-Feet
5	Invest in infrastructure that provides multiple benefits	This project is a multi-benefit project that improves water quality, provides water supply, and integrates native habitat	N.A.		
6	Prioritize Nature-Based Solutions	Landscape plans to include additional native trees, shrubs, and grasses to be installed at select spots impacted by the construction throughout the project area. The swales will be sized to convey all flows from the surface drainage.	Landscape Plans	1.0	Each
7	Provide a spectrum of project sizes from neighborhood to regional scales	The project will construct a regional stormwater capture facility	Design Plans	1.0	Each

Figure 11. Screenshot of the Transfer Agreement

Table 2 details key cost aspects that are both consistent among and differentiate between the various modeled options presented in this memo.

Table 2. Summary of key cost components for different discharge options.

Cost applicable to….	Key Cost Components	O&M Cost Components
All Options	Diversion Infrastructure, Pretreatment, Optional Pump	Inspection, Sediment Removal, Pumping Maintenance/Electricity
Infiltration	Excavation, Basin Construction	Landscaping Maintenance
Combination	Excavation, Basin Construction, Filtration Unit(s)	Landscaping Maintenance, Filter Cartridge Cleaning

5.0 OPTIMIZATION MODELING RESULTS

Using the methods described in Section 4.0, different configuration alternatives and modeling parameters are presented below to demonstrate the BMP performance associated with these options and narrow them down to a recommended project configuration that will meet different needs for the ULAR watershed.

5.1 Diversion Rate

The 85th percentile storm peak flow rate is 6.26 cfs. To fully capture the 85th percentile storm, the design diversion rate should be no smaller than 6.3 cfs. Other diversion rates were modeled to study the impact of diversion rate on the BMP's long-term stormwater capture and pollutant removal performance.

Table 3 compares the performance of an infiltration-only BMP with different diversion rates. Diversion rates above 6.3 cfs do not provide additional water supply or pollutant reduction benefits. When the diversion rate is high enough, the maximum storage volume and the treatment rate become the limiting factors of BMP performance, i.e. the BMP is not capable of treating all the flows diverted.

Table 3. Performance of the San Rafael Infiltration BMP with Various Diversion Rates.

Diversion Rate	Avg. Annual Runoff Infiltrated (ac-ft)	Avg. Annual Zinc Reduction (lbs)
1.0	21.1	5.60
5.0	25.0	8.87
6.3	25.0	8.88
10.0	25.0	8.88
15.0	25.0	8.88

Table 4 compares the impacts of diversion rates on a BMP with both infiltration discharge and filtration discharge. The infiltration pool is set to the optimal value (0.068 acre-feet) which will be discussed in the following sections. Similar to the comparison in ***Table 3***, making the diversion higher than 6.3 cfs does not significantly improve BMP performances, because the BMP performance is limited by the storage capacity and the treatment rate rather than the diversion rate. Therefore, to save construction cost, the recommended diversion rate is **6.3 cfs**.

Table 4. Performance of the San Rafael Combination BMP with Various Diversion Rates.

Diversion Rate	Avg. Annual Runoff Filtered (ac-ft)	Avg. Annual Runoff Infiltrated (ac-ft)	Avg. Annual Zinc Reduction (lbs)
1.0	7.2	14.2	5.0
5.0	22.6	15.3	11.8
6.3	23.1	15.7	12.5
10.0	23.3	15.9	12.8
15.0	23.3	15.9	12.8

5.2 Outflow Options

5.2.1 Infiltration Discharge or Combination Discharge

The modeled 85th percentile, 24-hour storm runoff volume is 3.409 acre-feet. Due to the limited basin volume and footprint, the infiltration-only option only treats 1.610 acre-feet, which is significantly smaller than the full 85th percentile runoff. Therefore, a filter must be used to increase runoff capture. The combination outflow option that discharges water through infiltration and filtration will be used.

5.2.2 Recommended Filtration Rate and Infiltration Pool Volume

Three filtration rates (2.88 cfs, 5.76 cfs, and 7.84 cfs) were considered. To save construction and maintenance costs, a smaller filtration unit with a lower filtration rate is preferred. However, to fulfill the 85th percentile volume capture requirement, a smaller filter needs to start filtering at a lower water level so that it can filter enough water in the basin. This means the outlet to a smaller filter needs to be lower, and the infiltration pool would be smaller, as illustrated in ***Figure 10***.

The maximum infiltration pool is determined based on 85th percentile runoff volume capture using each filter. Any infiltration pool smaller than this value will leave space in the basin to accept the peak flow. The results are compiled in ***Table 5***.

Table 5. Average Performance of BMP Treatment Types across all Filtration Rates.

Outflow	Max. Infil. Pool to Capture 85th Storm Runoff (acre-feet)	Avg. Annual Runoff Filtered (ac-ft)	Avg. Annual Runoff Infiltrated (ac-ft)	Avg. Annual Total Runoff Treated (ac-ft)	Avg. Annual Zinc Removal (lbs)
2.9 in/hr infiltration, **2.88 cfs filtration**	0.068	23.1	15.7	38.8	12.5
2.9 in/hr infiltration, **5.76 cfs filtration**	0.437 (full basin)	17.3	25.0	42.3	13.9
2.9 in/hr infiltration, **7.84 cfs filtration**	0.437 (full basin)	17.3	25.0	42.3	13.9

Using the smallest filter, the maximum allowable infiltration pool volume is 0.068 acre-feet. Any storage volume above this value will be available for the filter. This option requires the outlet to the filter to be set at approximately 2.6 feet below the maximum water level. The performance of the 5.76 cfs and the 7.84 cfs filter are similar. Compared to the 2.88 cfs filter, the larger filters provide significantly more groundwater recharge through infiltration (avg. annual runoff infiltrated), and slightly better pollutant removal (avg. annual zinc removal).

As mentioned in Section 4.2.4, infiltration at the San Rafael site is no longer considered a groundwater recharge benefit. To save costs and maintenance effort without losing too much pollutant removal benefits, the **2.88 cfs** filtration unit and a **0.068 acre-feet** infiltration pool are recommended.

5.3 Recommendation Summary

According to the optimization modeling results in Section 5.1 and 5.2, the following configurations are recommended for the San Rafael BMP:

- **Diversion rate: 6.3 cfs gravity diversion.**
- **Mode of discharge: infiltration and filtration.**
- **Filtration rate: 2.88 cfs.**
- **Storage volume reserved for infiltration only (infiltration pool): 0.068 acre-feet; outlet to the filter to be set at approximately 2.6' below the maximum water level.**

This BMP configuration is expected to provide full capture of the 85th percentile storm peak flow and runoff volume. The modeled average annual runoff filtered is **23.1 acre-feet** (60% of total stormwater capture), and the average annual runoff infiltrated is **15.7 acre-feet** (40% of total stormwater capture). The BMP is expected to remove an average of **12.5 pounds** of Zinc per year.

6.0 DIVERSION STRUCTURE DESIGN

The proposed diversion structure consists of a drop inlet with grates spanning the width of the storm drain, and an 18-inch diversion pipe conveying water from the drop inlet to a stream. This section explains the configuration of the diversion structure, and its anticipated performance predicted by hydraulic calculations.

6.1 Diversion Structure Configuration

The proposed drop inlet will span across the bottom of the 10' X 5' rectangular open channel. The grated inlet is 3'-7" wide along the channel, and 8'-9" long across. The bottom of the drop inlet has a slope across the channel towards the diversion pipe. The proposed diversion pipe will be an 18" Reinforced Concrete Pipe at a 0.5% slope. ***Figure 12*** and ***Figure 13*** are the plan and section view of the proposed diversion structure and diversion pipe.

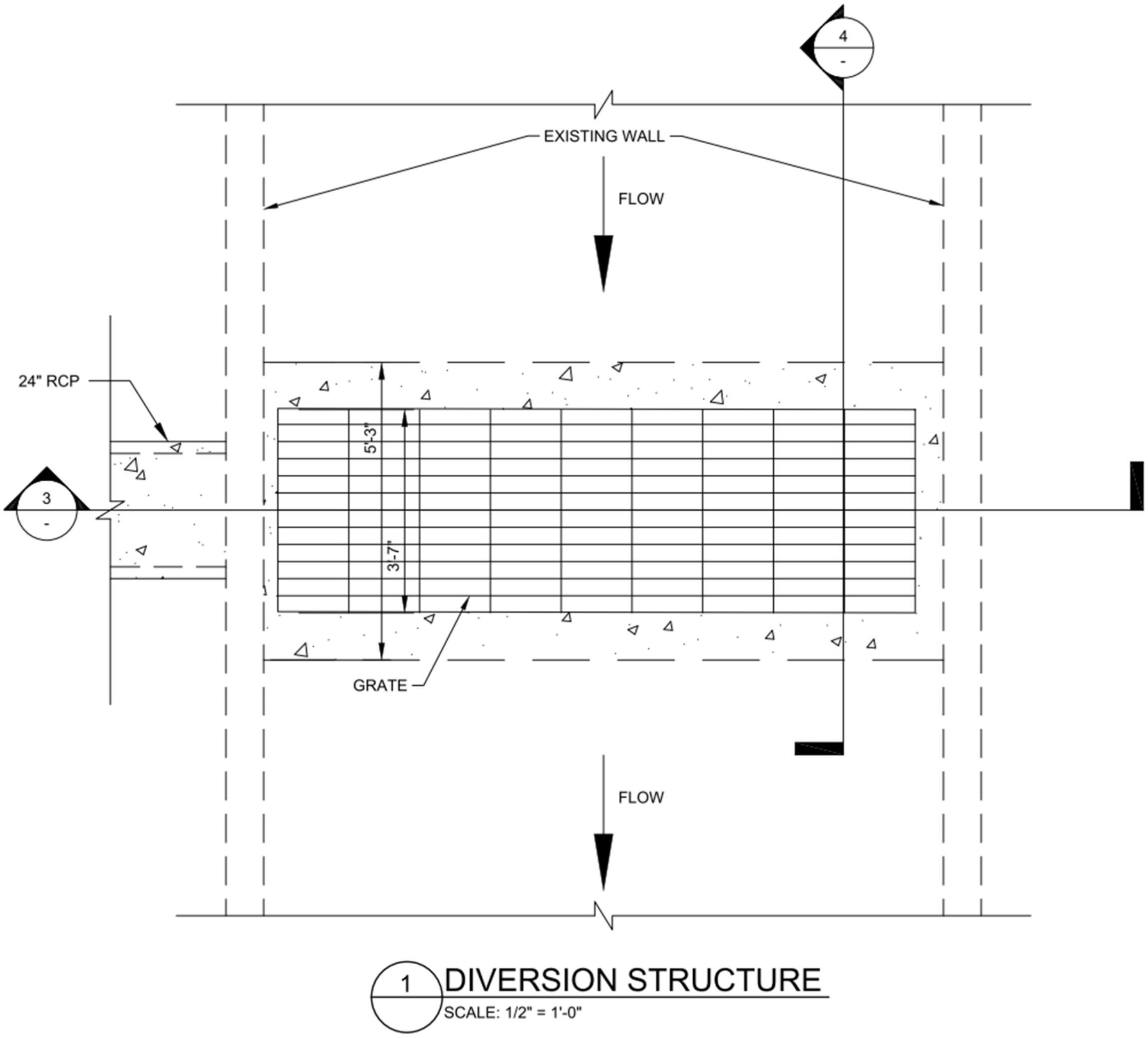


Figure 12. Proposed Channel Diversion Structure Plan View

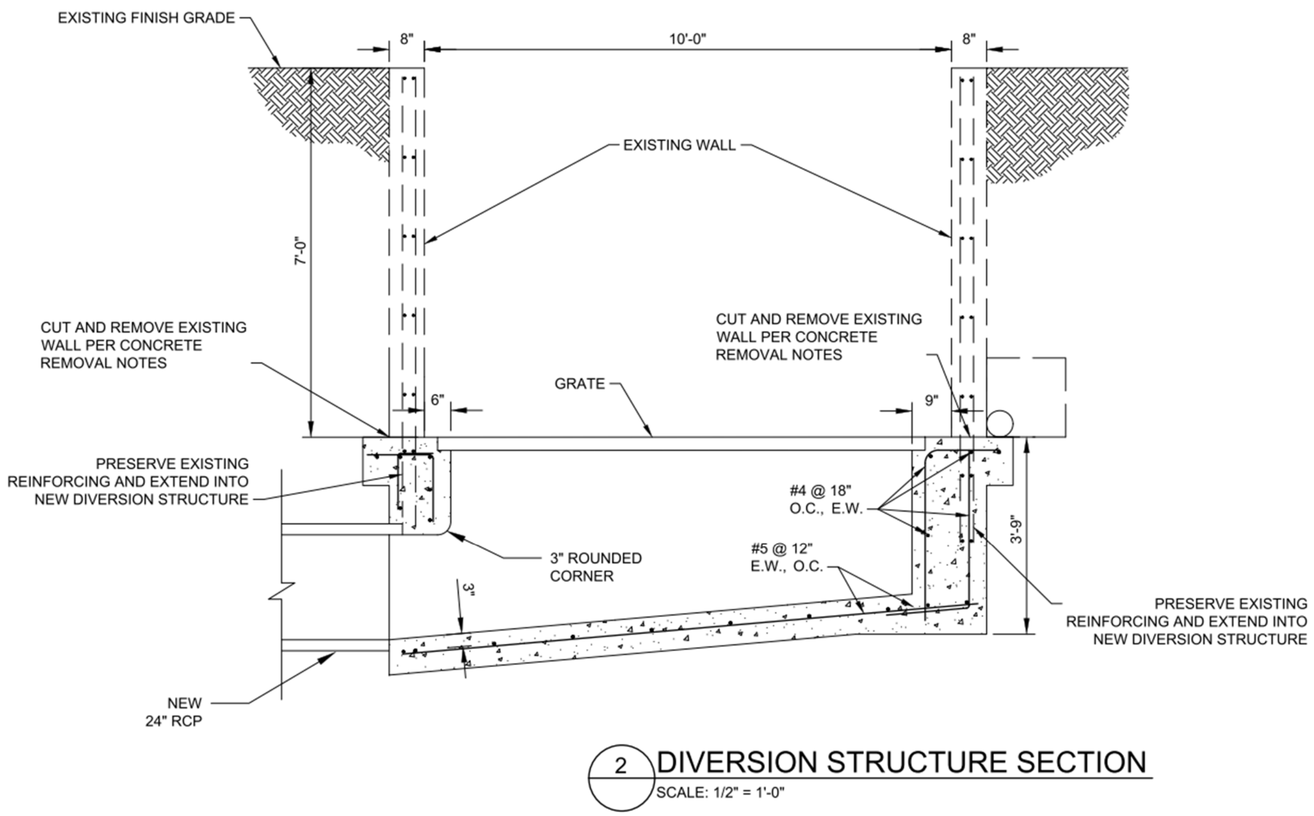


Figure 13. Proposed Channel Diversion Structure Section View

6.2 Diversion Structure Performance Prediction

The diversion structure configuration is simplified for hydraulics calculations. Equation and parameters from the Federal Highway Administration's *Urban Drainage Design Manual* (HEC-22) were used for the following calculations. The components of the system are:

- The existing storm drain simplified as a single rectangular open channel. The channel has a width of 10', a maximum depth of 5', a longitudinal slope of 0.0243, and a Manning's n of 0.013.
- A grate simplified as an orifice. The grate is 8'-9" long across the channel and 3'-7" wide along the channel. An opening area of 80% is assumed (P-50 x 100 grate). To ensure sufficient flow capacity under clogging conditions, a clogging factor of 0.5 is applied to further reduce the effective grate opening area.
- An 18" diameter circular pipe at 0.5% slope flowing as a culvert. Culvert calculation was performed in Hydraflow Express Extension for Autodesk Civil 3D.

Figure 14 illustrates the relationship between these components. As discussed in Section 5.3, the recommended diversion rate is 6.3 cfs. Calculations were performed to examine whether sufficient diversion capacity is provided.

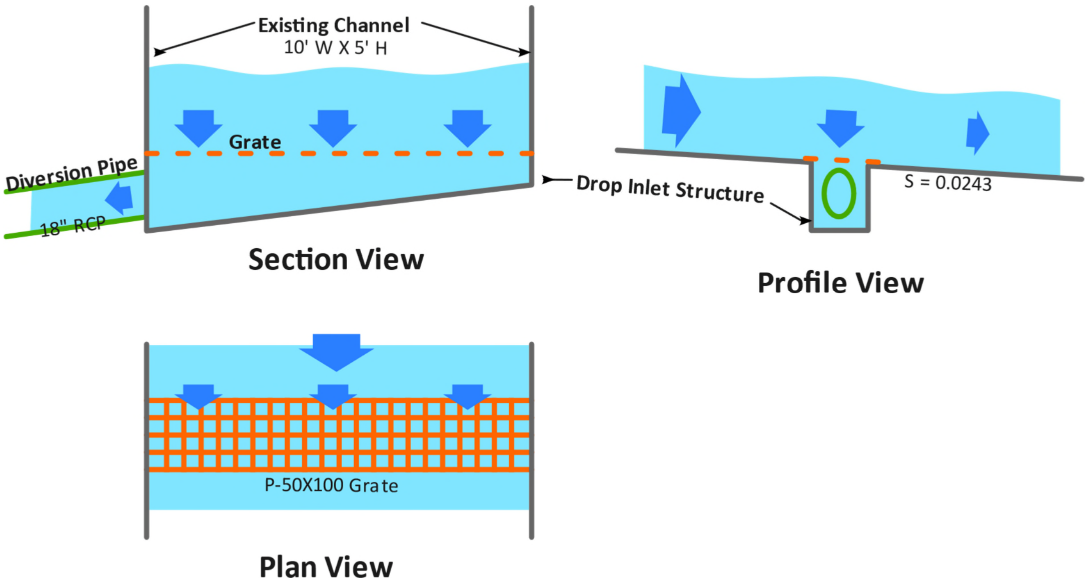


Figure 14. Components of Hydraulics Calculations

6.2.1 Existing San Rafael Open Channel

Flow rate in the channel at depth d is calculated with Manning's equation (HEC-22 Section 5.1.5, Equation 5-5),

$$Q = (1.486/n)\ A\ R^{2/3}\ S^{1/2}$$

$$A = Ld,\ P = 2d + L,\ R = A/P$$

where n = 0.013 is the Manning's roughness coefficient for concrete, L = 10 ft is the channel bottom width, d is the flow depth upstream of the diversion structure, P is the wetted perimeter in ft, A is the cross-sectional flow area in sqft, R is the hydraulic radius in ft, and S = 0.0243 is the energy grade line slope.

6.2.2 Drop Inlet Grate

The performance of the drop inlet grate was calculated based on the *San Diego County Hydraulic Design Manual - September 2014* which references the Federal Highway Administration's *Urban Drainage Design Manual* (HEC-22 Section 4.4.5.1). The grate capacity Q is calculated as follows,

$$Q = C_O(0.8LWC_A)(2gd)^{0.5}$$

where C_O = 0.67 is the orifice coefficient, 0.8×L×W is the grate opening area in sqft, C_A=0.5 is the area clogging factor, g = 32.2 ft/s^2 is the gravitational acceleration, and d is the channel flow depth upstream of the grate in ft.

6.2.3 Diversion Line

Several flow rate values were used in Hydraflow to calculate the hydraulic grade line (HGL). The headwater elevation is the water elevation in the drop inlet structure which is considered to be the same as the elevation in the open channel. ***Figure 15*** shows the inputs of the Hydraflow Express tool.

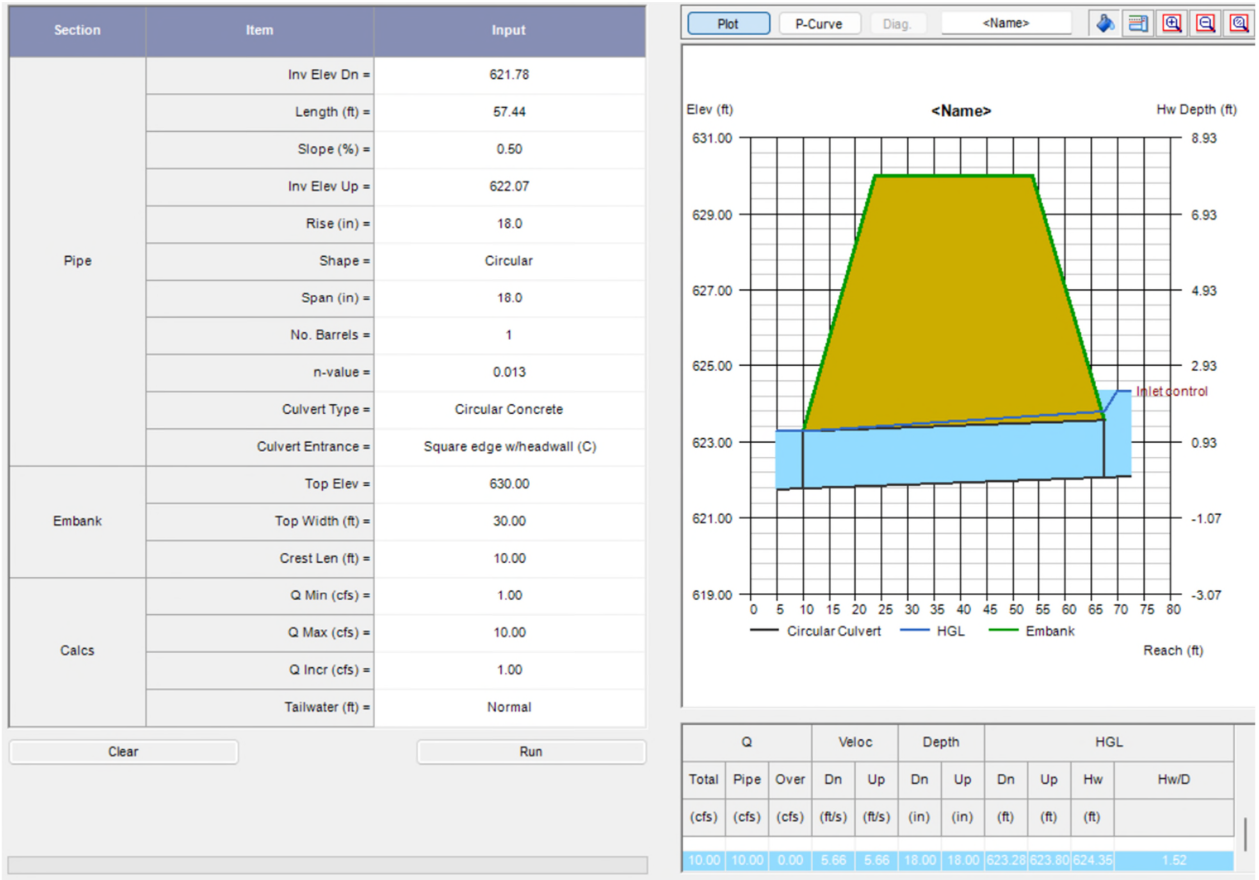


Figure 15. Hydraflow Express Inputs and Outputs for Culvert Calculation

6.2.4 Performance Prediction

The flow diverted to the San Rafael basin would be the smallest of 1) the flow rate in the storm drain, 2) the drop inlet grate capacity, and 3) the diversion pipe capacity. The grate capacity and the diversion pipe capacity are compared to the channel flow rate in ***Figure 16***.

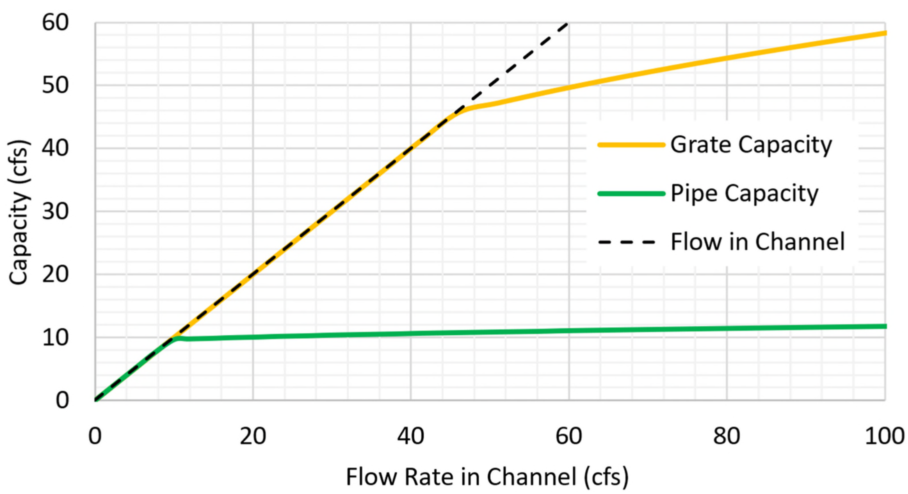


Figure 16. Diverted Flow Rate Prediction

It can be observed from ***Figure 16*** that pipe capacity is the limiting factor of the diversion rate. The grate has the sufficient capacity to provide flow to the diversion pipe even if 50% of the grate area was clogged (as assumed in Section 6.2.2). The diversion pipe can divert the 6.3 cfs 85th percentile peak flow when there is 6.3 cfs in the channel.

The flow diverted to the BMP will exceed 6.3 cfs during high flow conditions. Based on the 10-year hourly runoff time-series generated by LSPC, the highest flow rate in the channel within that 10-year period is 52 cfs, under which condition 11 cfs will be diverted to the BMP. The modeled 10-year runoff in the San Rafael channel was organized as an empirical cumulative distribution function (ECDF) graph shown in ***Figure 17***. According to the graph, the runoff in the channel and the diverted flow rate will stay under 6.3 cfs 99.7% of the time.

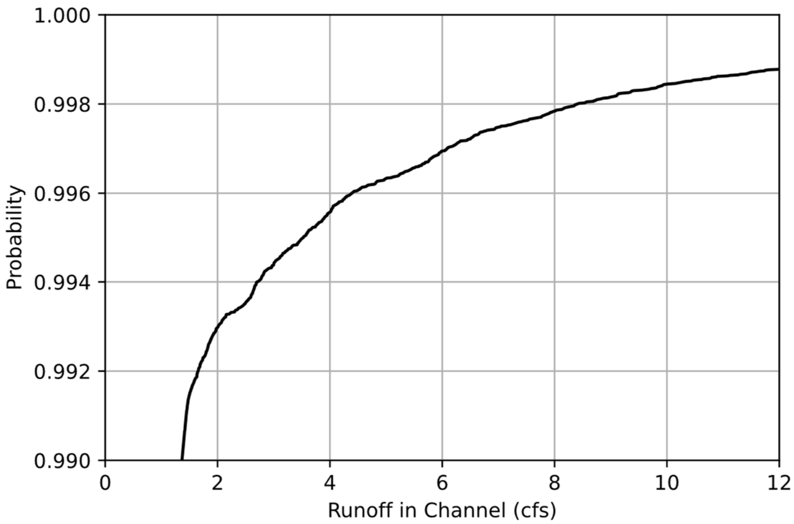


Figure 17. Empirical Cumulative Distribution Function of Modeled Runoff in San Rafael Channel

Based on the hydraulics calculation summarized in ***Figure 16*** and the long-term runoff modeling summarized in ***Figure 17***, it was concluded that

- The diversion structure can meet the targeted diversion rate of 6.3 cfs when there is 6.3 cfs in the channel. The diverted flow rate is controlled by the diversion pipe.
- The stream and the basin should be designed to handle a peak diverted flow rate of approximately 10 cfs which will occur during some extreme conditions.
- Considering the low probability of the diverted flow rate exceeding 11 cfs, the current flow control design is sufficient to handle the high flows.

7.0 SUMMARY AND CONCLUSION

7.1 Analysis and Modeling Results

The design and performance of the San Rafael treatment basin were modeled using the 85th percentile 24-hour design storm and the 10-year hourly runoff and pollutant time series. The recommended BMP configuration consists of a 6.3 cfs gravity diversion structure, a 0.437 acre-feet basin with 0.068 acre-feet reserved for infiltration only, and a 2.88 cfs filtration unit on the discharge line. The recommended BMP configuration is expected to provide 1) full capture of the 85th percentile storm peak flow and runoff volume, 2) 23.1 acre-feet stormwater filtration per year, 3) 15.7 acre-feet infiltration per year, and 4) 12.5 pounds of Zinc removal per year. Analysis shows that the diversion structure has sufficient capacity and can handle high flows in the channel.

7.2 Compliance with the Transfer Agreement

The Safe Clean Water Program (SCWP) transfer agreement specifies the performance target for the Arroyo Seco Treatment Wetlands Project which consists of the San Rafael site and the San Pascual site (see ***Figure 11***). According to the analysis for San Rafael in this report and a previous report for San Pascual, the combined benefits of the two sites meets the performance metrics in the transfer agreement. The modeled performances of the two sites are summarized in ***Table 6***.

Table 6. Comparison Between Modeled Project Performance and Targeted Performance

Metrics	San Rafael	San Pascual	Total	Target
Average Annual Runoff Volume Treated (ac-ft)	38.8	534	572.8	27.0
Average Annual Zinc Load Reduction Compared to Divertible Load	12.5 lbs (81%)	157 lbs (74%)	169.5 lbs (80%)	65%
Average Annual Water Capture for Water Supply (ac-ft)	Not Counted	320	320	100

7.3 Contribution to EWMP Compliance Goals

The ULAR EWMP (to which the Arroyo Seco is tributary to) bases their compliance pathway on structural BMP Capacity. While this is implicitly based on pollutant reduction, BMP storage capacity is the regulatory metric that cities are held to. The updated ULAR EWMP Appendix 7F (not approved by the water board as of Jan 2023) details the required structural BMP capacity for the City of Pasadena within the Arroyo Seco watershed to be 86.9 ac-ft, 8.2 ac-ft of which is designated for regional projects on public parcels. See clip from the EWMP below (***Figure 18***).

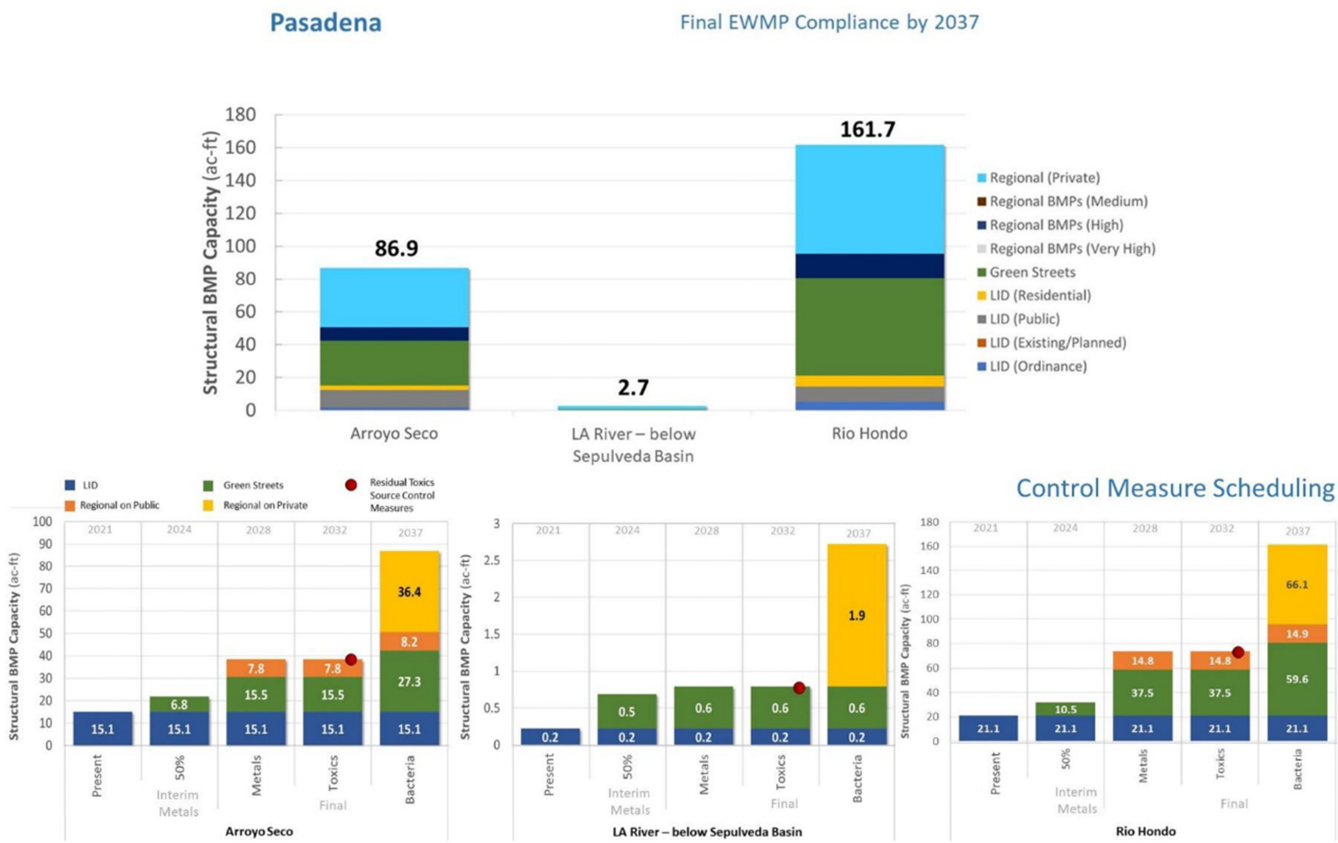


Figure 18. City of Pasadena EWMP Compliance Targets

San Rafael provides 0.437 ac-ft of storage. Therefore, it fulfills about 5.3% (0.437/8.2) of this regional on public fraction and approximately 0.5% (0.437/86.9) of the City of Pasadena's total. However, we consider "treated volume" to be a more appropriate volume metric as the EWMP did not take into consideration infiltration or filtration benefits. During an 85th percentile 24-hour design storm, San Rafael treats an additional 0.018 ac-ft of volume due to infiltration and 2.886 ac-ft of volume is treated by the outflow filter. Therefore, the total treated volume is 0.437 + 0.018 + 2.886 = 3.341 ac-ft, which would be 3.8% (3.341/86.9) of the City of Pasadena's total compliance goal. Although BMP storage is currently attached to the MS4 permit, we expect the Regional Board to lean towards pollutant load reduction amount more than BMP storage amounts as a regulatory metric in future WMPs.

Appendix F-2

San Pascual Hydrology Study

MEMO

TO: Christina Monde, Project Manager – City of Pasadena

CC: Brent Maue, Assistant City Engineer – City of Pasadena
Joe Conroy, Engineer – City of Pasadena

FROM: Courtney Semlow, Project Manager – Craftwater Engineering, Inc.
Thom Epps, Senior Stormwater Systems Scientist – Craftwater Engineering, Inc.

SUBJECT: San Pascual Stormwater Capture Facility
Stormwater Capture Study Technical Memorandum

DATE: September 27, 2022

The Upper Los Angeles River (ULAR) Watershed is a largely built-out, urbanized watershed of approximately 485 square miles, or 310,400 acres. Runoff from this watershed drains to over 50 linear miles of the LA River. One major tributary to the Upper Los Angeles River is the Arroyo Seco River, which makes up about 46.7 square miles of the total ULAR drainage area. The city of Pasadena and South Pasadena make up about 20% of the area tributary to the Arroyo Seco. The development of the San Pascual Stormwater Capture Facility Study in the City of Pasadena represents another major opportunity to continue the regional scale progress to achieve pollutant load reductions for the Upper Los Angeles River Watershed Management Program. Towards this goal, this memo presents the analytical results evaluating the potential stormwater capture and water use alternatives for a treatment basin design. The exact basin design was specified during the creation of 60% design level documents for the project. These design documents and this Stormwater Capture Study can then be utilized to support a funding application under Los Angeles County's Safe, Clean Water Program.

Figure 1-1. San Pascual Site, South Pasadena/Los Angeles

Figure 1-2. Existing Diversion within Arroyo Seco

This project is intended to intercept a sizeable portion of the stormwater flows from the Arroyo Seco Channel to the project site (**Figure 1-1**). Stormwater will be diverted from the Arroyo Seco reinforced concrete channel (Concrete Conduit Section 2) managed by the Los Angeles County Flood

Control District (LACFCD) at an existing diversion (**Figure 1-2**) point that already directs flows to the project location. A surface treatment infiltration and filtration basin best management practice (BMP) is proposed at the San Pascual site to capture and infiltrate stormwater from the diverted drainage channel. Potential project performance will be detailed in this memo to demonstrate how the proposed design can contribute to both water quality goals as well as other important project considerations and desired outcomes. These options can then be considered and weighed before proceeding with the ultimate design of the project by identifying the project configuration that best meets the desired outcome and contributes to water quality benefits in a cost-effective manner.

1.0 OBJECTIVES

To identify the most effective stormwater capture configuration at the project site, decision support modeling has been conducted to identify the optimal BMP configuration using a balanced approach that incorporates design storm hydrologic targets as well as long-term water quality considerations. BMP configuration recommendations will be made for the San Pascual site for the following key design criteria:

Diversion Rates

A range of feasible diversion flowrates will be simulated to develop cost-effectiveness curves and to determine the optimal flowrate to be diverted to the capture facility that will provide the greatest water quality benefit without surpassing the point of declining returns. Flowrates will range in values grounded in construction feasibility and subject to other project constraints identified in the initial project concept development.

BMP Storage

Multiple Project conditions and constraints informed the final BMP size and footprint to be used at the site. The primary factors influencing BMP size included preserving trees, ensuring maintenance road access, creating a public walkway, and maintaining existing elevations. Final BMP dimensions were determined prior to the creation of this memo as part of the 60% design level documents. **The final BMP size has a total volume of approximately 3.46 ac-ft and total footprint of 0.73 acres.** The following analysis will demonstrate how this configuration can provide multi-benefits and treat the project tributary area.

Discharge –Water Use and Flowrate

Different routes exist for the outflows from the BMP, and each entail differing requirements, infrastructure, and constraints that impact the overall performance of the stormwater capture system and project cost. Also, these options represent different contributions to other local water supply efforts, of which stormwater is a growing component. Infiltration to local groundwater can be utilized to dewater the BMP and contribute to regional groundwater recharge goals. Infiltration feasibility has been determined by geotechnical analysis and will be discussed within this memo. While the design infiltration rate is set by geotechnical analysis, the infiltration outflow rate will vary. This is because the entire basin footprint will not always be available for infiltration since the amount of infiltrative area is dependent on the wetted basin surface. This phenomenon is further discussed in Section 3.2.4. The potential to capture dry weather flows for off-site irrigation was also analyzed. Stormwater for irrigation would be used at the nearby golf course, and potentially directed to a nearby park. Water reuse benefits for this scenario are analyzed within this memo. Additionally, the potential to filter stormwater and return it to the channel will be assessed for this site to quantify the potential benefits of different options. Filtration throughflow rates for commonly available systems will be evaluated to ensure that these discharge options are right sized to the baseline water quality for the drainage area and other system configuration options. A combination of infiltration and filtration treatment will also be analyzed to determine if the BMP can create a meaningful balance between water supply and water quality.

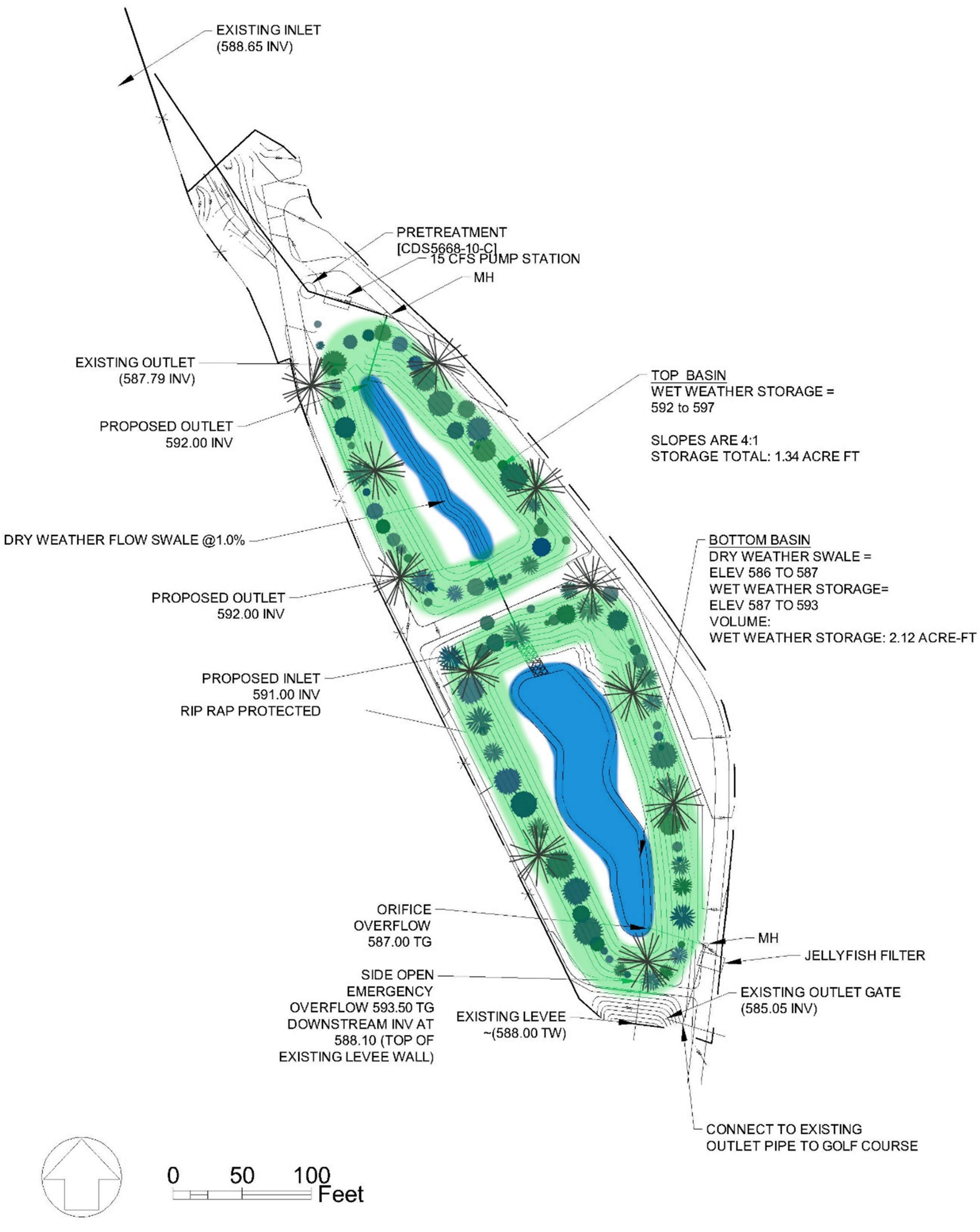


Figure 1-3. Preliminary concept schematic for the San Pascual Treatment Basin BMPs, east of the Arroyo Seco Channel (may not represent final project details).

2.0 BASELINE SITE CONDITIONS AND CONSTRAINTS

The following subsections summarize the baseline watershed, hydrologic, and on-site conditions and constraints that will be accounted for in BMP configuration and optimization analysis for the San Pascual site.

2.1 Watershed Characterization

For this study, the Loading Simulation Program C++ (LSPC) software was used to simulate the contaminant loading, runoff volume, and flow rate associated with a long-term, 10-year continuous time series (Water Year 2009 to Water Year 2018) as well as the 85th percentile storm. The LSPC model used is part of the Los Angeles County Watershed Management Modeling System (WMMS 2.0), which is accepted by the Los Angeles Water Quality Control Board for performance of compliance analyses in the context of EWMP/WMP development.

The drainage area delineations for the project site (**Figure 2-1**) were developed using geospatial data associated with the WMMS modeling subwatersheds and verified/corrected slightly using further GIS analysis where full subwatersheds did not coincide with project locations and where subsurface storm drains overlapped. Digital stormwater pipe inventories and high-resolution Light Detection and Ranging (LiDAR) elevation data were used to accomplish subwatershed splitting. Developed drainage areas were used to model runoff and water quality baseline timeseries'. These were then incorporated into BMP models to optimize the BMP decision variables. The overall area and impervious fraction are summarized in **Table 2-1**

Table 2-1. Summary of watershed and hydrologic conditions for the San Pascual Project drainage area

Total Tributary Area (ac)	Impervious Tributary Area (ac)	Average Annual Runoff (ac-ft)	Average Annual Zn Loading (lbs)	85th Percentile Surface Runoff (ac-ft)	85th Percentile Peak Flow (cfs)
5,018	863 (17.2%)	1,305	613	58.2	85.9

2.2 Hydrologic Considerations

Long-term baseline flows and pollutant loads to the site are also summarized in **Table 2-1**. The total loadings presented in this table represent the maximum possible reductions that could be achieved by control measures at the project site. However, pragmatic diversion limitations, space constraints, and subsequent treatment mechanisms will ultimately limit how much runoff and pollutant mass can potentially be diverted into the BMP. Peak flow rate and total runoff for the 85th percentile design storm (1.05 in., taken from isohyetal data for the centroid of the drainage areas) are found in **Table 2-1** as well.

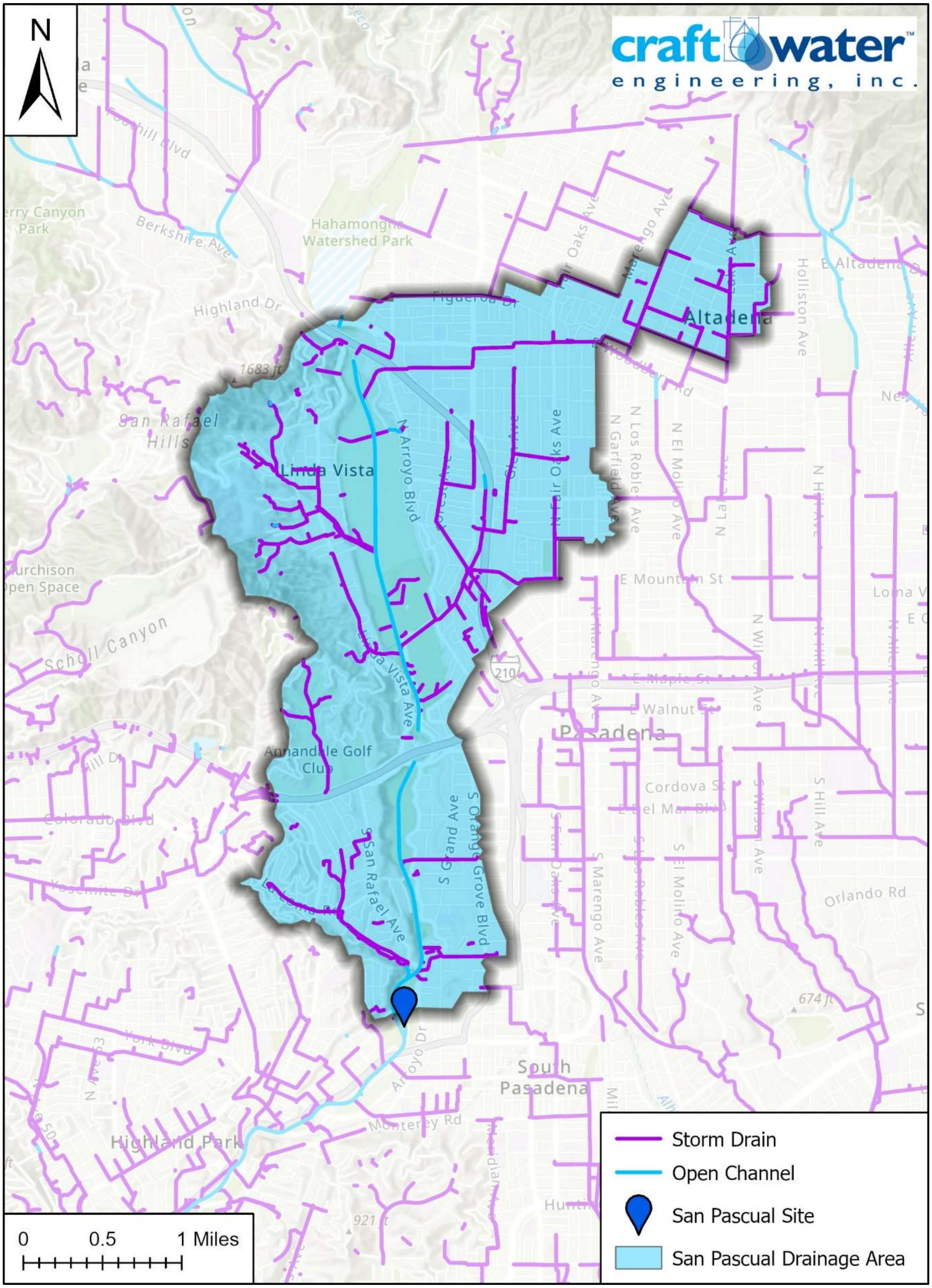


Figure 2-1. Drainage area for San Pascual Project.

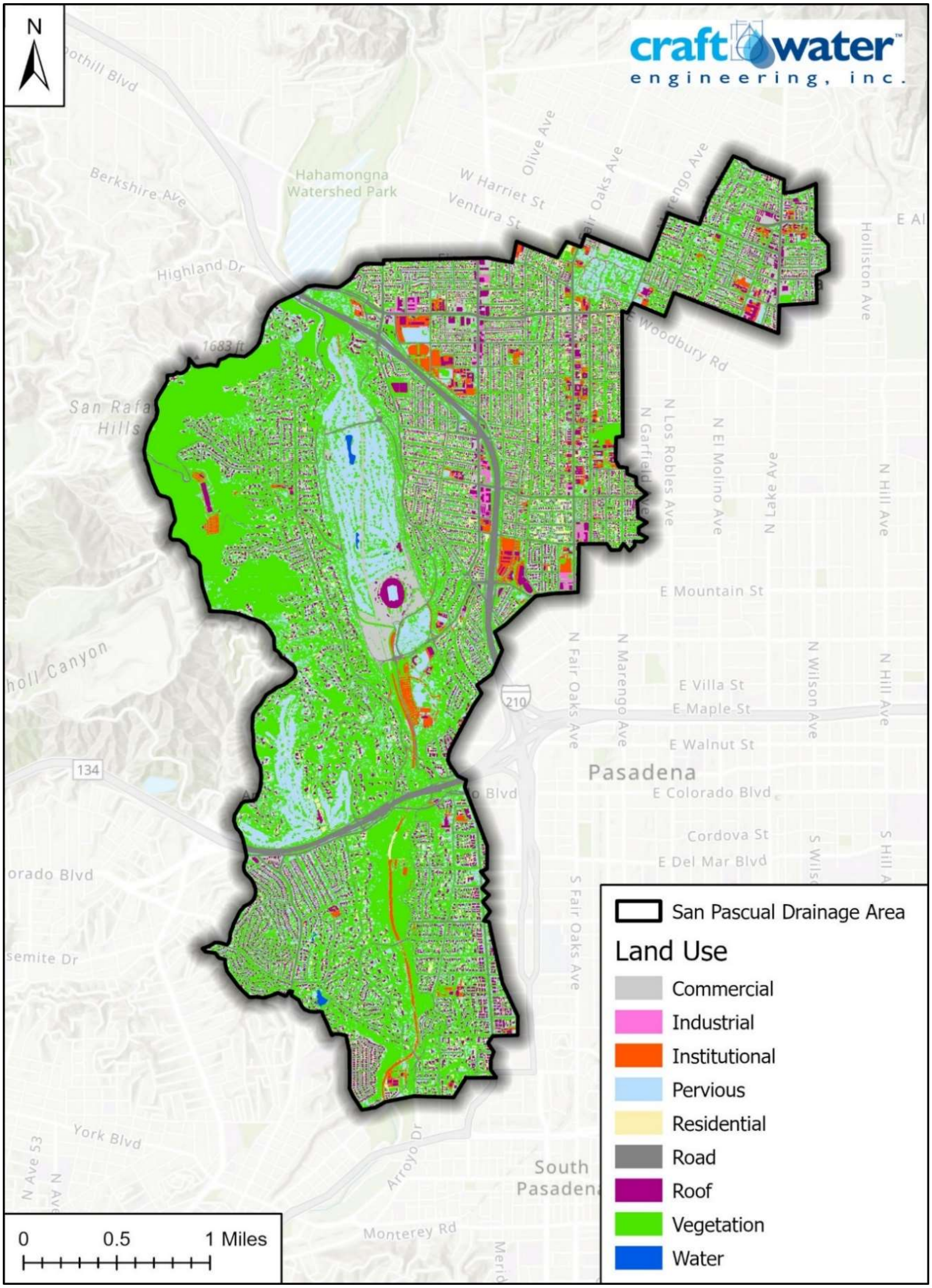


Figure 2-2. Land Uses within the San Pascual Drainage Area.

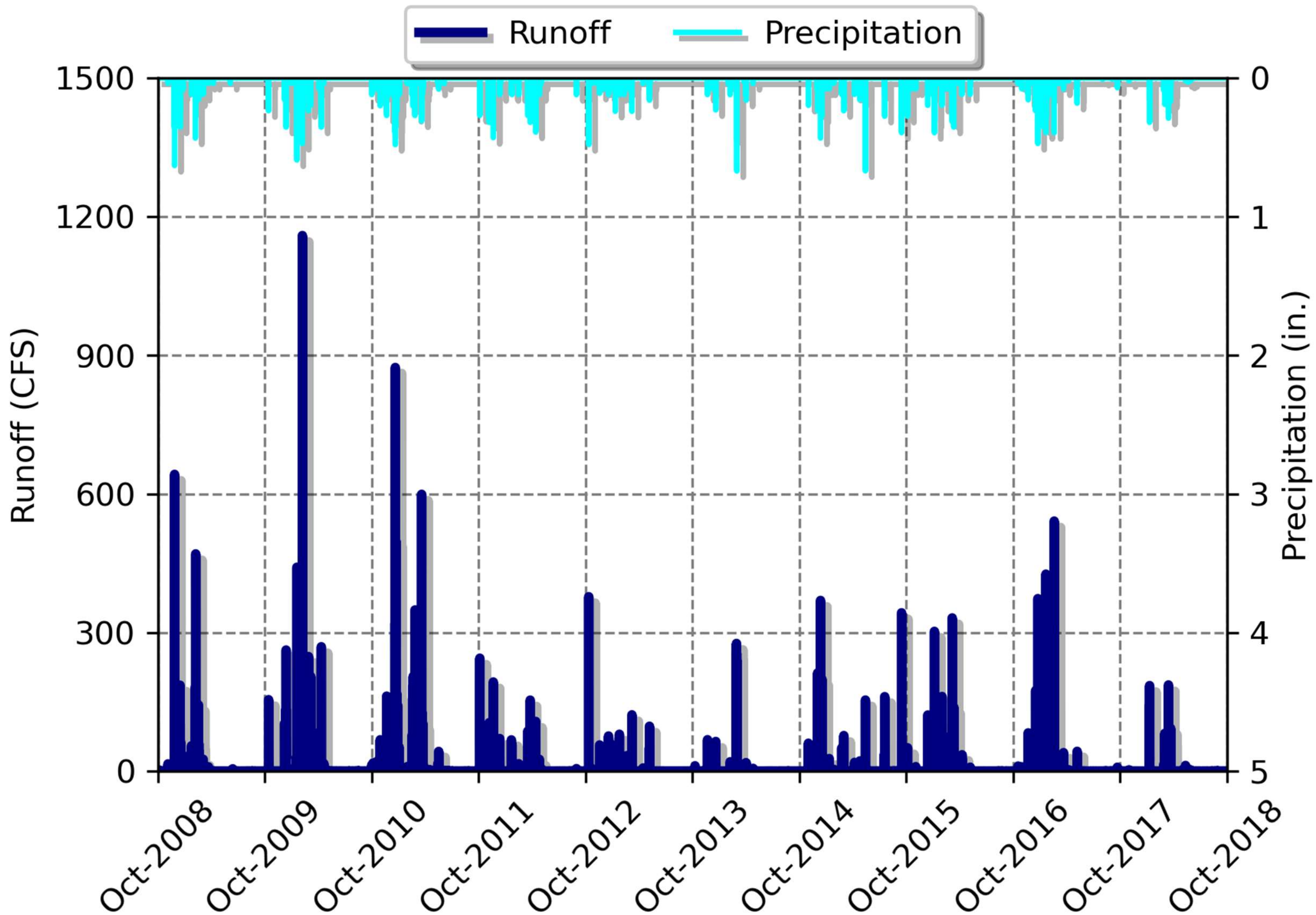


Figure 2-3. Baseline Model Runoff Timeseries for the San Pascual Drainage Area (WY2009-2018)

3.0 STORMWATER CAPTURE OPTIMIZATION METHODS

3.1 Water Quality Optimization Strategy

The primary design goal of the Project is to reduce long-term annual loading of pollutants to the ULAR watershed using zinc as the limiting pollutant of interest in the analysis as established by the EWMP for this watershed group. To ensure that the system will be sized to maximize load reductions in a cost-effective manner, optimization modeling was performed.

As mentioned previously, the BMP storage and footprint were created as part of the Project's 60% level design documents. Therefore, the purpose of optimization modeling in this memo is to balance inflow diversion rates and outflow treatment rates such that it does not limit the performance of the system or negate cost-effectiveness (see **Figure 3-1** at right). Optimization supports decision making throughout the design process by guiding selection of the most cost-effective system design.

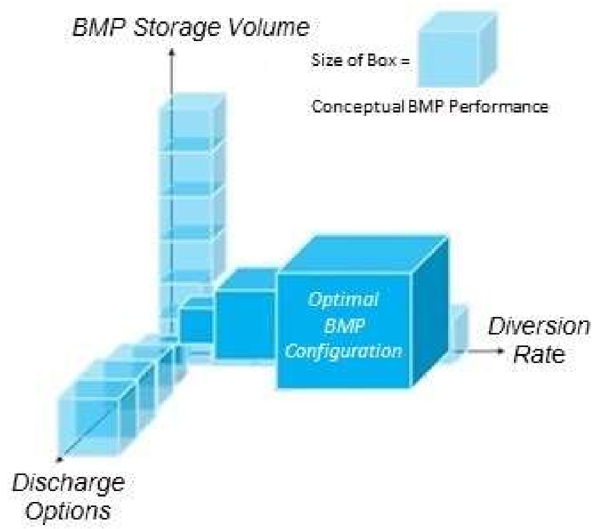


Figure 3-1. Conceptual illustration of optimization modeling balancing various design components to maximize performance.

The model setup for water quality simulation and optimization is complex, involving several modeling systems and iterative feedback from design engineers. The general methodology is discussed below, and the results are presented thereafter.

3.2 BMP Performance Modeling and Diversion Optimization

The first step of the modeling was to predict BMP performance for a range of potential BMP sizes, diversion points, inflow rates, and discharge alternatives. A custom BMP model was used to improve upon certain modeling limitations in EPA's System for Urban Stormwater Treatment and Analysis Integration (SUSTAIN). This custom model is grounded in the physical BMP representations used in SUSTAIN, and it provides built-in optimization algorithms to more systematically automate the process of evaluating many different BMP configurations to select a cost-effective solution related to project goals. The model was run using 10 years of runoff and pollutant loading time-series data generated by LSPC at an hourly time step. During this preliminary decision-support modeling, the discharge alternatives were simulated using certain site constraints to capture approximate BMP throughflow rates. Subsequent targeted modeling then provided a clear decision pathway for the development of optimal project alternatives. Modeling efforts investigated the range of BMP configurations as detailed in the following subsections.

3.2.1 Diversion Rates

Model runs were limited to feasible diversion ranges slightly larger and smaller than previous estimates to ensure prior selection was warranted and kept relatively low as to not overload vegetation and landscaping within the infiltration basins for the proposed diversion point based on prior project knowledge related to the drainage area and potential project storage size. Rates were also minimized considering large pumping costs beyond 20 cfs (See

Section 3.2.5). Diversion rates for the San Pascual BMP were modeled over the range of 5 to 25 cfs, varying in 5 cfs increments, to assess the most cost-effective configuration of diversion inflow rates.

3.2.2 Discharge Alternatives

Different routes exist for the outflows from the BMP, with each entailing differing requirements, infrastructure, and constraints that impact the overall performance of the stormwater capture system and project cost. Additionally, these options represent different contributions to other local water supply efforts, of which stormwater is a growing component.

Irrigation

Project stakeholders provided yearly estimated water demands to irrigate the Arroyo Seco golf course and the nearby Arroyo Park. These values are listed in **Table 3-1**.

Table 3-1. Irrigation Demands Potentially Fulfilled by the San Pascual BMP.

Irrigation Use	Irrigation Demand (ac-ft/yr)
Arroyo Seco Golf Course	30
Arroyo Park	32
Golf Course and Park	***62***

Available runoff would be reserved for irrigation treatment, which would be discharged off-site. How runoff could be stored for irrigation use is further discussed in Section 3.2.3.

Infiltration

Geotechnical investigations indicated substantial infiltration rates at the basin storage depth (approximately 3.3 in/hr with factors of safety applied). While the infiltration rate is set at 3.3 in/hr, the entire basin footprint will not always be used for infiltration. Since the infiltrative area depends on the wetted surface area of the BMP basin, infiltration outflows will vary depending on the amount of runoff stored in the BMP. Section 3.2.4 discusses this aspect of treatment.

Filtration

Several commonly available stormwater filtration devices were also modeled to compare this alternative to infiltration (at 2.88 cfs, 5.76 cfs, and 7.84 cfs discharge rates). These values were chosen to cover a range of potential outflows common to off-the-shelf proprietary filter products. If the desired outflow rate changes, rates can be revaluated in later stages of design. Water treated through filtration would be returned downstream of the diversion point.

Infiltration and Filtration

Dual infiltration and filtration treatment was also analyzed for the San Pascual infiltration basin BMPs. In the combined treatment configuration, diverted flows would first enter the basins to be treated through infiltration. The filter would treat flows stored above a predetermined volume threshold. For example, a filter would only treat flows when a BMP is at least halfway full. Since the chosen filtration rates are comparable to/greater than infiltration, additional treatment capacity can be added through filtration. This can come at the cost of groundwater recharge, as the filter could now treat flows that were originally reserved for infiltration. Different filter configurations will be analyzed to determine which, if any, are ideal for the project based on SCW goals and cost.

3.2.3 Basin Configurations, Storage Volumes, and Footprints

Site assessments and discussions with project stakeholders have led to the development of a surface infiltration basin BMP made of two distinct cells (**Figure 1-2**). Both basin cells will direct and store dry weather flows for irrigation reuse and infiltrate wet weather flows. The basins will be designed such that incoming flows are distributed evenly between cells. If the first, smaller cell cannot accept any more flow, runoff will continue to accumulate in the second cell. In a standalone filtration scenario, flows would simply exit the second cell through the filter. In a combination configuration, only flow stored above a predetermined threshold would be eligible to enter the filter. For example, filtration would only occur if the BMP was at least 50% full.

Figure 3-2 contains a flow diagram detailing the potential full treatment train of the BMP. While Section 4.0 will determine which exact discharge configuration is optimal for the site, the full treatment train is provided to exemplify where water supply and water quality benefits can be obtained. While complex, the configurations described above allow the San Pascual BMP to provide as many multi-benefits as possible within the site footprint and without violating site constraints. **Table 3-2** also contains the breakdown of storage volume and footprints for these basin cells. These basin storage/footprint configurations were the only ones modeled for this analysis, as it was determined to be the most feasible to construct within the site footprint.

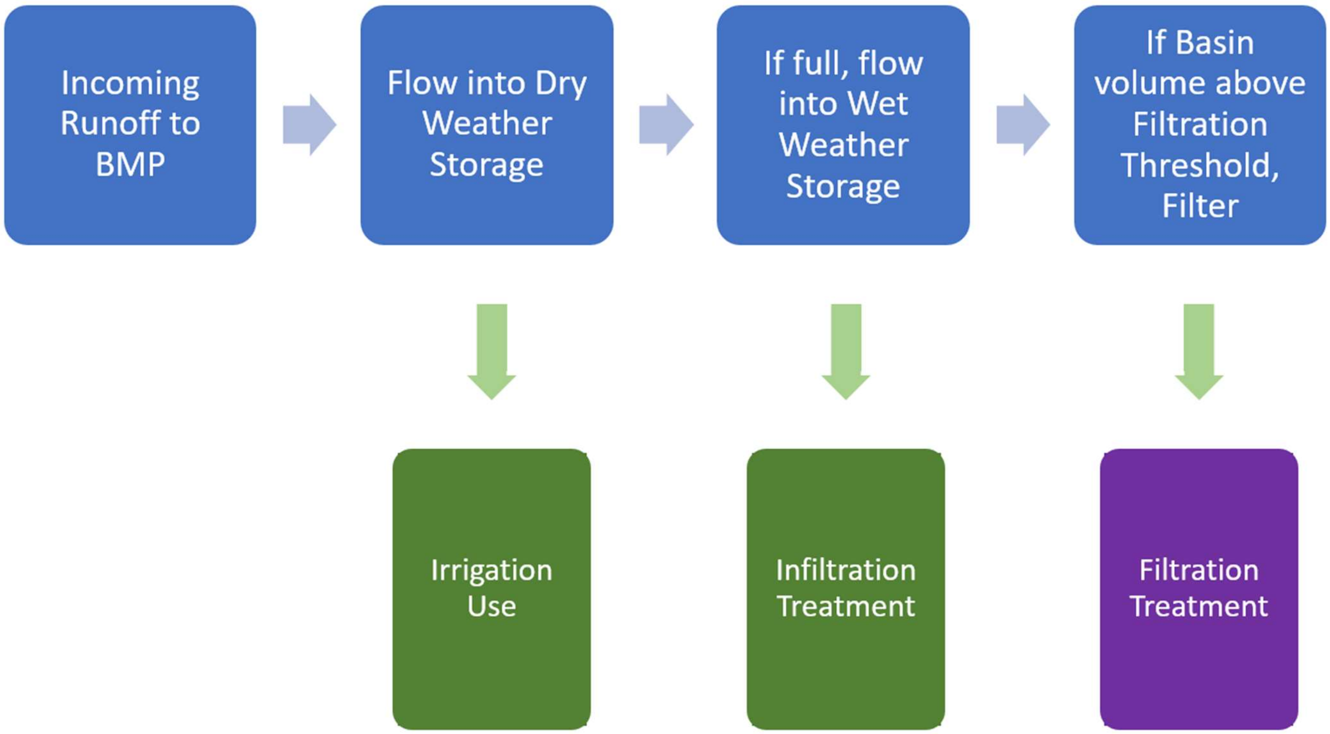


Figure 3-2. Full Potential Treatment Train for the San Pascual BMP.

Table 3-2. Basin Dimensions and Volumes for the San Pascual BMP.

Basin Cell	Top Rim Surface Area (sq. ft)	Bottom Rim Surface Area (sq. ft)	Storage Volume (ac-ft)
1 (Wet-Weather)	13,530	7,020	1.34
1 (Dry-Weather)	1,564	-	
2 (Wet-Weather	27,854	12,525	2.12
2 (Dry-Weather)	8,170	-	
1+2 (Wet-Weather)	-	-	3.46

3.2.4 Safe Clean Water Program (SCWP) and O&M Considerations

When comparing treatment options, three factors must be considered.

- **Outflow Rate —** Filtration devices have set treatment rates that represent the maximum possible throughflow for the device. Infiltration outflow rates are correlated with the available infiltrative footprint. The maximum infiltrative footprint has been set by the basin cell design, but the moment-to-moment infiltrative footprint depends on how much runoff is in a basin cell. **Figure 3-3** demonstrates how an infiltration basin is made up of a maximum and minimum infiltrative area, and how the water level determines how much infiltration can occur. Any runoff stored in the basin increases the wetted surface area, thus increasing the amount of area that is available for infiltration at a given moment. A combination between the two treatment methods would create a BMP with a similar variable infiltrative outflow rate and a design filtration rate.

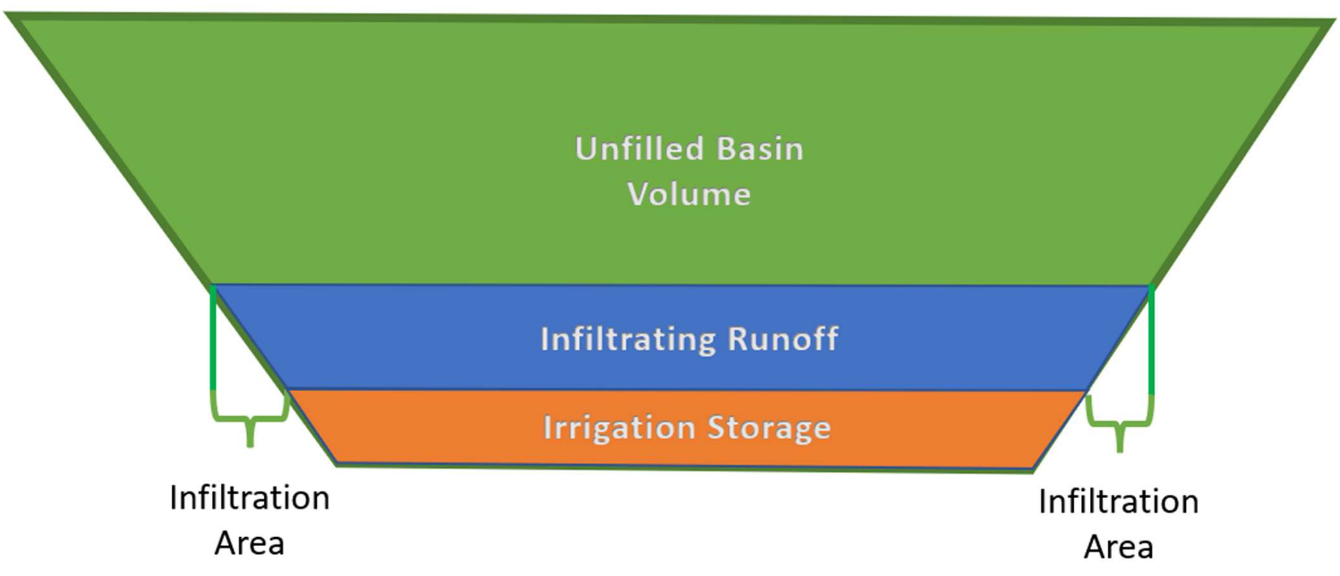


Figure 3-3. Basic Schematic Demonstrating Variable Infiltrative Footprint.

- **Pollutant Removal** — Filtration devices remove most of the pollutants that enter it; physical limitations prevent complete removal. While the effluent concentration is less than incoming loads, it still generally results in a small amount of pollutant leaving the BMP. Infiltrative BMPs, on the other hand, fully remove all diverted pollutants that enter it. A combination BMP would both completely and partially remove pollutants depending on how much runoff is treated by each method.

- **Water Capture** — Filtration devices will usually return treated stormwater to an adjacent storm drain or channel, which may or may not have the potential for reuse. Infiltrative BMPs recharge groundwater, providing direct benefits to the local groundwater shed. A combination BMP would have less groundwater recharge than an infiltration BMP since filtration would treat runoff normally reserved for infiltration. Water stored in the "Dry-weather" section of the BMP will also contribute to water supply goals since it will be used for irrigation.

Water quality benefits predicted for different BMP configuration options must also be weighed against Safe Clean Water Program (SCWP) scoring criteria to determine the optimal choice for a given site to ensure a Project meets the needs of this important regional program. The following SCWP scoring categories are primarily dependent on the proposed treatment type:

- **Wet Weather vs. Dry Weather BMP:** Does the proposed BMP capture the 85th percentile storm of the targeted drainage area? If so, it is historically defined as a wet weather project per the SCWP Scoring Committee. Otherwise, it is a dry weather BMP. Wet Weather and Dry Weather BMPs have different water quality scoring criteria, as detailed blow. Both BMP types can still fulfill all other project related SCW scoring criteria (Water Supply, Community Investment, etc.)
- **Water Quality**
    - *Wet Weather BMP:* Removal of 50%/80% of divertible pollutants.
    - *Dry Weather BMP:* Removal of 100% of all tributary dry weather flows
- **Water Supply**: Utilizing captured stormwater to replenish local water supply (water reclamation and groundwater recharge).
    - Scoring thresholds for SCW occur at 25, 100, 200, and 300 ac-ft of water supply benefit.
- **Nature Based Solutions**: Implement or mimic natural processes to treat stormwater (infiltration).

Table 3-3 details key cost and scoring aspects that are both consistent among and differentiate between the various modeled options presented in this memo.

Table 3-3. Summary of key cost components and SCW scoring criteria for different discharge options.

Cost applicable to….	Key Cost Components	O&M Cost Components	Relevant SCW Scoring Criteria
All Options	Diversion Infrastructure, Pretreatment, Optional Pump	Inspection, Sediment Removal, Pumping Maintenance/Electricity	---
Infiltration	Excavation, Basin Construction	Landscaping Maintenance	Water Supply AND Water Quality
Filtration	Excavation, Basin Construction, Filtration Unit(s)	Landscaping Maintenance, Filter Cartridge Cleaning	Water Quality ONLY
Combination	Excavation, Basin Construction, Filtration Unit(s)	Landscaping Maintenance, Filter Cartridge Cleaning	Water Supply AND Water Quality

3.2.5 Inflow Infrastructure

Diverted inflows can be conveyed to the storage BMP via gravity-fed pipes or by way of pumps. The two options have tradeoffs associated with costs that are typically defined by the invert depth of the storm drains at the diversion points and the BMP storage footprint. Gravity-fed inflows require the BMP to be sited deep enough underground for flows to move passively toward the storage. This is associated with excavation and stabilization costs that are determined by the storm drain invert and distance of the diversion. Pumped inflows allow the BMP to be sited vertically with minimal soil cover, but are associated with costs of pumping infrastructure, operation, and maintenance. At different sizes of a given BMP and site, pumping inflows may be more cost-effective than gravity-fed diversions, and vice versa. ***To minimize site-specific excavation and project costs, a pumped diversion will be used at the site.***

4.0 OPTIMIZATION MODELING RESULTS

The optimization analysis aimed to maximize the long-term pollutant load reduction and 85th percentile design storm volume capture by simultaneously varying the diversion rate and discharge rates related to options previously discussed. Each of these design features has an associated range of options that were modeled to assess alternatives against long-term water quality benefits and identify the most effective configuration. Different configuration alternatives and modeling parameters are presented below to demonstrate the cost-effectiveness associated with these options and narrow them down to a recommended project configuration that will meet different needs for the ULAR watershed.

4.1 Outflow Options

4.1.1 Irrigation Outflow

Irrigation demands for the golf course and park are more than three times smaller than the modeled dry-weather flows. Since these dry-weather flows would quickly fill up the dry-weather storage component of the BMP, there will always be flow into the wet-weather storage component. Thus, irrigation drawdown is effectively accounted for if flows equal to or greater than the irrigation demand are truncated from the BMP inflow timeseries. The following treatment type analysis (Section 4.1.2 through 4.2) will not include irrigation for the sake of simplicity and to see differences more easily between treatment types instead of irrigation configuration. Final performance numbers utilizing infiltration before other treatment are listed in Section 5.0.

If irrigation reuse is highly desired here, it is advised that further study of the availability of dry-weather flows be conducted, and these results be compared to historic on-site water use before any decision is made regarding the inclusion of filtration and irrigation systems. Should monitoring corroborate better availability and storage of flows, the costs of filtration equipment, irrigation system upgrades, and associated O&M activities should be weighed throughout design processes to determine if this discharge option is desirable for the Project.

4.1.2 Infiltration and Filtration Outflow

All singular treatment outflow options were modeled across all diversion rate scenarios (5-25 cfs), with average values of performance presented in **Table 4-1**.

Overall, increasing the filtration rate increases total pollutant removal. *Improvements in filtration performance do not severely decline before 7.84 cfs filtration, so the largest filter rate should be used for the project's drainage area.* However, none of the runoff treated through filtration would contribute to groundwater recharge goals. *Infiltration treatment alone is comparable to 2.88 cfs filtration treatment, but it also provides water supply benefits that filtration alone would not.* However, an infiltrative practice could still benefit from filtration to further increase total treatment. **Table 4-1** also contains the average performance of the combination infiltration basin and 7.84 cfs filtration BMP for the San Pascual site. While adding this filter would incur approximately 400K of additional project cost, this addition does not cause the project to exceed previously determined total cost estimates submitted in a previous SCWP application. The extra protection it could provide would increase overall cost-effectiveness by treating runoff that a standalone infiltration BMP could not.

All possible diversion rates were analyzed for an optimized filtration and infiltration BMP configuration that balances water supply and water quality benefits. As mentioned earlier (Section 3.2.2), the total runoff infiltrated is subject to change when a combination treatment BMP is used. There is less filtration runoff treatment in a combination configuration than standalone filtration because it only treats flows when there is enough flow stored in the BMP. There is also less groundwater recharge than standalone infiltration since some of the runoff stored is no longer reserved for infiltration.

While filtration has a higher flowrate than infiltration, groundwater recharge is not seriously impacted with a filter because of the volume of divertible flows available compared to BMP treatment capacity. As mentioned previously, the San Pascual BMP footprint and volume was primarily driven by site constraints. While this BMP treats as much runoff as possible within the site footprint, it is not necessarily right sized to treat all incoming flows. For example, the standalone infiltration BMP bypasses over 200 ac-ft of flows per year. If it had a larger outflow rate, then there are opportunities for additional treatment. Altogether, while filtration removes flows normally reserved for infiltration, the impact does not overly reduce recharge since there is still an abundance of flows that still fill the BMP. On average, the combination BMP treats more total runoff and pollutants than all other singular outflow options. ***Therefore, a combination infiltration basin and 7.84 cfs filtration BMP should be used for the San Pascual site to maximize the total amount of runoff treated for the large drainage area.***

Table 4-1. Average Performance of BMP Treatment Types across all Diversion Rates.

Outflow Type	Outflow Rate	Avg. Annual Runoff Filtered (ac-ft)	Avg. Annual Runoff Infiltrated (ac-ft)	Avg. Annual Total Runoff Treated (ac-ft)	Avg. Annual Zinc Removal (lbs)
Infiltration	3.3 in/hr	0.0	357	357	101
Filtration	2.88 cfs	384	0.0	384	75.5
	5.76 cfs	456		456	102
	7.84 cfs	486		486	115
Infiltration and 7.84 cfs Filtration	3.3 in/hr 7.84 cfs	192	308	501	147

4.2 Diversion Rate

Diversion rates were varied to get a sense for what the most effective flowrate into the BMP should be. BMP performance is a balance between inflow, storage, and outflow, so diversion rates should not be chosen in isolation of these other BMP configuration variables. Overall, increasing diversion rates increased treatment capacity across all discharge configurations. However, these improvements severely declined after 15 cfs. While larger diversions offer more pollutant removal, they often warrant larger storage volume—and therefore cost—for only slight improvements in water quality benefit. Additionally, there is an existing diversion pipe and structure that can be modified to accommodate a 15 cfs diversion into the BMP. Doing so would reduce costs since it would eliminate new construction of a diversion. ***Therefore, a 15 cfs diversion rate is the most cost-effective for the San Pascual site.***

Table 4-2. Performance of the San Pascual Combination BMP with Various Diversion Rates.

Diversion Rate	Avg. Annual Runoff Filtered (ac-ft)	Avg. Annual Runoff Infiltrated (ac-ft)	Avg. Annual Total Runoff Treated (ac-ft)	Avg. Annual Zinc Reduction (lbs)
5	108	298	406	104
10	202	304	506	150
15	216	313	529	165
20	217	313	531	160
25	218	313	532	158

5.0 PROJECT ALTERNATIVES AND RECOMMENDATIONS

5.1 Capture of 85th Percentile Design Storm and Dry Weather Flows

Based on the infiltration rate of 3.3 in/hr for this project, capture of the 85th percentile storm volume is not feasible at the site given the previously developed footprint. Therefore, the San Pascual BMP will be designated as a dry-weather BMP under SCWP scoring criteria. **Table 5-1** displays the design storm performance of the combination BMP with a 15 cfs diversion. ***The San Pascual Combination BMP cannot capture the 85th percentile design storm, thus designating it as a "dry-weather" project under SCWP scoring criteria.***

Table 5-1. Design Storm Performance of the San Pascual Combination BMP with a 15 cfs Diversion.

Design Storm Volume (ac-ft)	Design Storm Peak Flow (cfs)	Filtered Volume (ac-ft)	Infiltrated Volume (ac-ft)	Volume Treated (ac-ft)
58.2	85.9	14.6	6.5	21.1 (36%)

Dry-weather flows are defined as any flows that occur in a period which is at least 24 hours since the last rainfall occurrence. Average annual dry-weather flow volumes, pollutant loading, and average flow rate are presented in **Table 5-2**. As mentioned previously, dry-weather BMPs must treat 100% of all tributary dry-weather flows. It is sufficient to say that the San Pascual BMP fully treats 100% of all dry-weather flows if the long-term performance matches or exceeds the dry-weather minimum.

Table 5-2. Dry Weather Flow Characteristics for the San Pascual BMP Drainage Area.

Average Annual Dry-Weather Flows (ac-ft)	Average Annual Dry-Weather Zinc Load (lbs)	Average Dry-Weather Flow (cfs)
230	37.7	0.34

5.2 Long-Term Performance of the San Pascual site

Table 5-3 summarizes the long-term performance of the San Pascual BMP using a 15 cfs diversion, irrigation, infiltration, and 7.84 cfs filtration treatment for the established basin design. The given design treats all dry-weather flows, achieves over 300 ac-ft of groundwater recharge, and removes over 70% of divertible pollutants on an average annual basis. Therefore, the basin design established by the 60% design level documents can provide multiple benefits and treat an appreciable amount of runoff and pollutants from the drainage area.

Table 5-3. Average Annual Performance of the Selected San Pascual Combination BMP.

Stormwater Filtration (ac-ft)	Irrigation Reuse (ac-ft)	Groundwater Recharge (ac-ft)	Water Supply Benefit (ac-ft)	Total Runoff Treated (ac-ft)	Avg. Annual Zinc Reduction (lbs)
214	62	258	320	534	157 (74%)

6.0 CONCLUSIONS

This Stormwater Capture Memo was prepared for the San Pascual Stormwater Capture Facility Project to demonstrate progress towards compliance for the ULAR region. The existing hydrology and water quality conditions were first characterized for the drainage area. Site analysis and conversations with Project stakeholders yielded a set basin design for the San Pascual site. ***This basin BMP design has a total footprint of approximately 0.73 acres and a storage volume of 3.46 ac-ft.*** Then, an optimization analysis informed data-driven selection of appropriate diversion rates and treatment methods. ***From this analysis, a combination infiltration and 7.84 cfs filtration basin BMP with irrigation reuse using a 15 cfs pumped diversion was selected as the recommended San Pascual BMP configuration***. This BMP can treat 100% of dry-weather flows while also removing over 70% of divertible pollutants and providing over 300 ac-ft of water supply benefits. The performance of the feasible BMPs demonstrate that long-term pollutant reduction targets can be achieved based on several key compliance metrics, including average-annual reduction (from which the BMP's operating parameters were optimized). These performance estimates will contribute to pollutant reduction initiatives in the larger watershed.

Appendix G

Noise Data

San Pascual

FIELD NOISE MEASUREMENT DATA

PROJECT: ~~San Pascual~~ Arroyo Seco Water Reuse   PROJ. #

SITE IDENTIFICATION: OBSERVER(S):

START DATE/TIME: Friday 6/9/13 16:30 hrs   END DATE/TIME: Friday 6/9/23 19:00 hrs

ADDRESS:

METEOROLOGICAL CONDITIONS: Wind coming from W direction

TEMP: 69.1 °F   HUMIDITY: 65.3 %R.H.   WIND: ☐ CALM ☐ LIGHT ☒ MODERATE ☐ VARIABLE

WINDSPEED: 3.4 MPH   DIR: ☐ N ☐ NE ☐ E ☐ SE ☐ S ☒ W ☐ NW   ☐ STEADY ☐ GUSTY

SKY: ☐ SUNNY ☒ CLEAR ☐ OVRCST ☐ PRTLY CLOUDY ☐ FOG ☐ RAIN ☐ OTHER:

ACOUSTIC INSTRUMENTS:

INSTRUMENT: TYPE: ☐ 1 ☐ 2   SERIAL #:

CALIBRATOR: SERIAL #:

CALIBRATION CHECK: PRE-TEST 0.00 dBA SPL   POST-TEST -0.06 dBA SPL   WINDSCREEN

SETTINGS: ☐ A-WEIGHTED ☐ SLOW ☐ FAST ☐ FRONTAL ☐ RANDOM ☐ ANSI ☐ OTHER: ____

REC #	START	END	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	OTHER:	(TYPE?)
NM1	5:02	5:24	62.6	77.4	56.7					
NM2	5:39	6:00	64.4	80.6	50.5					
NM3	6:20	6:41	57.1	78.6	40.5					

COMMENTS:

SOURCE INFO AND TRAFFIC COUNTS:

PRIMARY NOISE SOURCE: ☒ TRAFFIC ☐ AIRCRAFT ☐ RAIL ☐ INDUSTRIAL ☒ AMBIENT ☐ OTHER: ____

ROADWAY TYPE:

TRAFFIC COUNT DURATION: ____ -MIN ____ SPEED   #2 COUNT ____ SPEED

	☐NB/☐EB	☐SB/☐WB	☐NB/☐EB	☐SB/☐WB	☐NB/☐EB	☐SB/☐WB	☐NB/☐EB	☐SB/☐WB
AUTOS	NM1 49	NM2 57	NM3 No cars visible from location below bridge					
MED. TRUCKS:								
HVY TRUCKS:								
BUSES:								
MOTORCYCLES:								

SPEED ESTIMATED BY: ☐ RADAR ☐ DRIVING ☐ OBSERVER

OTHER SOURCES: ☐ DIST. AIRCRAFT ☐ RUSTLING LEAVES ☐ DIST. BARKING DOGS ☐ BIRDS ☐ DIST. INDUSTRIAL ☐ DIST. CHILDREN PLAYING ☐ DIST. TRAFFIC ☐ DIST. LANDSCAPING ACTIVITIES ☐ OTHER: ____

DESCRIPTION/SKETCH:

TERRAIN: ☐ HARD ☐ SOFT ☐ MIXED ☐ FLAT ☐ OTHER:

PHOTOS:

OTHER COMMENTS/SKETCH:

NM1: Across a sports field next to wash; playground adjacent to field with children practicing soccer + playing in playground

NM2: Across a baseball field with 20+ adults & children watching a game

NM3: Hiking and horse trail under a bridge and next to a wash; unable to see vehicles above crossing bridge

Construction Generated Noise - San Rafael

Building Type Roads, Sewers, Trenches — **Distance (ft)**

Construction Noise at 50 Feet (dBA Leq) — 50

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	84	84
Excavation	88	78
Foundation Construction	88	88
Building Construction	79	78
Finishing and Site Cleanup	84	84

North - San Rafael Ave Residences

Maximum Construction Noise (dBA Leq) — 80

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	80	80
Excavation (Site Preparation)	84	74
Foundation Construction	84	84
Building Construction	75	74
Paving	80	80

Average Construction Noise (dBA Leq) — 350

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	67	67
Excavation (Site Preparation)	71	61
Foundation Construction	71	71
Building Construction	62	61
Paving	67	67

West - Aratina St Residences

Maximum Construction Noise (dBA Leq) — 170

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	73	73
Excavation (Site Preparation)	77	67
Foundation Construction	77	77
Building Construction	68	67
Paving	73	73

Average Construction Noise (dBA Leq) — 380

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	66	66
Excavation (Site Preparation)	70	60
Foundation Construction	70	70
Building Construction	61	60
Paving	66	66

South - San Pascual Stables

Maximum Construction Noise (dBA Leq) — 60

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	82	82
Excavation (Site Preparation)	86	76
Foundation Construction	86	86
Building Construction	77	76
Paving	82	82

Average Construction Noise (dBA Leq) — 130

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	76	76
Excavation (Site Preparation)	80	70
Foundation Construction	80	80
Building Construction	71	70
Paving	76	76

East - Arroyo Dr Residences

Maximum Construction Noise (dBA Leq) — 340

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	67	67
Excavation (Site Preparation)	71	61
Foundation Construction	71	71
Building Construction	62	61
Paving	67	67

Average Construction Noise (dBA Leq) — 580

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	63	63
Excavation (Site Preparation)	67	57
Foundation Construction	67	67
Building Construction	58	57
Paving	63	63

100 feet Reference Distance			
Maximum Construction Noise (dBA Leq)			100
Construction Phase	**All Applicable Equipment in Use**[1]	**Minimum Required Equipment in Use**[1]	
Ground Clearing/Demolition	78	78	
Excavation (Site Preparation)	82	72	
Foundation Construction	82	82	
Building Construction	73	72	
Paving	78	78	
Average Construction Noise (dBA Leq)			100
Construction Phase	**All Applicable Equipment in Use**[1]	**Minimum Required Equipment in Use**[1]	
Ground Clearing/Demolition	78	78	
Excavation (Site Preparation)	82	72	
Foundation Construction	82	82	
Building Construction	73	72	
Paving	78	78	

Source: Bolt, Beranek and Newman, "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances," prepared for the USEPA, December 31, 1971. Based on analysis for Office Building, Hotel, Hospital, School, and Public Works.

Construction Generated Noise - San Pascual

Building Type Roads, Sewers, Trenches

Construction Noise at 50 Feet (dBA Leq) — Distance (ft): 50

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	84	84
Excavation	88	78
Foundation Construction	88	88
Building Construction	79	78
Finishing and Site Cleanup	84	84

North - San Ramon Drive Residences

Maximum Construction Noise (dBA Leq) — 30

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	88	88
Excavation (Site Preparation)	92	82
Foundation Construction	92	92
Building Construction	83	82
Paving	88	88

Average Construction Noise (dBA Leq) — 460

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	65	65
Excavation (Site Preparation)	69	59
Foundation Construction	69	69
Building Construction	60	59
Paving	65	65

West - San Pascual Ave Residences

Maximum Construction Noise (dBA Leq) — 70

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	81	81
Excavation (Site Preparation)	85	75
Foundation Construction	85	85
Building Construction	76	75
Paving	81	81

Average Construction Noise (dBA Leq) — 470

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	65	65
Excavation (Site Preparation)	69	59
Foundation Construction	69	69
Building Construction	60	59
Paving	65	65

South - San Pascual Park

Maximum Construction Noise (dBA Leq) — 110

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	77	77
Excavation (Site Preparation)	81	71
Foundation Construction	81	81
Building Construction	72	71
Paving	77	77

Average Construction Noise (dBA Leq) — 200

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	72	72
Excavation (Site Preparation)	76	66
Foundation Construction	76	76
Building Construction	67	66
Paving	72	72

East - Arroyo Park

Maximum Construction Noise (dBA Leq) — 40

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	86	86
Excavation (Site Preparation)	90	80
Foundation Construction	90	90
Building Construction	81	80
Paving	86	86

Average Construction Noise (dBA Leq) — 130

Construction Phase	All Applicable Equipment in Use[1]	Minimum Required Equipment in Use[1]
Ground Clearing/Demolition	76	76
Excavation (Site Preparation)	80	70
Foundation Construction	80	80
Building Construction	71	70
Paving	76	76

100 feet Reference Distance

Maximum Construction Noise (dBA Leq)			100
Construction Phase	**All Applicable Equipment in Use**[1]	**Minimum Required Equipment in Use**[1]	
Ground Clearing/Demolition	78	78	
Excavation (Site Preparation)	82	72	
Foundation Construction	82	82	
Building Construction	73	72	
Paving	78	78	

Average Construction Noise (dBA Leq)			100
Construction Phase	**All Applicable Equipment in Use**[1]	**Minimum Required Equipment in Use**[1]	
Ground Clearing/Demolition	78	78	
Excavation (Site Preparation)	82	72	
Foundation Construction	82	82	
Building Construction	73	72	
Paving	78	78	

Source: Bolt, Beranek and Newman, "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances," prepared for the USEPA, December 31, 1971. Based on analysis for Office Building, Hotel, Hospital, School, and Public Works.

Construction Generated Vibration - San Rafael

North - San Rafael Ave Residences		Closest Distance (feet):	115
	Approximate RMS a	Approximate RMS	
	66	73.000	
Equipment	inch/second	inch/second	
Large bulldozer	0.089	0.009	
Small bulldozer	0.003	0.000	
Loaded trucks	0.076	0.008	
	Criteria	0.250	
West - Aratina St Residences		Closest Distance (feet):	190
Equipment	**Approximate RMS a** Velocity at 25 ft, inch/second	Approximate RMS Velocity Level, inch/second	
Large bulldozer	0.089	0.004	
Small bulldozer	0.003	0.000	
Loaded trucks	0.076	0.004	
	Criteria	0.250	
South - San Pascual Stables		Closest Distance (feet):	125
Equipment	**Approximate RMS a** Velocity at 25 ft, inch/second	Approximate RMS Velocity Level, inch/second	
Large bulldozer	0.089	0.008	
Small bulldozer	0.003	0.000	
Loaded trucks	0.076	0.007	
	Criteria	0.250	
East - Arroyo Dr Residences		Closest Distance (feet):	360
Equipment	Approximate RMS a Velocity at 25 ft, inch/second	Approximate RMS Velocity Level, inch/second	
Large bulldozer	0.089	0.002	
Small bulldozer	0.003	0.000	
Loaded trucks	0.076	0.001	
	Criteria	0.250	

Based on distance to nearest structure

[1.] Determined based on use of jackhammers or pneumatic hammers that may be used for pavement demolition at a distance of 25 feet

Notes: RMS velocity calculated from vibration level (VdB) using the reference of one microinch/second.

Source: Based on methodology from the United States Department of Transportation Federal Transit Administration, *Transit Noise and Vibration Impact Assessment* (2006).

Construction Generated Vibration - San Pascual

North - San Ramon Drive Residences		Closest Distance (feet):	65
	Approximate RMS a	Approximate RMS	
	66	73.000	
Equipment	inch/second	inch/second	
Large bulldozer	0.089	0.021	
Small bulldozer	0.003	0.001	
Loaded trucks	0.076	0.018	
	Criteria	0.250	1700
West - San Pascual Ave Residences		Closest Distance (feet):	120
	Approximate RMS a	Approximate RMS	
	Velocity at 25 ft,	Velocity Level,	
Equipment	inch/second	inch/second	
Large bulldozer	0.089	0.008	
Small bulldozer	0.003	0.000	
Loaded trucks	0.076	0.007	
	Criteria	0.250	
South - San Pascual Park		Closest Distance (feet):	630
	Approximate RMS a	Approximate RMS	
	Velocity at 25 ft,	Velocity Level,	
Equipment	inch/second	inch/second	
Large bulldozer	0.089	0.001	
Small bulldozer	0.003	0.000	
Loaded trucks	0.076	0.001	
	Criteria	0.250	
East - Arroyo Park		Closest Distance (feet):	80
	Approximate RMS a	Approximate RMS	
	Velocity at 25 ft,	Velocity Level,	
Equipment	inch/second	inch/second	
Large bulldozer	0.089	0.016	
Small bulldozer	0.003	0.001	
Loaded trucks	0.076	0.013	
	Criteria	0.250	

Based on distance to nearest structure

[1.] Determined based on use of jackhammers or pneumatic hammers that may be used for pavement demolition at a distance of 25 feet

Notes: RMS velocity calculated from vibration level (VdB) using the reference of one microinch/second.

Source: Based on methodology from the United States Department of Transportation Federal Transit Administration, *Transit Noise and Vibration Impact Assessment* (2006).

Appendix H

Traffic Evaluation

MEMORANDUM

To: Jillian Neary

From: Darlene Danehy Yellowhair, T.E., PTOE, RSP2i

Date: October 27, 2023

Subject: Arroyo Seco Water Reuse Project Traffic Evaluation

Introduction

This memorandum provides an evaluation of construction traffic expected to be generated by the Arroyo Seco Water Reuse Project (Project). The Project includes two sites - San Rafael (North Project) and San Pascual (South Project). The San Rafael site is located north of San Pascual Avenue and the San Pascual site is located south of San Pascual Avenue. Figure 1 shows the project location.

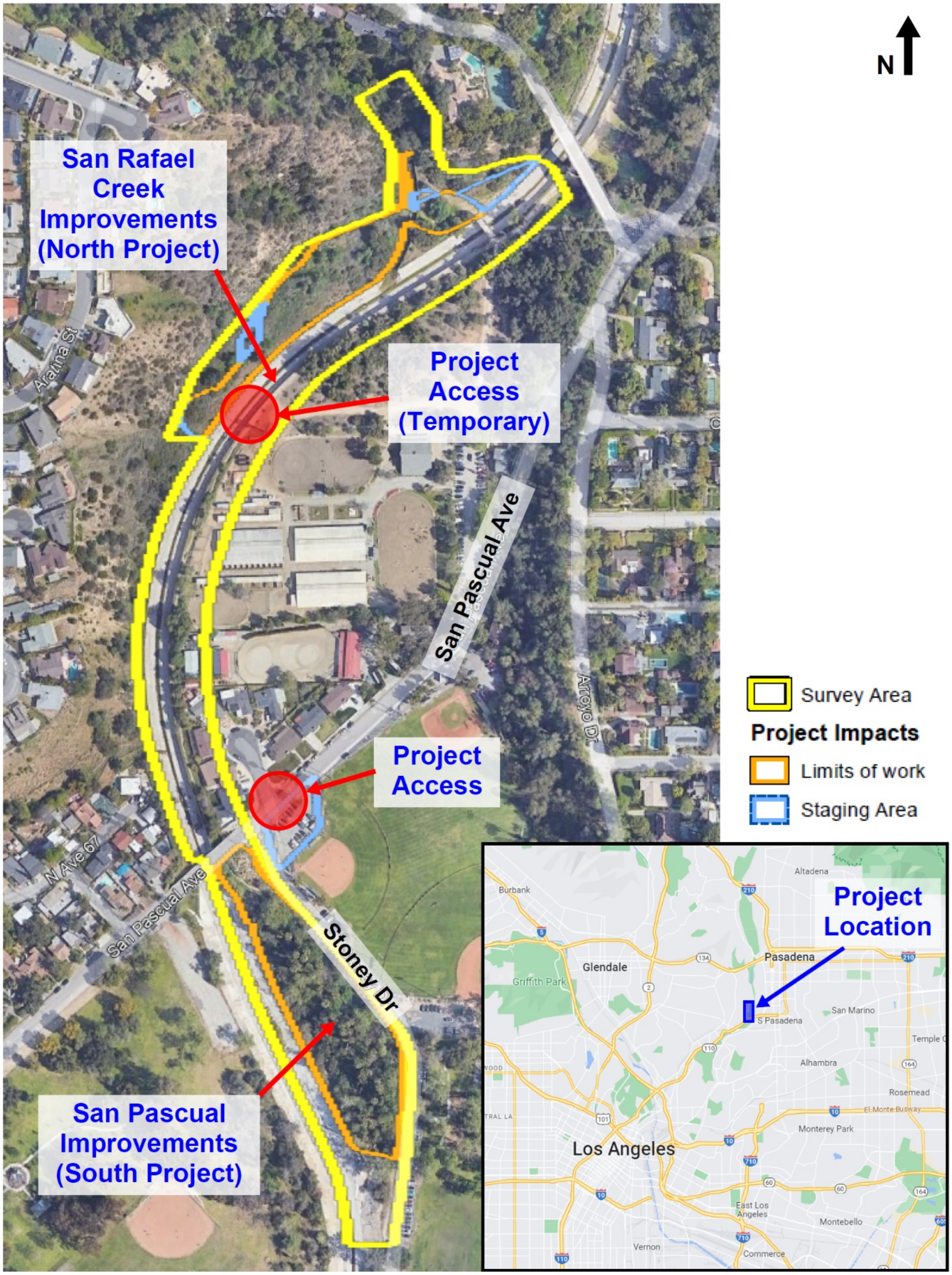
The Project will include construction of water treatment and expanded recreational facilities in the Lower Arroyo Seco but is not expected to generate any new permanent trips. Because the Project is not expected to result in a change in the permanent trip generation related to the Lower Arroyo Seco, a traffic analysis is not required. However, this memorandum provides a discussion of the anticipated construction traffic generated by the Project.

Project Construction Traffic

Construction Trip Generation

The Project is expected to include activities at two sites – San Rafael and San Pascual. Construction activity at each site is expected to include truck trips and worker trips, and each has a specified duration. On each workday, construction activities are expected to occur during an eight-hour period. It was assumed that truck trips would be evenly spaced throughout the workday, and that all workers would arrive during the same hour in the morning and would depart in the same hour in the afternoon/evening. Table 1 shows the total construction trips anticipated for the Project along with the duration of each activity. In terms of timeframe, as soon as the demolition, site preparation and grading/excavation at San Rafael Creek site is completed, the crew will be moving to the San Pascual site and will do same operations while the water infrastructure is under construction at the San Rafael Creek site. The total construction time for both sites is expected to be 17 months, including first 4 months at the San Rafael Creek site only, 5 months simultaneous construction at both sites, and 8 months at the San Pascual site only.

Figure 1. Project Location



Based on Table 1, the peak day occurs in the 8th month. Table 2 shows the peak day construction traffic along with the peak hour (on the peak day) construction traffic. As seen in the table, this conservative assumption would result in 57 daily construction trips, including 23 trips in the peak hour, in the 8th month.

Table 1. Total Construction Trips

San Rafael Creek Improvements (North Project)					
Month	**Activity**	**Total Trips**	**Work Days**	**Daily Trips**	**Peak Hour Trips**
1	Demolition	6	20	Assume 2 trips on 3 consecutive days	0
2	Site Preparation	200	20	10	1
3-4	Grading/Excavation	400	40	10	1
5-8	Water Infrastructure Construction	4	80	Assume 4 trips in same day	1
9	Paving	0	20	0	0
Construction Worker Trips - Per Day Rates Only				20	10
San Pascual Improvements (South Project)					
Month	**Activity**	**Total Trips**	**Work Days**	**Daily Trips**	**Peak Hour Trips**
5	Demolition	0	20	0	0
6-7	Site Preparation	400	40	10	1
8-10	Grading/Excavation	800	60	13	2
11-16	Water Infrastructure Construction	10	120	Assume 2, 2, 1 trip in single days distributed through phase	0
17	Paving	0	20	0	0
Construction Worker Trips - Per Day Rates Only				20	10

Table 2. Peak Day Construction Trips (8th Month)

Components	Activity	Total Trips	Work Days	Daily Trips	Peak Hour Trips
San Rafael Creek	Water Infrastructure Construction	4	80	4	1
	Construction Worker Trips - Per Day Rates			20	10
San Pascual	Grading	800	60	13	2
	Construction Worker Trips - Per Day Rates			20	10
			Peak Day	**57**	**23**

Per the Pasadena Department of Transportation's *Transportation Impact Analysis Current Practice and Guidelines (2015)*, any project which is expected to generate fewer than 300 new permanent daily trips is considered exempt, is not expected to generate any impacts, and does not require a full traffic analysis.

As previously discussed, the Project is not expected to generate any permanent trips. Similarly, the Project is also not expected to result in a permanent increase in daily VMT. Therefore, no analysis is required and the Project is not expected to have a significant impact due to long-term traffic. The City of Pasadena does not require evaluation of construction traffic.

Construction Trip Distribution

Construction debris, greenwaste, and excavated soil will be disposed at Scholl Canyon Landfill, approximately five miles from the Project sites. As shown in Figure 1, truck traffic for this Project is expected to access both sites from San Pascual Avenue. The northern project access will consist of a temporary bridge which will span the concrete channel. Trucks are expected to use Orange Grove Boulevard and State Route 134 as the major roadways to access the project area but will also have to travel along Madeline Drive and Arroyo Boulevard to access the Project site. Orange Grove Boulevard is an arterial roadway. Although it is closer to the site, State Route 110 is less likely to be used than State Route 134 due to weight restrictions.

Conclusion

As outlined in this memorandum, the Arroyo Seco Water Reuse Project is not expected to generate any new permanent traffic. Further, a conservative estimate of the construction traffic indicates that the Project will generate 57 trips on the peak day, below the City of Pasadena thresholds for requiring a traffic analysis. Therefore, the Project is expected to have a less than significant traffic impact.