Appendix A
Biological Resources Assessment

Final

2354 SAN CLEMENTE STREET, LAGUNA BEACH, CALIFORNIA

Biological Resources Assessment

Prepared for
Kevin Aaronson
32741 Seven Seas
Dana Point, California 92629

June 2022 (Revised November 2023)

ESA

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Biological Resources Assessment

Executive Summary

The purpose of this study is to document the existing biological resources located at 2354 San Clemente Street (APNs 656-122-04 and 656-122-05) in the City of Laguna Beach, Orange County, California. The proposed project is the demolition of an existing single-family residence and the replacement construction of a new single-family residence on the property. Biological field studies were completed on October 31, 2018, August 7, 2019, February 25, 2022, and on June 16, 2023. High Value Habitat, as defined in the City's General Plan, is present within the study area in the form of lemonade berry scrub. The proposed single-family residence, replacing the existing single-family residence, will not be located within a High Value Habitat area but is proposed to be located within a designated Open Space Preserve Area, albeit surrounded by existing residential uses. Construction will not occur within a significant watercourse or within a 25-foot drainage course buffer area. Fuel modification will be conducted in accordance with the projects AMM, and will avoid impacts to High Value Habitat in the form of lemonade berry scrub. New vegetation changes resulting from fuel modification implementation will concentrate on removal of non-native or selected non-dominant species occurring within the lemonade berry scrub. Selective thinning of species for fuel modification will avoid or minimize impacts to the biological resources, and associated Alternate Materials, Design, and Methods of construction described in a separate report will minimize overall impacts to High Value Habitat within the study area. Impacts to biological resources can be avoided or minimized with the implementation of the recommendations provided in this report. A significant watercourse is present within the study area, but there will be no encroachment within this significant drainage or the 25-foot setback buffer.

CHAPTER 1
Introduction

Background and Purpose

This report presents the findings of a general biological survey conducted by **Environmental Science Associates (ESA)** for the property located at 2354 San Clemente Street (Assessor Parcel Numbers [APNs] 656-122-04 and 656-122-05, main parcel and fuel modification parcel respectively; referred to collectively as the study area) in the City of Laguna Beach (City), Orange County, California. The purpose of this study is to document the existing biological resources and assess the potential biological and regulatory constraints associated with the future construction of a proposed single-family home to replace the existing single-family residence on the property. The submittal of this report is intended to satisfy documentation according to the City of Laguna Beach Biological Report Requirements (City of Laguna Beach 2006a).

The proposed single family home will consist of a new 3,583 square-foot single-family residence and an attached 528 square-foot, two-car garage in the R-1 (Residential Low Density) zone. The proposed new residence will include a new two-level residential structure, additional covered/tandem parking, lot coverage, interconnected concrete decking (1,377 square feet), skylights, grading, retaining walls, pool and spa, and landscaping/fuel modification. These facilities are proposed within the main parcel. A second adjacent parcel is non-buildable and is to remain as a natural open space zone.

Fuel modification within both parcels will also be required as part of the project, and include a 20-foot irrigated zone surrounding all proposed constructed residential facilities identified as Zone A. Zone B is a 50-foot irrigated, non-buildable zone that consists of an area beyond Zone A. Zone B separates Zone A from the 25-foot setback that avoids the significant watercourse. Zone C consists of the area contained within the 25-foot setback on either side of the significant watercourse, which is non-irrigated and consists of a 50-percent thinning fuel management zone. Fuel modification Zones A and B overlap portions of High Value Habitat associated with lemonade berry scrub. The project proposes the use of water cannons for fire protection in areas outside of Zone A.

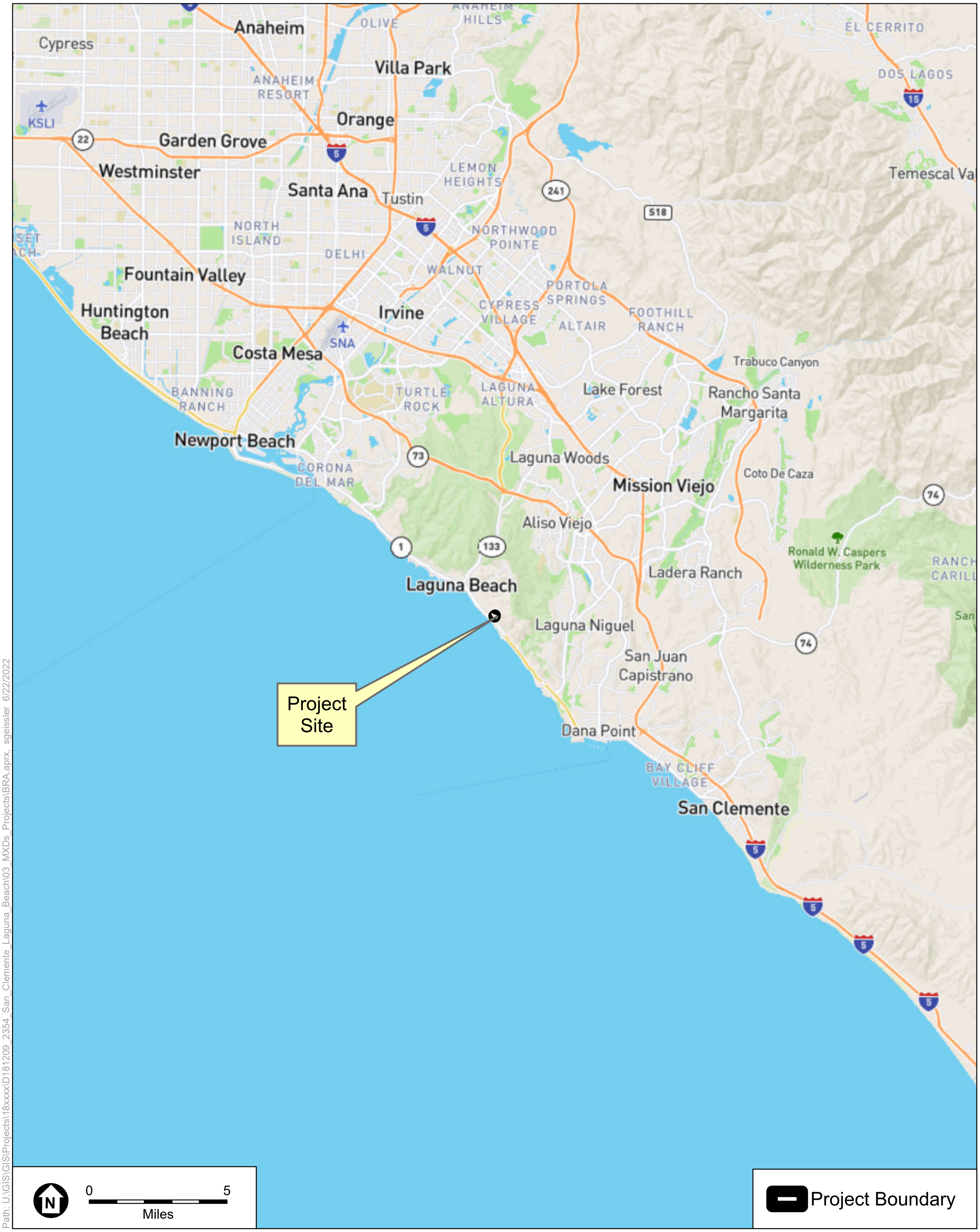
The existing single-family residence will be demolished and removed from the project site. In addition to the new residential structure, the project will provide a cul-de-sac turnaround at the end of San Clemente Street. Stormwater flows from the roadway will be directed downslope to the offsite, adjacent drainage course to the north.

Study Area Location

The study area consists of approximately 0.51 acres located at 2354 San Clemente Street in Laguna Beach, as shown in **Figure 1,** *Regional Map*. The study area can be found within U.S. Geological Survey (USGS) 7.5' Laguna Beach topographic quadrangle, Section 31, Township 7 S., Range 8 W. and Section 36, Township 7 S., Range 9 W. Elevation on-site ranges from approximately 250 feet (75 meters) above mean sea level (MSL) in the northern portion of the study area to approximately 330 feet (98 meters) above MSL in the eastern portion of the study area. The Project Site at 2354 San Clemente Street is approximate 900 feet east of South Coast Highway (State Highway 1) and 1.65 miles southeast of Laguna Canyon Road (Highway 133), **Figure 2,** *Project Location Map.*

Scope of Study

The scope of this assessment is to document the existing biological resources within the study area, and to identify any potential sensitive biological resources that may pose constraints to future development within the study area. This report incorporates the findings of a literature review and four general biological surveys of the property conducted on October 31, 2018, August 7, 2019, February 25, 2022, and June 16, 2023. This documentation is consistent with accepted scientific and professional standards pursuant to the California Environmental Quality Act (CEQA) and congruent with technical requirements of the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW), where appropriate. While general biological resources are discussed in a comprehensive manner, the focus of this assessment is on those resources considered to be sensitive.



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SOURCE: Open Street Map, 2018.

2354 San Clemente Project

Figure 1
Regional Map

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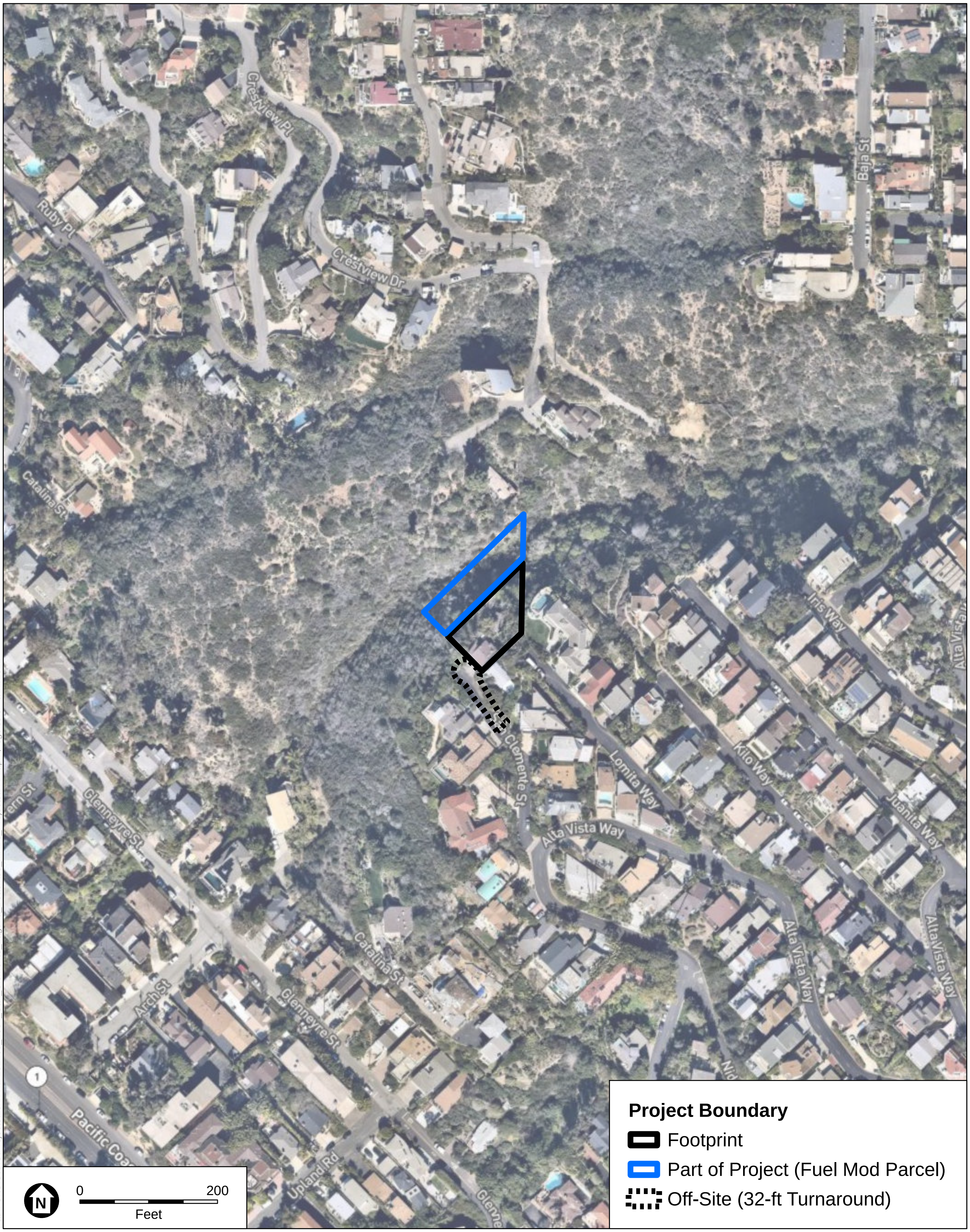

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SOURCE: Mapbox, 2021

2354 San Clemente Project

Figure 2
Project Location Map

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CHAPTER 2
Methodology

Literature Review

Prior to conducting the field assessment, ESA biologists conducted a query of available resource inventory databases to analyze the potential for sensitive natural resources to occur within the study area. The California Natural Diversity Database (CNDDB), a CDFW species account database, was reviewed for pertinent information regarding the localities of known observations of sensitive species in the vicinity of the study area (CDFW 2022). Federal register listings, protocols, the Laguna Beach General Plan Open Space and Conservation Element (City of Laguna Beach 2006b), the Laguna Beach Biological Resources Inventory (Marsh et al. 1983), as well as species data provided by the USFWS and CDFW occurrences databases were reviewed in conjunction with anticipated federally and State listed species potentially occurring within the vicinity. In addition, regional flora and fauna field guides were utilized in the identification of species and suitable habitats. These sources and other references reviewed provided a baseline from which to inventory the biological resources potentially occurring within the study area, and are listed in Section 5.0, *References*.

Field Investigation

A biological field assessment of parcel APN 656-122-04 was initially conducted on October 31, 2018. The survey consisted of walking the property footprint to assess the potential for the site to support sensitive biological resources and to map the vegetation on the property. On August 7, 2019, a second survey was conducted by ESA biologist Karla Flores on two parcels (APNs 656-122-04 and 656-122-05) to identify woody shrubs allowed within the fuel modification requirements of the city of Laguna Beach. In addition, observations were made of the vegetation on the adjacent parcel to the north APN 656-122-003. On February 25, 2022 a third survey was conducted by ESA botanist Douglas Gordon-Blackwood to assess the site for special-status plants, including big-leaved crownbeard (*Verbesina dissita*) and intermediate mariposa lily (*Calochortus weedii* var. *intermedius*). On June 16, 2023 a fourth survey was conducted by Mr. Gordon-Blackwood to reassess the vegetation on both parcels and to conduct a focused rare plant surveys for big-leaved crownbeard and intermediate mariposa lily. During the course of each survey, an inventory of plant and wildlife species observed on-site was compiled and special attention was paid to areas potentially supporting sensitive habitat, special-status plant and wildlife species, and areas that may be under the jurisdiction of Federal and State regulatory agencies.

Natural Community Classification and Mapping

During the 2018 assessment, natural communities were mapped with the aid of a 1”=60’ scale aerial photograph. Plant community designations follow the Orange County Habitat Classification System (OCHCS) (Gray and Bramlet 1992). After completing the fieldwork, the plant community polygons were digitized using Geographic Information System (GIS) technology to calculate acreages. During the 2023 site visit, vegetation was remapped and characterized in the field in accordance with *A Manual of California Vegetation, Second Edition* (Sawyer et al. 2009). A detailed description of each plant community and land use is provided in Chapter 3 of this report.

General Plant Inventory

All plant species observed within the study area were identified and recorded in field notes or collected and later identified using taxonomic keys. Plant taxonomy follows Baldwin et al (2012). Common plant names, when not available from Baldwin, were taken from Roberts (1998), or Clarke et al (2007). Because common names vary significantly between references, scientific names are included during the first mention of a species; common names consistent within the report are used thereafter. A complete list of observed plant species is provided in **Appendix A**, *Species Compendia*. Special-status plant species are discussed in the following section.

Special-Status Plant Surveys

Special-Status plants include those listed by the USFWS, CDFW, and California Native Plant Society (CNPS) (particularly species with a California Rare Plant Rank (CPRP) of Ranks 1A, 1B, 2A, and 2B). It should be noted that a focused special-status plant survey was not conducted during the October 21, 2018 and August 7, 2019 site visits because of the late season surveys. In accordance with the City’s biological reporting requirement, a presence/absence focused survey was made for the Federal and State-threatened big-leaved crownbeard during the February 25, 2022 site visit. A reference site for big-leaved crownbeard was visited to confirm plant phenology during the time of the February 2022 survey[1]. A second focused survey for rare or special-status species was conducted in June 2023. Reference sites were visited prior to the June 2023 focused survey for intermediate mariposa lily[2] and big-leaved crownbeard, during their peak bloom period.

General Wildlife Inventory

All wildlife species observed during the field investigation either by sight, call, tracks, nests, scat, remains, or other sign were recorded in field notes. Binoculars were utilized in the field for the

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1 Calflora Observation: <https://www.calflora.org/entry/occdetail.html?seq_num=po145453&taxon=Verbesina+dissita>

2 Calflora Observation: < https://www.calflora.org/entry/occdetail.html?seq_num=oe407&taxon=Calochortus+weedii+var.+intermedius>

identification of wildlife, as necessary. Wildlife species observed within the study area are provided in Appendix A, *Species Compendia*.

Wildlife taxonomy in this report followed Stebbins (2003) for amphibians and reptiles, the American Ornithologists' Union (2013) for birds, and Jameson and Peeters (1988) for mammals. Because common names vary significantly between references, scientific names are included during the first mention of a species; common names are used thereafter. Sensitive wildlife species are discussed in the following section

Special-Status Wildlife Surveys

As previously mentioned, all wildlife species observed on-site were recorded during the field investigation; however, no focused protocol surveys for special-status wildlife species were conducted.

Regional Connectivity/Wildlife Movement Corridor Assessment

The analysis of wildlife movement corridors associated with the study area and its immediate vicinity is based on information compiled from the literature and analysis of aerial photographs and topographic maps. Little quantitative data exists on the movements of animals through corridors. A literature review was conducted that included documents on island biogeography (studies of fragmented and isolated habitat "islands"), reports on wildlife home range sizes and migration patterns, and studies on wildlife dispersal. Wildlife movement studies conducted in southern California were also reviewed. The relationship of the study area to large open space areas in the immediate vicinity was also evaluated in terms of connectivity and habitat linkages. Relative to corridor issues, the discussions in this report are intended to focus on wildlife movement associated with the study area and the immediate vicinity.

The focus of this study is to determine if the alteration of current land use within the study area will have significant impacts on the regional movement of wildlife. This study did not include the use of track plates, camera stations, scent stations, or snares. Where applicable, notes were made during the field investigation of any animal sign found, and if any wildlife movement patterns exist. The conclusions drawn from the assessment are based on the knowledge of desired topography and resource requirements for wildlife potentially utilizing the study area and vicinity. It is noted that a portion of the study area, parcel APN 626-122-005, is currently developed with a single-family residence and the study area is located within a developed residential community. The drainage to the north, partially within the study area, provides the primary opportunity for wildlife movement as there is cover for wildlife protection and there are few to no barriers for wildlife passage.

CHAPTER 3
Existing Conditions

Characteristics of the Study Area and Surrounding Area

The study area is located at the northeast end of a cul-de-sac at 2354 San Clemente Street in the City of Laguna Beach, north of the intersection of Alta Vista Way and San Clemente Street. The study site consists of an existing residential structure, natural communities, and planted ornamental landscaping.

The study area is immediately bordered by residential development to the east, southeast and southwest, bordered by an undeveloped canyon to the northwest. Each of the surrounding residential structures, including the existing residence on the project site, have associated fuel modification requirements to provide defensible space. Parcel APN 656-122-04 supports an area that has been designated as “High Value Habitat” under the Laguna Beach General Plan Open Space and Conservation Element (City of Laguna Beach 2006b). Ornamental and invasive non-native species were also observed in this portion of the study area. Much of this designated “High Value Habitat” is developed with a single-family residence or is within the fuel modification areas for existing residential uses.

The topography of the study area is characterized by moderate to steep sloping hillsides with ornamental and chaparral vegetation. Elevations range from approximately 250 feet above mean sea level (MSL) in the northern portion of the study area to approximately 320 feet above MSL in the southern portion of the study area.

Natural Communities

The natural communities and land cover types located within the survey area were characterized and remapped during the June 2023 biological field assessment and are depicted in **Figures 3a – Vegetation Map and Figure 3b – Vegetation Map with Fuel Modification Zones**. Each natural community and land cover type is described in detail below. A complete list of plant species observed during the site assessment is provided in **Appendix A – Species Compendia**. Representative photographs are shown in **Appendix B – Site Photographs**. A summary of acreages for each natural community and land cover type within the study area are presented below in **Table 1**.

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SOURCE: Mapbox, 2021

2354 San Clemente Project

Figure 3a
Vegetation Map

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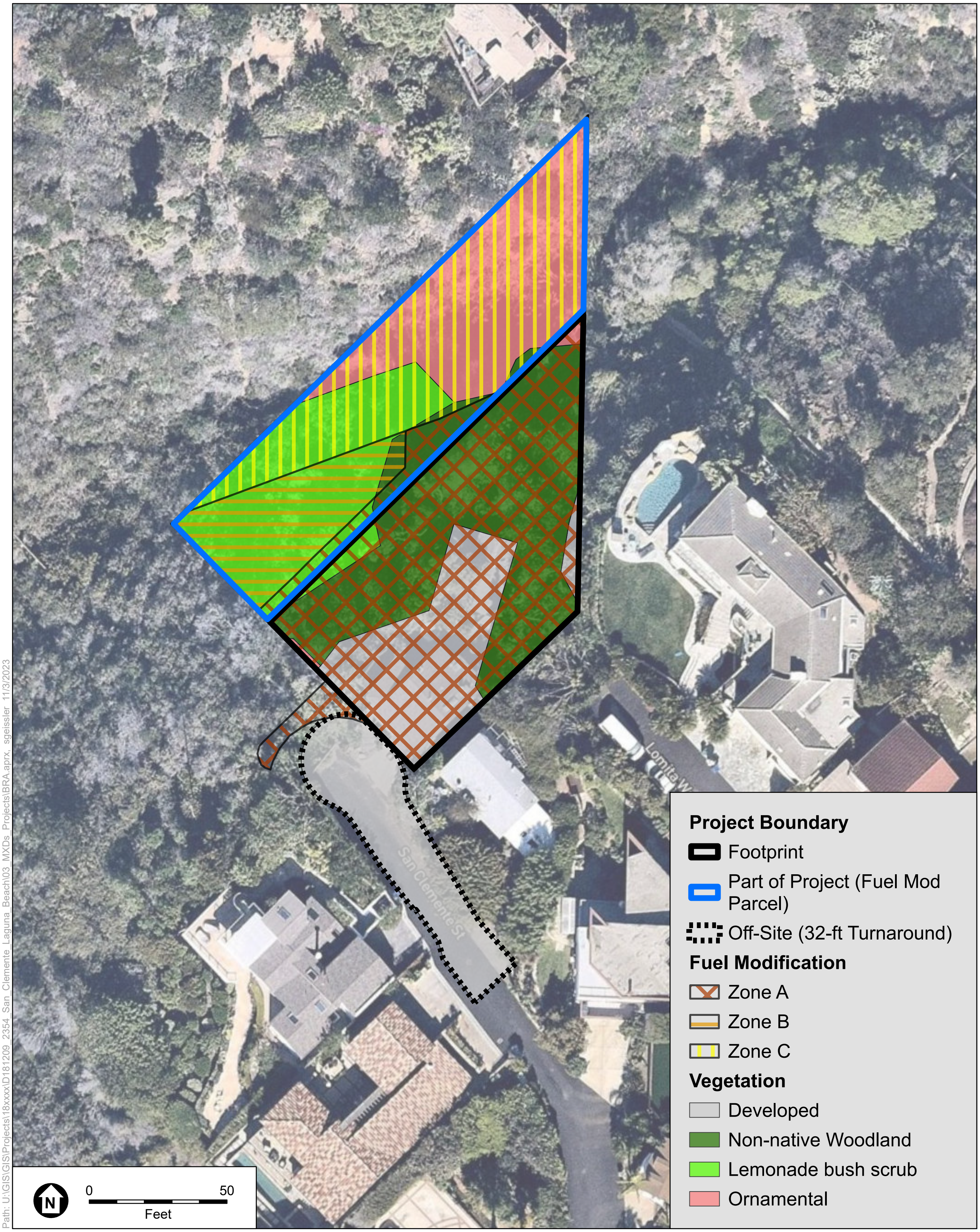

SOURCE: Mapbox, 2021

2354 San Clemente Project

Figure 3b
Vegetation Map with Fuel Mod Zones

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TABLE 1
NATURAL COMMUNITIES AND LAND COVER TYPES WITHIN THE BIOLOGICAL STUDY AREA

Natural Community/Land Cover Type	Project Footprint (acres)	Fuel Modification Parcel			Off-site (32-foot turnaround)	Total (acres)[2]
		Fuel Mod Zone A	Fuel Mod Zone B	Fuel Mod Zone C		
Lemonade Berry Scrub (*Rhus integrifolia* shrubland alliance)	0.01	0.01	0.05	0.04	-	0.11
Non-native Woodland	0.13	0.01	0.00[2]	0.00	-	0.15
Ornamental	0.00	-	-	0.10	-	0.10
Developed	0.07	-	-	-	0.06	0.13
TOTAL	**0.21**	**0.02**	**0.05**	**0.14**	**0.06**	**0.49**

1 Vegetation was characterized in the field in accordance with A Manual of California Vegetation, Online (CNPS, 2023)

2 Biological study area totals are rounded from overall calculated acreage to the nearest 100th and may differ slightly from cumulative totals for those areas where natural communities and land cover types occur in the BSA. Acreages 0.004 or below are reflected as 0.00 in the table.

SOURCE: ESA, 2023

Lemonade Berry Scrub

Lemonade berry scrub (*Rhus integrifolia* shrubland alliance), was mapped along the western portion of the study area, on north-facing slopes. Lemonade berry scrub has lemonade berry (*Rhus integrifoli*a) as the dominant shrub, and may include toyon (*Heteromeles arbutifolia*) and laurel sumac (*Malosma laurina*) as subdominants. Lemonade berry scrub typically occurs in mesic north-facing slopes in coastal areas. Lemonade berry scrub accounts for 0.11 acre within the study area, including 0.10 acre within the fuel modification parcel and 0.01 acre within the project footprint. This natural community was previously mapped as toyon sumac scrub, 3.12 in OCHCS (Gray and Bramlet 1992).

Non-native Woodland

Non-native woodland was mapped within the southern portion of the study area, on the north-facing slope immediately adjacent to the existing house and within proposed fuel modification Zone A. Non-native woodland consists of various non-native tree species, including Brazilian pepper (*Schinus terebinthefolius*), ngaio (*Myoporum laetum*), Victorian box (*Pittosporum undulatum*), and blue gum (*Eucalyptus* spp.) as codominant species in the tree canopy. Understory species observed within this community included garden nasturtium (*Tropaeoleum majus*), bank catclaw (*Acacia redolens*), and castor bean (*Ricinus communis*). This community comprises 0.15 acre within study area, including 0.02 acre within the fuel modification parcel.

Ornamental

Ornamental vegetation in the study area have a variety of non-native trees, shrubs, and ground cover planted as landscaping, being the dominant species within the community. The area has been subject to regular and historic disturbance in the form of fuel modification. Within this community, remnant native species were also observed intermixed with ornamental landscaping plantings. Species observed within this community include native laurel sumac, lemonade berry, California sagebrush (*Artemisia californica*), coyote brush (*Baccharis pilularis*), California buckwheat (*Eriogonum fasciculatum*), spiny redberry (*Rhamnus crocea*), toyon, bushrue (*Cneoridium dumosum*), and ornamental or non-native Brazilian peppertree, hottentot fig (*Carpobrotus edulis*), sowthistle (*Sonchus asper* var. *asper*), Australian saltbush (*Atriplex semibaccata*), Haworth's aeonium (*Aeonium haworthii*), jade plant (*Crassula ovata*), spotted spurge (*Euphorbia maculata*), Bailey acacia (*Acacia baileyana*), ngaio, Victorian box, trailing lantana (*Lantana montevidensis*), century plant (*Agave americana*), giant yucca (*Yucca gigantea*), and pampas grass (*Cortaderia selloana*). Ornamental vegetation in the study area comprises 0.10 acre within the study area, including 0.10 acre within the fuel modification parcel and 0.002 acre within the project development footprint. This community was previously mapped as ornamental landscaping, 15.5 in OCHCS (Gray and Bramlet 1992).

Developed

Developed areas within the study area consist of the existing residential single-family home, the associated driveway and San Clemente Street. Developed areas comprise 0.13 acre within the study area.

General Plant Inventory

The plant communities discussed above are composed of a variety of plant species. Plant species observations and identifications were completed during the field visit to the study area. No special-status species were detected. Focused surveys for intermediate mariposa lily and big crownbeard were conducted during the peak bloom period in June 2023, and neither species was observed within the study area. All plant species observed within the study area are included in Appendix A, *Species Compendia*. Special-status plant species occurring or potentially occurring within the study area are discussed below under, Special-Status Plant Species.

General Wildlife Inventory

A general habitat assessment for wildlife was performed while visiting the study area. No special-status species were detected, and no focused surveys were conducted. The native and ornamental trees and shrubs may provide foraging and cover habitat for a number of wildlife species, including year-round and seasonal avian residents and migrating songbirds. Bird species observed within or over the study area include turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*) Anna's hummingbird (*Calypte anna*), California scrub-jay (*Aphelocoma californica*), American crow (*Corvus brachyrhynchos*), bushtit (*Psaltriparus minimus*), wrentit (*Chamaea fasciata*), California towhee (*Melozone crissalis*), spotted towhee (*Pipilo maculatus*), and lesser goldfinch (*Spinus psaltria*). All wildlife species observed within the study area are indicated in Appendix A, *Species Compendia*. Special-status wildlife species occurring or potentially occurring within the study area are discussed below under, Special-Status Wildlife Species.

Wildlife Movement

Overview

Wildlife corridors link together areas of suitable habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance. The fragmentation of open space areas by urbanization creates isolated "islands" of wildlife habitat. In the absence of habitat linkages that allow movement to adjoining open space areas, various studies have concluded that some wildlife species, especially the larger and more mobile mammals, will not likely persist over time in fragmented or isolated habitat areas because such conditions preclude the infusion of new individuals and genetic information into isolated populations (MacArthur and Wilson 1967, Soule 1987, Harris and Gallagher 1989, Bennett 1990).

Corridors effectively act as links between different populations of a species. A group of smaller populations (termed "demes") linked together via a system of corridors is termed a "metapopulation." The long-term health of each deme within the metapopulation is dependent upon its size and the frequency of interchange of individuals (immigration vs. emigration). The smaller the deme, the more important immigration becomes, because prolonged inbreeding with the same individuals can reduce genetic variability. Immigrant individuals that move into the deme from adjoining demes mate with individuals and supply that deme with new genes and gene combinations that increases overall genetic diversity. An increase in a population's genetic variability is generally associated with an increase in a population's health and long-term viability.

Corridors mitigate the effects of habitat fragmentation by: (1) allowing animals to move between remaining habitats, which allows depleted populations to be replenished and promotes genetic diversity; (2) providing escape routes from fire, predators, and human disturbances, thus reducing the risk that catastrophic events (such as fires or disease) will result in population or local species extinction; and (3) serving as travel routes for individual animals as they move within their home ranges in search of food, water, mates, and other needs (Noss 1983, Fahrig and Merriam 1985, Simberloff and Cox 1987, Harris and Gallagher 1989).

Wildlife movement activities usually fall into one of three movement categories: (1) dispersal (e.g., juvenile animals from natal areas, individuals extending range distributions); (2) seasonal migration; and (3) movements related to home range activities (foraging for food or water, defending territories, searching for mates, breeding areas, or cover). A number of terms have been used in various wildlife movement studies, such as "travel route," "wildlife corridor," and "wildlife crossing" to refer to areas in which wildlife move from one area to another. To clarify the meaning of these terms and facilitate the discussion on wildlife movement in this study, these terms are defined as follows:

Travel route: A landscape feature (such as a ridge line, drainage, canyon, or riparian strip) within a larger natural habitat area that is used frequently by animals to facilitate movement and provide access to necessary resources (e.g., water, food, cover, den sites). The travel route is generally preferred because it provides the least amount of topographic resistance in moving from one area to another; it contains adequate food, water, and/or cover while moving between habitat areas; and provides a relative direct link between target habitat areas.

Wildlife corridor: A piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Wildlife corridors are usually bounded by urban land areas or other areas unsuitable for wildlife. The corridor generally contains suitable cover, food, and/or water to support species and facilitate movement while in the corridor. Larger, landscape-level corridors (often referred to as "habitat or landscape linkages") can provide both transitory and resident habitat for a variety of species.

Wildlife crossing: A small, narrow area, relatively short in length and generally constricted in nature, that allows wildlife to pass under or through an obstacle or barrier that otherwise hinders or prevents movement. Crossings typically are man-made and include culverts, underpasses, drainage pipes, and tunnels to provide access across or under roads, highways, pipelines, or other physical obstacles. These are often "choke points" along a movement corridor.

Wildlife Movement within the Study Area

As previously described, wildlife movement activities usually fall into one of three movement categories: (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 (foraging for food or water, defending territories, searching for mates, breeding areas, or cover). Although the nature of each of these types of movement are species specific, large open spaces will generally support a diverse wildlife community representing all types of movement. Each type of movement may also be represented at a variety of scales from non-migratory movement of amphibians, reptiles, and some birds on a "local" level, to many square mile home ranges of large mammals moving at a "regional" level.

The study area supports "High Value Habitat," as designated under the City General Plan Open Space and Conservation Element (City of Laguna Beach 2006b) (**Figure 4**, *General Plan High Value Habitat and Significant Watercourse*), although this does not fully correspond to the biological resources of highest value observed on the project site. High Value Habitats are extensive areas dominated by indigenous plant communities with good species diversity, and are often linked to other extensive open space areas by traversable open space corridors. This movement does not occur within the Project Site. Their faunal carrying capacity is good to excellent, and many areas are utilized as bedding and foraging sites by mule deer, or possess large resident populations of birds or native small mammals. The High Value Habitat mapped on-site within the City's General Plan is found in the extreme northeastern corner. Northwest of the study area is comprised of native chaparral and provides high quality native habitat; therefore, this area adjacent to the study area should be considered as High Value Habitat that may be utilized for wildlife movement, while the area onsite currently designated as High Value Habitat should not be so designated based on the observed biological resources present.

The native habitat within the study area is contiguous to open space areas consisting of undeveloped hillsides and canyons, primarily upslope from the study area. Although this open space area is surrounded by residential development, it is loosely connected to the open space area of Aliso and Wood Canyons Wilderness Park further to the east. There is no direct connection of open space from the study area to the Pacific Ocean. However, generally, the study area provides live-in habitat (e.g., for cover, foraging, nesting, etc.) for a variety of wildlife species. Although the study area is not a wildlife movement corridor (i.e., a piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another) since it does not connect Aliso and Wood Canyons Wilderness Park to another large open space area, it is a part of habitat that can be considered a habitat patch and likely supports movement within it on a local and regional level.

Jurisdictional Determination

No formal jurisdictional delineation was performed. However, a preliminary jurisdictional determination was conducted to identify any drainage features potentially subject to the jurisdiction of the USACE, RWQCB, and/or CDFW. One drainage occurs within approximately 0.01 acre of the northern portion of the study area (**Figure 4**, *General Plan High Value Habitat and Significant Watercourse*). This drainage is fringed by lemonade berry and other species associated with lemonade berry scrub, as well as some sparse sweet fennel, tree tobacco, and pampas grass that were also observed. No native riparain vegetation was observed witin the drainage.

Sensitive Biological Resources

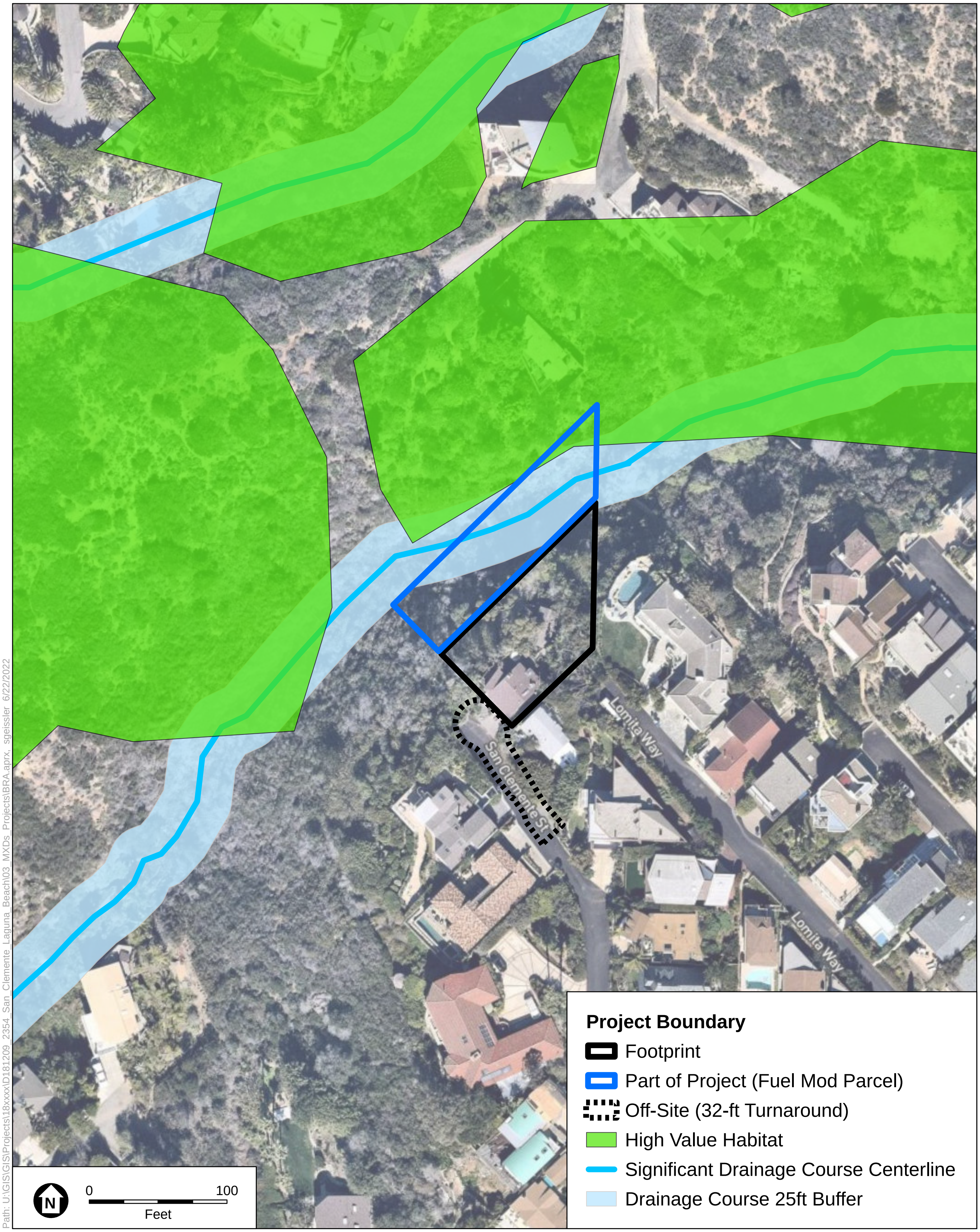
Sensitive biological resources are habitats or individual species that have special recognition by Federal, State, or local conservation agencies and organizations as endangered, threatened, or rare. The USFWS, the CDFW, and special groups like the CNPS maintain watch lists of such resources, under the provisions of the Federal and State Endangered Species Acts.

Special-status species that occur or could potentially occur within the study area are based on one or more of the following: (1) the direct observation of the species on the property during the biological survey, (2) a record reported in the CNDDB, or (3) the study area is within the known distribution of a species and contains appropriate suitable habitat.

Sensitive Resource Classification

Federal Protection and Classifications

The FESA of 1973 defines an endangered species as “any species which is in danger of extinction throughout all or a significant portion of its range.” A threatened species is defined as “any species which is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range.” Under provisions of Section 9(a)(1)(B) of the FESA, unless properly permitted, it is unlawful to “take” any listed species. “Take” is defined in Section 3(18) of FESA: “...harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Further, the USFWS, through regulation, has interpreted the terms “harm” and “harass” to include certain types of habitat modification as forms of “take.” These interpretations, however, are generally considered and applied on a case-by-case basis and often vary from species to species. Of legal note, the FESA does not protect or regulate Federal threatened or endangered listed plant species on private property unless a federal action, such as regulatory permit approval or federal funding, is involved.



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SOURCE: Mapbox, 2021

2354 San Clemente Project

Figure 4
General Plan High Value Habitat
and Significant Watercourse

ESA

All references to Federally-protected species in this report include the most current published status or candidate category to which each species has been assigned by USFWS.

For purposes of this assessment the following acronyms are used for Federal status species:

- FE Federally-listed as Endangered
- FT Federally-listed as Threatened
- FPE Federally proposed for listing as Endangered
- FPT Federally proposed for listing as Threatened
- FPD Federally proposed for delisting
- FC Federal candidate species (former C1 species)

State of California Protection and Classifications

California's Endangered Species Act (CESA) defines an endangered species as:

> *"…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease."*

The State defines a threatened species as:

> *"a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter. Any animal determined by the commission as rare on or before January 1, 1985 is a threatened species."*

Candidate species are defined as:

> *"…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the commission has formally noticed as being under review by the department for addition to either the list of endangered species or the list of threatened species, or a species for which the commission has published a notice of proposed regulation to add the species to either list."*

Candidate species may be afforded temporary protection as though they were already listed as threatened or endangered at the discretion of the Fish and Game Commission. Unlike the FESA, CESA does not include listing provisions for invertebrate species.

Article 3, Sections 2080 through 2085, of the CESA addresses the taking of threatened or endangered species by stating:

> *"no person shall import into this State, export out of this State, or take, possess, purchase, or sell within this State, any species, or any part or product thereof, that the*

> *commission determines to be an endangered species or a threatened species, or attempt any of those acts, except as otherwise provided."*

Under the CESA, "take" is defined as, "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

Additionally, some sensitive mammals and birds are protected by the State as Fully Protected Mammals or Fully Protected Birds, as described in the California Fish and Game Code, Sections 4700 and 3511, respectively.

California Species of Special Concern are species designated as vulnerable to extinction due to declining population levels, limited ranges, and/or continuing threats. Informally listed species are not protected per se, but warrant consideration in the preparation of biological assessments. For some species, the CNDDB is only concerned with specific portions of the life history, such as roosts, rookeries, or nest sites. The CNDDB records represent both specific and generalized information and mapping of observed species; thus, it is more often than not used as an indicator of the potential presence of special status species on a particular study area and is without regulatory authority.

For the purposes of this assessment, the following acronyms are used for State status species:

- SE State-listed as Endangered
- ST State-listed as Threatened
- SR State-listed as Rare
- SCE State candidate for listing as Endangered
- SCT State candidate for listing as Threatened
- SFP State Fully Protected
- SSC California Species of Special Concern
- WL California Watch List

California Native Plant Society

The CNPS is a private plant conservation organization dedicated to the monitoring and protection of sensitive species in California. CNPS has compiled an inventory comprised of the information focusing on geographic distribution and qualitative characterization of Rare, Threatened, or Endangered vascular plant species of California (CNPS 2022). The list serves as the candidate list for listing as Threatened and Endangered by CDFW. CNPS has developed six California Rare Plant Ranks (CRPR) categories of rarity:

- Rank 1A Plants presumed extirpated in California and either Rare or Extinct elsewhere.
- Rank 1B Plants Rare, Threatened, or Endangered in California and elsewhere.
- Rank 2A Plants presumed extirpated in California, but common elsewhere.

- Rank 2B Plants Rare, Threatened, or Endangered in California, but more common elsewhere.
- Rank 3 Plants about which more information is needed – a review list.
- Rank 4 Plants of limited distribution – a watch list.

The CNPS recently added "threat ranks" which parallel the ranks used by the CNDDB. These ranks are added as a decimal code after the CRPR List (e.g., List 1B.1). The threat codes are as follows:

- .1 – Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat);
- .2 – Fairly threatened in California (20-80% occurrences threatened/moderate degree and immediacy of threat);
- .3 – Not very threatened in California (<20% of occurrences threatened/low degree and immediacy of threat or no current threats known).

Sensitive species that occur or potentially could occur within the study area are based on one or more of the following: (1) the direct observation of the species on the property during one of the biological surveys; (2) a record reported in the CNDDB; and (3) the study area is within known distribution of a species and contains appropriate habitat.

County of Orange Central/Coastal Subregion Natural Community Conservation Plan and Habitat Conservation Plan (NCCP/HCP)

The study area is located within the coastal subregion of the County of Orange Central/Coastal Subregion NCCP/HCP. The NCCP/HCP was reviewed and approved by the USFWS and CDFW in 1996 to address protection and management of coastal sage scrub habitat and coastal sage scrub-obligate species, as well as other covered habitats and species, and mitigate anticipated impacts on those habitats and species on a programmatic, subregional level rather than on a project-by-project, single-species basis. A habitat reserve in excess of 37,000 acres was established for the protection of coastal sage scrub, other upland habitats, the coastal California gnatcatcher (*Polioptila californica californica*), and the other primarily coastal sage scrub-dependent species identified in the NCCP/HCP. Specifically, the NCCP/HCP, the USFWS, and the CDFW authorized take of 39 identified species of plants and wildlife (including covered and conditionally covered species). Further, the NCCP/HCP contains requirements for adaptive management, interim management, and funding management for the reserve as well as procedures and minimization measures related to the take of identified species and habitat. Thus, the NCCP/HCP provides for the protection and management of a broad range of plant and wildlife populations while providing certainty to the public and affected landowners with respect to the location of future development and open space in the subregion.

The NCCP/HCP provides for the protection of a number of plant and animal species, referred to as Target Species and Identified Species. There are also identified NCCP/HCP species that have conditional regulatory coverage under the NCCP/HCP, referred to as conditionally covered Identified Species. The conservation and management of these species is provided for under the

NCCP/HCP. The NCCP/HCP provides permits for the take of all covered and conditionally covered species so long as the conditions imposed are satisfied. For the purpose of this assessment the following acronyms are used relative to the NCCP/HCP:

- TN Target NCCP/HCP Species – Covered Species
- IN Identified NCCP/HCP Species – Covered Species
- IN/CC Identified NCCP/HCP Species – Conditionally Covered Species

Sensitive Natural Communities

The study area supports 0.10 acre of lemonade berry scrub, which is considered a sensitive natural community on CDFW's Natural Community List (*Rhus integrifolia* scrub alliance [lemonade berry scrub alliance, 37.803.00] (CDFW 2023). Project implementation will result in impacts to lemonade berry scrub, where fuel modification will be required of the new single-family residence. The study area also supports High Value Habitat as defined under the Laguna Beach General Plan Open Space and Conservation Element (City of Laguna Beach 2006b). As previously mentioned above, High Value Habitats are designated for extensive areas dominated by indigenous plant communities with good species diversity, and are often linked to other extensive open space areas by traversable open space corridors. Although the lemonade berry scrub is conservatively labeled as High Value Habitat, this natural community does not have extensive links to other open space areas to form large contiguous habitat blocks.

Portions of the High Value Habitat identified within the City of Laguna Beach General Plan Open Space and conservation Element on-site includes the northeastern portion of the study area, where many ornamental and non-native invasive species occur, and the area is subject to regular brush removal as a result of fuel modification for existing residences in the area. These areas do not meet the definition of a High Value Habitat, and should not be considered as such (refer to **Figure 4**, *General Plan High Value Habitat and Significant Watercourse*).

Lemonade berry scrub mapped in the western portion of the study area should be considered a sensitive habitat, qualifies as ESHA and is therefore conservatively considered High Value Habitat, as defined in the City's General Plan. Required fuel modification currently overlaps 0.10 acre of lemonade berry scrub. Although fuel modification is required within these areas, the City's General Plan "Prohibit[s] intrusion of fuel modification programs into environmentally sensitive areas, including chaparral and coastal sage scrubs. In accordance with the City's General Plan, fuel modification of 0.10 acre of lemonade berry scrub will be avoided and impacts to lemonade berry scrub should be minimized through selective thinning of undesirable nonnative shrubs, installation and use of irrigation rotors on galvanized poles within fuel modification Zone A, water cannons to assist with fire-fighting in Zone B, and other additional fire prevention and protection measures as recommended in the *Updated Request for Alternate Materials, Design, and Methods of Construction for 2354 San Clemente* (AMM; Stamm, 2019). Lemonade berry scrub within Zone C is completely within the 25 foot setback of the drainage and would be avoided completely.

Special-Status Plant Species

During the course of the field investigation, no special-status plant species were observed on-site. A discussion of those special-status plant species with the potential to occur within the study area is included in **Chapter 4**, *Biological Constraints*.

Special-Status Wildlife Species

A number of special-status wildlife species, including bats, were reported in the CNDDB and are reported within the region. No special-status wildlife species were observed within the study area during the field investigation. A discussion of those special-status wildlife species with the potential to occur within the study area is included in **Chapter 4**, *Biological Constraints*.

The coastal California gnatcatcher, a federally threatened species, is recorded within the Laguna Beach USGS topographic quadrangle, but is unlikely to be found within the study area. The only potentially suitable habitat is of poor quality, fragmented, and isolated from any other suitable habitat. The coastal California gnatcatcher has a high affinity for coastal sage scrub dominated by California sagebrush, which does not occur in sufficient quantities in the study area. While components of coastal sage scrub habitat were identified within the onsite chaparral communities, few individual California sagebrush shrubs were observed. Although the species may benefit from other shrub species, the onsite habitat was of low quality with only a few of the favored species evident. Additionally, the habitats were on a moderate to steep slope, a condition the species tends to avoid.

The least Bell's vireo (*Vireo bellii pusillus*) is a federal endangered and State endangered bird species that inhabits riparian habitats. However, no suitable riparian habitat to support this species occurs within the study area; therefore, this species is not expected to occur on-site.

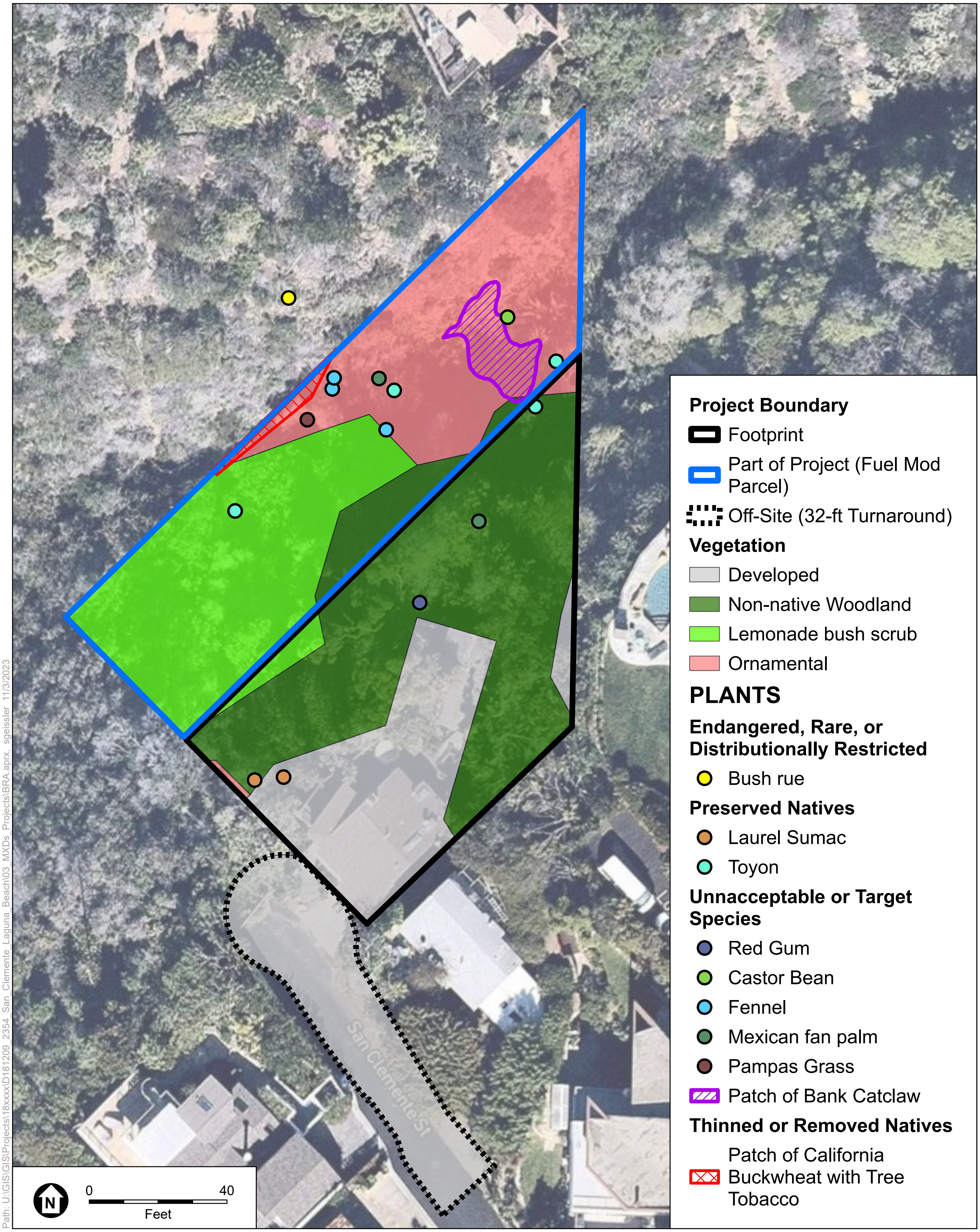
There is also potential for a number of other special-status wildlife species to occur within the study area, including coast horned lizard (*Phrynosoma blainvillii*), orange-throated whiptail (*Aspidoscelis hyperythra*), coast patch-nosed snake (*Salvadora hexalepis virgultea*), red-diamond rattlesnake (*Crotalus ruber*), northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), and San Diego desert woodrat (*Neotoma lepida intermedia*). In addition to the above special-status wildlife species, western mastiff bat (*Eumops perotis californicus*) and big free-tailed bat (*Nyctinomops macrotis*) were identified as having potential to forage within the undeveloped portions of the property, specifically within the canyon northwest of the property. These bat species are not federally or state listed by USFWS or CDFW, respectively, but are considered species of special concern by CDFW. Both species are known to roost in trees and are found in a variety of habitats including chaparral and rocky outcrops.

CHAPTER 4
Biological Constraints

The following discussion outlines the biological resources that may pose constraints to future development (e.g., the development of a single-family residence and any associated driveways, roads, infrastructure, fuel modification, and/or landscaping) within the study area.

Special-Status Plant Species

According to the CNDDB and CNPS database search, more than 30 special-status plant species have been recorded in the region (**Appendix C – Special-Status Plant Species**). However, based on microhabitat characteristics, only 7 special-status plant species have moderate to high potential to occur within the study area. Plants with a moderate to high potential to occur within the project site include: Allen's pentachaeta (*Pentachaeta aurea* ssp. *allenii*), big-leaved crownbeard, Coulter's saltbush (*Atriplex coulteri*), intermediate monardella (*Monardella hypoleuca* ssp. *intermedia*), summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*), intermediate mariposa lily, and thread-leaved brodiaea (*Brodiaea filifolia*). Allen's pentachaeta typically grows within coastal sage scrub habitat and away from direct coastal influence. The closest recorded location of this species to the study area is about five miles to the northeast. Suitable habitat is present for big-leaved crownbeard and the June 2023 field survey was conducted at a time of year when the species is flowering. Coulter's saltbush occurs within both grassland and coastal sage scrub communities, neither of which occur within the study area. Intermediate monardella has not been recorded in the vicinity of Laguna Beach and all current records for this species are found within the Santa Ana Mountains further to the east. The woody shrub summer holly is recorded in similar habitat as that occurring within the study area; however, the closest location to the study area recorded for this species is about three miles to the southeast. Thread-leaved brodiaea is a species that occurs within grassland communities, which do not occur within the study area. During the course of the 2022 and 2023 field surveys, no special-status plant species were observed onsite. A small cluster of bush rue, which is listed in the City's General Plan as 'Endangered, Rare, or Distributionally Restricted' plant, was observed in ornamental vegetation just beyond the eastern boundary of the fuel modification parcel. These plants were observed outside of any fuel modification zones and will not be impacted by fuel modification activities (See **Figure 5**, *Native and Invasive Plants*).



SOURCE: Mapbox, 2021

2354 San Clemente Project

Figure 5
Native and Invasive Plants

ESA

It is recommended that prior to any impacts to native lemonade berry scrub on-site, a focused special-status plant survey should be conducted during the appropriate blooming period for any special-status plant species[3] that has a potential to occur within the study area. If any special-status plant species are found on-site, development on-site should avoid or minimize impacts to these special-status plant populations to the maximum extent possible, and focus development within areas mapped as developed or ornamental land uses, which already exhibit significant disturbance.

No Allen’s pentachaeta, big-leaved crownbeard, Coulter’s saltbush, intermediate monardella, summer holly, intermediate mariposa lily, bush rue or thread-leaved brodiaea were observed within the survey area during focused surveys conducted in 2022 or 2023. No special-status plant species are expected to occur within the residential development structural footprint, as the area is either the existing residence or landscaped areas.

Special-Status Wildlife Species

Nearly 60 special status wildlife species were identified by the database reviewed (e.g., CNDDB; (**Appendix D – Special-Status Wildlife Species**) as having potential to occur within the vicinity of the study area. Of these, seven special-status wildlife species have moderate to high potential to occur within the study area. Wildlife species with a moderate to high potential of occurring within the project site include: coast horned lizard, orange-throated whiptail, coast patch-nosed snake, red-diamond rattlesnake, northwestern San Diego pocket mouse, and San Diego desert woodrat. No special-status species were observed within the study area during the site surveys.

To minimize impacts to special-status wildlife species that may occur within the area, any development on-site should try to avoid or minimize impacts to the native lemonade berry scrub plant community, and concentrate development within areas mapped as developed or ornamental, which already exhibit disturbance. In addition, Best Management Practices should be incorporated to make sure that during construction, workers are educated about the potential for special-status wildlife species to occur on-site and, if any wildlife are encountered during construction activities, the wildlife should be allowed to leave the work area unharmed and should be flushed or herded in a safe direction away from the work area.

In addition, the study area has the potential to support both raptor and songbird nests due to the presence of trees, shrubs, and ground cover. Disturbing or destroying active nests is a violation of the Migratory Bird Treaty Act (16 U.S.C. 703 et seq.). In addition, nests and eggs are protected under Fish and Game Code Section 3503. Vegetation removal activities (e.g., clearing for future development or thinning for fuel modification) should be scheduled outside the nesting season to avoid potential impacts to nesting birds. Nesting activity typically occurs from February 15 to August 31. This would insure that no active nests would be disturbed. If construction cannot be scheduled outside of the nesting season, all suitable habitat within 300 feet of project construction activities be thoroughly surveyed for the presence of nesting birds by a qualified biologist before commencement of vegetation removal activities. If any active nests are detected, a buffer of 300 feet (500 feet for raptors), or as determined appropriate by a qualified

[3] Including those listed in the City’s General Plan as Endangered, Rare, or Distributionally Restricted

biologist, will be delineated, flagged, and avoided until the biologist determines that the nesting cycle is complete.

Sensitive Natural Communities/High Value Habitat

The study area supports areas that have been designated as “High Value Habitat” under the Laguna Beach General Plan Open Space and Conservation Element (City of Laguna Beach 2006b). The High Value Habitat mapped on-site includes the extreme northeastern portion of the study area (refer to **Figure 4**, *General Plan High Value Habitat and Significant Watercourse*). The 0.10 acre of lemonade berry scrub is considered a sensitive natural community, which is also considered High Value Habitat. As discussed, no impacts to lemonade berry scrub will occur as a result of the project in accordance with the AMM.

Species identified as target species unacceptable for use in Fuel Modification Zone A (the zone closest to Combustible Habitable Structures) include wattle (*Acacia* species), toyon, and laurel sumac. Additional species observed within the Zone A Fuel Modification are listed as Target Species Unacceptable for use in all Fuel Modification Zones (A, B, or C) include *Eucalyptus* species, pampas grass, California sagebrush, Algerian ivy (*Hedera canariensis*), tree tobacco, castor bean, Brazilian pepper, and Mexican fan palm (*Washingtonia robusta*). Removal of non-native species within Zone A would provide an environmental benefit for the sensitive communities within Zone A (See Figure 5). Lemonade berry scrub in Zone C is located within the 25-foot setback buffer and would be avoided.

Jurisdictional Features

A preliminary jurisdictional determination was conducted to identify any drainage features potentially subject to the jurisdiction of the USACE, RWQCB, and/or CDFW. The onsite drainage occurs within approximately 0.01 acre of the northern portion of the study area.

Any development on-site, including fuel modification impacts, should avoid impacts to this jurisdictional feature, and concentrate development within areas that already exhibit disturbance. Fuel modification Zone C is intentionally designed to act as a 25-foot-wide setback from the significant watercourse. If avoidance is not feasible and it is determined that impacts to jurisdictional feature will occur from the proposed project, the appropriate permits will be obtained from the regulatory agencies (e.g., 404 permit from the USACE, 401 permit from the RWQCB, and Streambed Alteration Agreement from the CDFW) and mitigation will be required at a minimum 1:1 mitigation ratio, which may include one or more of the following:

- On- and/or off-site creation, restoration, and/or enhancement of USACE/RWQCB jurisdictional “waters of the U.S.” / “waters of the State” and CDFW jurisdictional streambed and associated riparian habitat;
- Purchase of mitigation credits at an agency-approved off-site mitigation bank or in-lieu fee program; and/or

- Off-site compensation through acquisition and protection of high-quality habitat elsewhere.

The proposed street improvement included in the project design will increase the size of the cul-de-sac adjacent to 2354 San Clemente Street. This increase would provide additional space for vehicle access and emergency vehicle turn around and also provide vehicular access for fire trucks and emergency personnel.

Wildlife Movement

The native habitat within the study area is contiguous to open space areas consisting of undeveloped hillsides and canyons. Although this open space area is surrounded by residential development, it is a loosely connected to the open space area of Aliso and Wood Canyons Wilderness Park to the east. There is no direct connection of open space from study area to the Pacific Ocean. However, the study area generally provides live-in habitat (e.g., for cover, foraging, nesting, etc.) for a variety of wildlife species within the natural communities on the hillside slope area. Although the study area is not a wildlife movement corridor (i.e., a piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another) because it does not connect Aliso and Wood Canyons Wilderness Park to another large open space area, a portion of the study area can be considered a habitat patch and could support localized movement but not on a regional level.

Development on-site will avoid or minimize impacts to potential wildlife movement, and development should be concentrated within areas mapped as developed or ornamental/toyon-laurel sumac chaparral, which already exhibit disturbance. In addition, Best Management Practices should be incorporated to make sure that homeowners are educated about the natural resources within their area. Education should emphasize the importance of:

- Lighting in backyards being shielded and/or directed away from open space areas to ensure that ambient lighting within open space areas is not increased;
- Avoid perimeter fencing along property boundaries;
- Not dumping toxic chemicals down the storm drains;
- No planting of invasive species[4] within their backyards, particularly those that are adjacent to open space areas or wildlife corridors;
- Discouraging outdoor pets, particularly cats, due to predation on native wildlife;
- Obeying signs and fencing along open space areas.

[4] Invasive species are considered to be those plant species on the California Invasive Plant Council's (Cal-IPC) Invasive Plant Inventory (Cal-IPC 2013).

Conclusion

The proposed single-family residence, replacing the existing single-family residence, will not be located within a High Value Habitat Area but is located within a designated Open Space Preserve Area. Fuel modification will be conducted in accordance with the projects AMM, and will avoid impacts to High Value Habitat in the form of lemonade berry scrub. Construction will not occur within a significant watercourse or within a 25-foot drainage course buffer area. Impacts to biological resources can be avoided or minimized with the implementation of the above recommendations.

CHAPTER 5
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Appendix A
Species Compendia

APPENDIX A1
Floral Compendium

Family	Scientific Name	Common Name	Nativity	Special Status?
EUDICOTS				
AIZOACEAE		**ICE-PLANT FAMILY**		
	Carpobrotus edulis	freeway iceplant	Naturalized	No
ANACARDIACEAE		**CASHEW FAMILY**		
	Malosma laurina	laurel sumac	Native	No
	Rhus integrifolia	lemonade berry	Native	No
APIACEAE		**CARROT FAMILY**		
	Foeniculum vulgare	fennel	Naturalized	No
ARALIACEAE		**GINSENG FAMILY**		
	Hedera helix	English ivy	Naturalized	No
ASTERACEAE		**SUNFLOWER FAMILY**		
	Artemisia californica	California sagebrush	Native	No
	Baccharis pilularis	coyote brush	Native	No
	Encelia californica	bush sunflower	Native	No
	Pseudognaphalium californicum	ladies' tobacco	Native	No
	Rafinesquia californica	California chicory	Native	No
BORAGINACEAE		**BORAGE FAMILY**		
	Echium candicans	pride of Madeira	Naturalized	No
	Eucrypta chrysanthemifolia	spotted eucrypta	Native	No
CHENOPODIACEAE		**GOOSEFOOT FAMILY**		
	Atriplex semibaccata	Australian saltbush	Naturalized	No
CONVOLVULACEAE		**MORNING-GLORY FAMILY**		
	Calystegia macrostegia	island false bindweed	Native	No
	Ipomoea purpurea	common morning-glory	Waif	No
CRASSULACEAE		**STONECROP FAMILY**		
	Aeonium arboreum var. *arboreum*	tree aeonium	Cultivated Plant	No
	Aeonium haworthii	Haworth's aeonium	Cultivated Plant	No
	Crassula ovata	jade plant	Cultivated Plant	No
CUCURBITACEAE		**GOURD FAMILY**		

Marah macrocarpa	chilicothe	Native	No
EUPHORBIACEAE	**SPURGE FAMILY**		
Euphorbia maculata	spotted spurge	Naturalized	No
Euphorbia peplus	petty spurge	Naturalized	No
FABACEAE	**LEGUME FAMILY**		
Acacia baileyana	Cootamundra wattle	Naturalized	No
Acacia longifolia	Sydney golden wattle	Naturalized	No
Acacia redolens	vanilla-scented wattle	Naturalized	No
GERANIACEAE	**GERANIUM FAMILY**		
Erodium cicutarium	redstem filaree	Naturalized	No
LAMIACEAE	**MINT FAMILY**		
Salvia mellifera	black sage	Native	No
MALVACEAE	**MALLOW FAMILY**		
Malacothamnus fasciculatus	chaparral mallow	Native	No
MYRTACEAE	**MYRTLE FAMILY**		
Eucalyptus globulus	blue gum	Naturalized	No
PITTOSPORACEAE	**PITTOSPORUM FAMILY**		
Pittosporum tobira	Japanese pittosporum	Naturalized	No
Pittosporum undulatum	Victorian box	Naturalized	No
PLANTAGINACEAE	**PLANTAIN FAMILY**		
Nuttallanthus texanus	blue toadflax	Native	No
POLYGONACEAE	**BUCKWHEAT FAMILY**		
Eriogonum fasciculatum	California buckwheat	Native	No
RHAMNACEAE	**BUCKTHORN FAMILY**		
Rhamnus crocea	spiny redberry	Native	No
ROSACEAE	**ROSE FAMILY**		
Heteromeles arbutifolia	toyon	Native	No
RUBIACEAE	**MADDER FAMILY**		
Galium aparine	goose grass	Native	No
Galium nuttallii subsp. *nuttallii*	climbing bedstraw	Native	No
RUTACEAE	**RUE FAMILY**		
Cneoridium dumosum	bushrue	Native	No
SCROPHULARIACEAE	**FIGWORT FAMILY**		
Myoporum laetum	myoporum, Ngaio tree	Naturalized	No
SOLANACEAE	**NIGHTSHADE FAMILY**		
Cestrum nocturnum	night-blooming jasmine	Naturalized	No
Nicotiana glauca	tree tobacco	Naturalized	No
Solanum douglasii	Douglas' nightshade	Native	No

TROPAEOLACEAE	**NASTURTIUM FAMILY**		
Tropaeolum majus	garden nasturtium	Naturalized	No
VERBENACEAE	**VERBENA FAMILY**		
Lantana montevidensis	trailing lantana	Waif	No
MONOCOTS			
AGAVACEAE	**AGAVE FAMILY**		
Agave americana	century plant	Cultivated Plant	No
Yucca gloriosa	Joshua tree	Naturalized	No
POACEAE	**GRASS FAMILY**		
Cortaderia selloana	pampas grass	Naturalized	No
Elymus condensatus	giant wild-rye	Native	No
Melica imperfecta	little California melica	Native	No

Key to Species Listing Status Codes

FE	*Federally Endangered*	SE	*State Listed as Endangered*
FT	*Federally Threatened*	ST	*State Listed as Threatened*
FC	*Federal Candidate*	SCE	*State Candidate for Endangered*
FPE	*Federally Proposed as Endangered*	SCT	*State Candidate for Threatened*
FPT	*Federally Proposed as Threatened*	SFP	*State Fully Protected*
FPD	*Federally Proposed for Delisting*		

California Native Plant Society (CNPS)

Rank 1A: Presumed extirpated in California and either Rare or Extinct elsewhere. *Rank 1B: Rare, threatened, or endangered throughout their range.* *Rank 2A: Presumed extirpated in California, but more common elsewhere.* *Rank 2B: Rare, threatened, or endangered in California, but more common in other states.* *Rank 3: Plant species for which additional information is needed before rarity can be determined.* *Rank 4: Species of limited distribution in California (i.e., naturally rare in the wild), but whose existence does not appear to be susceptible to threat.* Source: ESA 2023.	*New Threat Code extensions and their meanings:* *1 Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)* *2 Fairly threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)* *3 Not very threatened in California (<20% of occurrences threatened or no current threats known)*

APPENDIX A2
Faunal Compendium

Scientific Name	Common Name	Special-Status?
VERTEBRATES		
BIRDS		
ACCIPITRIDAE	**HAWKS, KITES, EAGLES, AND ALLIES**	
Buteo jamaicensis	Red-tailed Hawk	No
AEGITHALIDAE	**LONG-TAILED TITS AND BUSHTITS**	
Psaltriparus minimus	Bushtit	No
CATHARTIDAE	**NEW WORLD VULTURES**	
Cathartes aura	Turkey Vulture	No
COLUMBIDAE	**PIGEONS AND DOVES**	
Zenaida macroura	mourning dove	No
CORVIDAE	**CROWS AND JAYS**	
Aphelocoma californica	California Scrub-Jay	No
Corvus corax	common raven	No
FRINGILLIDAE	**FINCHES**	
Haemorhous mexicanus	house finch	No
Spinus psaltria	Lesser Goldfinch	No
MIMIDAE	**MOCKINGBIRDS AND THRASHERS**	
Toxostoma redivivum	California thrasher	No
PASSERELLIDAE	**NEW WORLD SPARROWS**	
Melozone crissalis	California towhee	No
STURNIDAE	**STARLINGS**	
Sturnus vulgaris	European starling	No
SYLVIDAE	**SYLVID WARBLERS**	
Chamaea fasciata	wrentit	No
TROCHILIDAE	**HUMMINGBIRDS**	
Calypte anna	Anna's hummingbird	No
MAMMALS		
CRICETIDAE	**RATS, MICE, AND VOLES**	
Neotoma fuscipes	dusky-footed woodrat	No
REPTILES		
PHRYNOSOMATIDAE	**SPINY LIZARDS**	
Uta stansburiana	common side-blotched lizard	No

Appendix B
Site Photographs

PHOTOGRAPH 1: Project location 2354 San Clemente Street.

PHOTOGRAPH 2: Project location 2354 San Clemente Street, west view.

PHOTOGRAPH 3: Representative plants comprising the lemonade berry scrub vegetation alliance found within project footprint. Representative plants include: lemonade berry (*Rhus integrifolia*), toyon (*Heteromeles arbutifolia*), laurel sumac (*Malosma laurina*), and sugar bush (*Rhus ovata*).

D181209.00

SOURCE: ESA, 2023

Appendix B
Site Photgraphs

PHOTOGRAPH 4: Representative non-native plants found within the lemonade berry scrub. Victorian box (*Pittosporum undulatum*)

PHOTOGRAPH 5: Representative non-native plants found within the lemonade berry scrub. Soap aloe (*Aloe saponaria*)

PHOTOGRAPH 6: Representative non-native plants found within the lemonade berry scrub. Eucalyptus (*Eucalyptus globulus*)

PHOTOGRAPH 7: Representative non-native plants found within the lemonade berry scrub. Prostrate acacia *(Acacia redolens*)

D181209.00

SOURCE: ESA, 2023

PHOTOGRAPH 5: Woodrat nest found approximately 15ft from the property. Nest likely constructed by dusky-footed woodrat (*Neotoma fuscipes*).

PHOTOGRAPH 6: Habitat adjacent to project footprint, west view.

PHOTOGRAPH 7: Habitat adjacent to project footprint, north view.

D181209.00

SOURCE: ESA, 2023

Appendix B
Site Photgraphs

ESA

Appendix C
Special Status Plant Species

Appendix C

Special-Status Plant Species

VASCULAR PLANTS								
Scientific Name	**Common Name**	**Flowering Period**	**Federal**	**State**	**CRPR**	**Preferred Habitat**	**Distribution**	**Occurrence On-site**
GYMNOSPERMS								
Cupressaceae	**Cypress Family**							
Hesperocyparis forbesii	Tecate cypress	N/A	None	None	1B.1	Clay, gabbroic or metavolcanic soils associated with closed-cone coniferous forest and chaparral. Between 80-1500 meters.	Riverside, Orange, San Diego Cos.	NE
ANGIOSPERMS (DICOTYLEDONS)								
Apiaceae	**Carrot Family**							
Eryngium aristulatum var. *parishii*	San Diego button-celery	Apr.-Jun.	FE	SE	1B.1	Valley grassland, coastal sage scrub, freshwater wetlands, wetland-riparian; vernal pools. 20 - 620 meters	San Diego and Riverside Cos.	NE
Asteraceae	**Sunflower Family**							
Centromadia parryi ssp. *australis*	southern tarplant	May-Nov.	None	None	1B.1	Margins of marshes and swamps, valley and foothill grassland (vernally mesic), vernal pools between 0 and 425 meters.	Los Angeles, Orange, San Diego, Ventura, Santa Barbara. Cos.	NE
Chaenactis glabriuscula var. *orcuttiana*	Orcutt's pincushion	Jan.-Aug.	None	None	1B.1	Coastal bluff scrub (sandy), coastal dunes; elevation 3-100 meters.	Los Angeles, Orange, San Diego, Ventura Cos.; Baja CA.	NE
Helianthus nuttallii ssp. *parishii*	Los Angeles sunflower	Aug.-Oct.	None	None	1A	Freshwater marsh, salt marsh. 10 - 1675 meters	Los Angeles, Orange, San Bernardino Cos.	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix C (Continued)

Special-Status Plant Species

VASCULAR PLANTS								
Scientific Name	**Common Name**	**Flowering Period**	**Federal**	**State**	**CRPR**	**Preferred Habitat**	**Distribution**	**Occurrence On-site**
Isocoma menziesii var. *decumbens*	decumbent goldenbush	Apr.-Nov.	None	None	1B.2	Chaparral, sandy coastal scrub,(often in disturbed areas); elevation 10-135 meters	Los Angeles, Orange, San Diego Cos.	NE
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	Feb.-Jun.	None	None	1B.1	Marshes and swamps (coastal salt), playas, vernal pools; elevation 1-1220 meters.	All of southern California coast; Riverside, San Bernardino Cos.; Baja CA.	NE
Pentachaeta aurea ssp. *allenii*	Allen's pentachaeta	Mar.-Jun.	None	None	1B.1	Coastal scrub (openings), valley and foothill grassland; elevation 75-520 meters	Orange County	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix C (Continued)

Special-Status Plant Species

VASCULAR PLANTS								
Scientific Name	**Common Name**	**Flowering Period**	**Federal**	**State**	**CRPR**	**Preferred Habitat**	**Distribution**	**Occurrence On-site**
Pseudognaphalium leucocephalum	white rabbit-tobacco	Jul.-Dec.	None	None	2B.2	Chaparral, cismontane woodland, coastal scrub, riparian woodland; often within drainages; sandy, gravelly; 0 - 2100 meters	Los Angeles, Riverside, Orange, San Diego, Ventura Cos.	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix C (Continued)

Special-Status Plant Species

VASCULAR PLANTS								
Scientific Name	**Common Name**	**Flowering Period**	**Federal**	**State**	**CRPR**	**Preferred Habitat**	**Distribution**	**Occurrence On-site**
Senecio aphanactis	chaparral ragwort	Jan.-Apr.	None	None	2B.2	Chaparral, cismontane woodland, coastal scrub; sometimes alkaline soil. 15 - 800 meters.	Los Angeles, Riverside, Orange, San Diego, Santa Barbara, Ventura Cos.	NE
Symphyotrichum defoliatum	San Bernandino aster	Jul.-Nov.	None	None	1B.2	Near ditches, springs, and streams; cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, valley and foothill grassland (vernally mesic). Between 2 and 2040 meters.	Los Angeles, Kern, Imperial, Riverside, San Bernardino, Orange, San Diego Cos.	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix C (Continued)

Special-Status Plant Species

VASCULAR PLANTS								
Scientific Name	**Common Name**	**Flowering Period**	**Federal**	**State**	**CRPR**	**Preferred Habitat**	**Distribution**	**Occurrence On-site**
Verbesina dissita	big-leaved crownbeard	Apr.-Jul.	FT	ST	1B.1	Chaparral (maritime), coastal scrub; elevation 45-205 meters.	Orange Co. and Baja CA.	NE
Boraginaceae	**Borage Family**							
Nama stenocarpum	mud nama	Jan.-Jul.	None	None	2B.2	Marshes and swamps (lake margins, riverbanks); elevation 5-500 meters.	Imperial, Los Angeles, Orange, Riverside, San Clemente Isl., San Diego Cos.; AZ and Baja CA.	NE
Chenopodiaceae	**Goosefoot Family**							
Aphanisma blitoides	aphanisma	Mar.-Jun.	None	None	1B.2	Coastal bluff scrub, coastal dunes, coastal scrub in sandy areas; elevation 1-305 meters.	All of Southern California coast, Channel Islands.	NE
Atriplex coulteri	Coulter's saltbush	Mar.-Oct.	None	None	1B.2	Coastal bluff scrub, coastal dunes, coastal scrub, valley and foothill grasslands in clay and alkaline areas; elevation 3-460 meters.	All of Southern California coast, Channel Islands, Baja CA.	NE
Atriplex pacifica	South Coast saltscale	Mar.-Oct.	None	None	1B.2	Coastal bluff scrub, coastal dunes, coastal scrub, playas; elevation 0-100 meters	Anacapa Island, Los Angeles, Orange, Riverside, San Clemente Island, Santa Catalina Island, Santa Cruz Island, San Diego, San Nicholas Island, Santa Rosa Island, Ventura Cos.; Arizona, Baja CA Sonora (Mexico).	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix C (Continued)

Special-Status Plant Species

VASCULAR PLANTS								
Scientific Name	**Common Name**	**Flowering Period**	**Federal**	**State**	**CRPR**	**Preferred Habitat**	**Distribution**	**Occurrence On-site**
Atriplex parishii	Parish's brittlescale	Jun.-Oct.	None	None	1B.1	Chenopod scrub, playas, vernal pools; elevation 25-1900 meters.	Los Angeles, Orange, Riverside, Santa Bernardino, San Diego Cos.; Baja CA.	NE
Atriplex serenana var. *davidsonii*	Davidson's saltscale	Apr.-Oct.	None	None	1B.2	Coastal bluff scrub, coastal scrub in alkaline areas; elevation 10-200 meters.	All of southern California coast, Channel Islands.	NE
Suaeda californica	California seablite	Jul.-Oct.	None	None	1B.1	Marshes and swamps (coastal salt). 0-15 meters.	Los Angeles, Orange, San Diego Cos.	NE
Suaeda esteroa	estuary seablite	May-Oct.	None	None	1B.2	Marshes and swamps (coastal salt); elevation 0-5 meters.	Los Angeles, Orange, Santa Barbara, San Diego, Ventura Cos.; Baja, CA.	NE
Crassulaceae	**Stonecrop Family**							
Dudleya blochmaniae ssp. *blochmaniae*	Blochman's dudleya	Apr.-Jun.	None	None	1B.1	Coastal bluff scrub, coastal scrub, valley and foothill grassland/often clay. 5 - 450 meters.	Los Angeles, Orange, Santa Barbara, Ventura Cos.	NE
Dudleya multicaulis	many-stemmed dudleya	Apr.-Jul.	None	None	1B.2	Coastal scrub, chaparral, valley and foothill grassland; heavy clay soils or rock outcrops; 15-790 meters.	Los Angeles, Orange, Riverside, San Bernardino, San Diego Cos.	NE
Dudleya stolonifera	Laguna Beach dudleya	May-Jul.	FT	ST	1B.1	Chaparral, coastal scrub, cismontane woodland, and valley and foothill grasslands in rocky areas; elevation 10-260 meters.	Orange County	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix C (Continued)

Special-Status Plant Species

VASCULAR PLANTS								
Scientific Name	**Common Name**	**Flowering Period**	**Federal**	**State**	**CRPR**	**Preferred Habitat**	**Distribution**	**Occurrence On-site**
Ericaceae	**Heath Family**							
Comarostaphylis diversifolia ssp. *diversifolia*	summer holly	Apr.-Jun.	None	None	1B.2	Chaparral, cismontane woodland; 30-7900 meters	Orange, Riverside, San Diego; Baja CA.	NE
Euphorbiaceae	**Spurge Family**							
Euphorbia misera	cliff spurge	Dec.-Aug.	None	None	2B.2	Coastal bluff scrub, coastal scrub, Mojavean desert scrub in rocky areas; elevation 10-500 meters.	Los Angeles, Orange, Riverside, Santa Barbara, San Clemente Island, Santa Catalina, San Diego Cos.; Baja CA, Guadalupe Island (Mexico).	NE
Tetracoccus dioicus	Parry's tetracoccus	Apr.-May	None	None	1B.2	Chaparral, coastal scrub. 165 - 1000 meters	Orange and San Diego Cos.	NE
Fagaceae	**Oak Family**							
Quercus dumosa	Nuttall's scrub oak	Feb.-Apr.	None	None	1B.1	Closed-cone coniferous forest, chaparral, coastal scrub in sandy clay loam or sandstone; elevation 15-400 meters.	Orange, Santa Barbara, San Diego Cos.; Baja CA.	NE
Lamiaceae	**Mint Family**							
Monardella hypoleuca ssp. Intermedia	intermediate monardella	Apr.-Sep.	None	None	1B.3	Chaparral, cismontane woodland, lower montane, coniferous forest (sometimes). 400-1250 meters	Riverside, Orange, San Diego Cos.	NE
Malvaceae	**Mallow Family**							
Ayenia compacta	California ayenia	Mar.-Apr.	None	None	2B.3	Creosote bush scrub, washes. 150 - 1095 meters	Riverside, San Bernardino, San Diego Cos.	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix C (Continued)

Special-Status Plant Species

VASCULAR PLANTS								
Scientific Name	**Common Name**	**Flowering Period**	**Federal**	**State**	**CRPR**	**Preferred Habitat**	**Distribution**	**Occurrence On-site**
Sidalcea neomexicana	Salt Spring checkerbloom	Mar.-Jun.	None	None	2B.2	Chaparral, coastal scrub, lower montane coniferous forest, Mojavean desert scrub, playas; alkaline and mesic soils. 15 - 1530 meters	Kern, Orange, Riverside, Ventura, San Bernardino, San Diego, possibly Los Angeles Cos.	NE
Nyctaginaceae	**Four O'clock Family**							
Abronia villosa var. *aurita*	chaparral sand-verbena	Jan.-Sep.	None	None	1B.1	Chaparral, coastal scrub, and desert dunes/sandy areas between 0 and 1,600 meters.	Los Angeles, Riverside, San Diego, San Bernardino, possibly Orange Cos.	NE
Orobanchaceae	**Broomrape Family**							
Chloropyron maritimum ssp. *maritimum*	salt marsh bird's beak	May-Oct.	FE	SE	1B.2	Coastal dunes, marshes, and swamps. 0-30 meters.	Los Angeles, Orange, San Diego, San Bernardino, Ventura Cos.	NE
Polemoniaceae	**Phlox Family**							
Navarretia prostrata	prostrate navarretia	Apr.-Jun.	None	None	1B.1	Meadows and seeps, valley and foothill grasslands, alkaline, vernal pools; elevation 0-700 meters.	San Joaquin Valley, Central and South Coast, Coast and Peninsular Ranges	NE
Polygalaceae	**Milkwort Family**							
Polygala cornuta var. *fishiae*	Fish's milkwort	May-Aug.	None	None	4.3	Chaparral, oak woodland, riparian woodland; elevation 90-1270 meters.	Monterey County south in cismontane CA to Baja CA.	NE
Polygonaceae	**Buckwheat Family**							

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix C (Continued)

Special-Status Plant Species

VASCULAR PLANTS								
Scientific Name	**Common Name**	**Flowering Period**	**Federal**	**State**	**CRPR**	**Preferred Habitat**	**Distribution**	**Occurrence On-site**
Dodecahema leptoceras	slender-horned spineflower	Apr.-Jun.	FE	SE	1B.1	Scrub and chaparral in sandy soils and alluvial fans. 200-760 meters.	Los Angeles, Riverside, San Bernardino Cos.	NE
Nemacaulis denudata var. *denudata*	coast woolly-heads	Apr.-Sep.	None	None	1B.2	Coastal dunes. 0 - 100 meters	Los Angeles, Orange, San Diego Cos.	NE
Rosaceae	**Rose Family**							
Horkelia cuneata ssp. *puberula*	mesa horkelia	Feb.-Jul.	None	None	1B.1	Chaparral, cismontane woodland, coastal scrub in sandy or gravelly areas; elevation 70-810 meters.	All of southern California coast.	NE
ANGIOSPERMS (MONOCOTYLEDONS)								
Alismataceae	**Water-Plantain Family**							
Sagittaria sanfordii	Sanford's arrowhead	May-Oct.	None	None	1B.2	Marshes and swamps. 0 - 650 meters	Orange, San Bernardino, Ventura Cos.	NE
Asparagaceae	**Asparagus Family**							
Brodiaea filifolia	thread-leaved brodiaea	May-Jun.	FT	SE	1B.1	Chaparral (openings), cismontane woodland, coastal scrub, playas, valley and foothill grasslands, vernal pools often in clay areas; elevation 25-860 meters.	Los Angeles, Orange, Riverside, San Bernardino, San Diego, and San Luis Obispo Cos.	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix C (Continued)

Special-Status Plant Species

VASCULAR PLANTS								
Scientific Name	**Common Name**	**Flowering Period**	**Federal**	**State**	**CRPR**	**Preferred Habitat**	**Distribution**	**Occurrence On-site**
Liliaceae	**Lily Family**							
Calochortus weedii var. *intermedius*	intermediate mariposa lily	May-Jul.	None	None	1B.2	Chaparral, coastal scrub, valley and foothill grasslands; elevation 105-855 meters.	Los Angeles, Orange, and Riverside Cos.	NE
Ruscaceae	**Butcher's Broom Family**							
Nolina cismontana	chaparral nolina	May-Jul.	None	None	1B.2	Chaparral, coastal scrub in sandstone or gabbro; elevation 140-1275 meters.	Los Angeles, Orange, San Diego, Ventura Cos.	NE

Key to Species Listing Status Codes

FE	*Federally Listed as Endangered*	FC	*Federal Candidate Species*	SCT	*State Candidate for Threatened*
FT	*Federally Listed as Threatened*	FSC	*Federal Special Concern Species*	SP	*State Protected*
FPE	*Federally Proposed as Endangered*	SE	*State Listed as Endangered*	SFP	*State Fully Protected*
FPT	*Federally Proposed as Threatened*	ST	*State Listed as Threatened*	SR	*State Rare*
FPD	*Federally Proposed for Delisting*	SCE	*State Candidate for Endangered*	SSC	*California Species of Special Concern*

Key to California Rare Plant Rank Codes

Rank 1A: *Presumed extirpated in California and either Rare or Extinct elsewhere.*
Rank 1B: *Rare, threatened, or endangered in California and elsewhere.*
Rank 2A: *Presumed extirpated in California, but common in other states.*
Rank 2B: *Rare, threatened, or endangered in California, but more common elsewhere.*
Rank 3: *Plant species for which additional information is needed.*
Rank 4: *Plant species of limited distribution.*

Key to Threat Codes

List .1: *Seriously threatened in California.*
List .2: *Fairly threatened in California.*
List .3: *Not very threatened in California.*

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix D
Special Status Wildlife Species

Appendix D

Special-Status Wildlife Species

Scientific Name	Common Name	Federal	State	Preferred Habitat	Distribution	Occurrence On-site
INVERTEBRATES						
CRUSTACEANS						
Branchinectidae	**Fairy Shrimp Family**					
Branchinecta sandiegonensis	San Diego fairy shrimp	FE	None	Vernal pools in areas of shallow depressions that have a clay hardpan soil layer that inhibits percolation.	Found throughout California	NE
Streptocephalus woottoni	Riverside fairy shrimp	FE	None	Vernal pools/swales; apparently prefers deeper pools through the warm weather of late April and May.	Ventura, Orange, and San Diego Counties in California.	NE
VERTEBRATES						
FISHES						
Cyprinidae	**Minnow Family**					
Gila orcutti	arroyo chub	None	SSC	Slow water sections of streams with mud or sand substrates; spawns in pools.	Native to the streams and rivers of the Los Angeles.	NE
Rhinichthys osculus ssp. 3	Santa Ana speckled dace	None	SSC	Permanent flowing streams with summer water temperatures of 17-20 C. Typically, these streams are maintained by outflows of cool springs. The dace inhabits shallow cobble and gravel riffles.	The headwaters of the Los Angeles, Santa Ana and San Gabriel rivers.	NE
Gobiidae	**Goby Family**					

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix D (Continued)

Special-Status Wildlife Species

Scientific Name	Common Name	Federal	State	Preferred Habitat	Distribution	Occurrence On-site
Eucyclogobius newberryi	tidewater goby	FE	SSC	Brackish water habitats along the coast; found in shallow lagoons and lower stream reaches with fairly still but not stagnant water and high oxygen levels.	Coastal ranges from Agua Hedionda Lagoon, San Diego Co. to the mouth of the Smith River.	NE
AMPHIBIANS						
Bufonidae	**True Toad Family**					
Anaxyrus californicus	arroyo toad	FE	SSC	Washes and streams with sandy banks, willows, cottonwoods, or sycamores; riparian habitats of semiarid areas, small cobbly streambeds. Requires clear, standing water for reproduction.	Southern part of the Coast Range from northern San Luis Obispo Co. south to Baja CA.	NE
Scaphiopodidae	**Spadefoot Toad Family**					
Spea hammondii	western spadefoot	None	SSC	Prefers burrow sites within relatively open areas in lowland grasslands, chaparral, and pine-oak woodlands, areas of sandy or gravelly soil in alluvial fans, washes, and floodplains. Requires temporary pools for reproduction.	Great Valley, bordering foothills, and coastal ranges from south of Monterey Bay to nw. Baja, CA.	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix D (Continued)

Special-Status Wildlife Species

Scientific Name	Common Name	Federal	State	Preferred Habitat	Distribution	Occurrence On-site
REPTILES						
Emydidae	**Box and Water Turtle Family**					
Emys marmorata pallida	southwestern pond turtle	None	SSC	Ponds, lakes, marshes, rivers, streams, and irrigation ditches that typically have a rocky or muddy bottom and grown to watercress, cattails, water lilies, or other aquatic vegetation; found in woodland, grassland, and open forest.	Northern CA south to NW Baja, CA.	NE
Phrynosomatidae	**Zebra-tailed, Earless, Fringe-toed, Spiny, Tree, Side-blotched, and Horned Lizard Family**					
Phrynosoma blainvillii	coast horned lizard	None	SSC	Valley-foothill hardwood, conifer, and riparian habitats, pine-cypress, juniper and annual grassland habitats below 6,000 feet, open country, especially sandy areas, washes, flood plains, and windblown deposits.	Coastal ranges from south Ventura, Los Angeles, San Bernardino counties, Orange, western Riverside and western San Diego counties.	P
Teiidae	**Whiptail Family**					
Aspidoscelis hyperythra	orange-throated whiptail	None	SSC	Gently sloping hillsides, ridges, and valleys supporting open coastal sage scrub, open chaparral, or sparse grasslands.	Extreme S Los Angeles Co., SW San Bernardino Co., Orange, Riverside, and San Diego Counties, west of the crest of the Peninsular Ranges, and Baja CA.	P

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix D (Continued)

Special-Status Wildlife Species

Scientific Name	Common Name	Federal	State	Preferred Habitat	Distribution	Occurrence On-site
Colubridae	**Colubrid Snake Family**					
Salvadora hexalepis virgultea	coast patch-nosed snake	None	SSC	Coastal chaparral, desert scrub, washes, sandy flats, and rock areas. Barren creosote bush desert flats. Sagebrush semi-deserts; sea level to 7,000 feet.	Point Conception south through Baja CA.	P
Thamnophis hammondii	two-striped garter snake	None	SSC	Found in or near permanent or intermittent freshwater, often along streams with rocky beds bordered by willows or other streamside growth; frequents oak woodland, brushlands, and sparse coniferous forests.	Coastal ranges from Monterey Co. to NW Baja CA.	NE
Viperidae	**Viper Family**					
Crotalus ruber	red-diamond rattlesnake	None	SSC	Chaparral, woodland, and arid desert habitats in rocky areas with dense vegetation.	San Bernardino county to tip of Baja CA.	P
BIRDS						
Charadiidae	**Plover Family**					
Charadrius alexandrinus nivosus	western snowy plover	FT	SSC	Barren to sparsely vegetated sand beaches, dry salt flats in lagoons , dredge spoils deposited on beach or dune habitat , levees and flats at salt-evaporation ponds, and river bars.	Coastal ranges from Monterey Co. to NW Baja CA.	NE
Laridae	**Gull Family**					
Sternula antillarum browni	California least tern	FE	SE/SFP	Open, sandy or gravelly shores near shallow-water feeding areas in estuaries.	San Francisco Bay area, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego Cos.	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix D (Continued)

Special-Status Wildlife Species

Scientific Name	Common Name	Federal	State	Preferred Habitat	Distribution	Occurrence On-site
Accipitridae	**Hawk, Kite, Harrier, and Eagle Family**					
Elanus leucurus	white-tailed kite	None	SFP	Grasslands with scattered trees, near marshes, along highways.	Year-long resident in coastal and valley lowlands; rarely found away from agricultural areas. Central valley of CA and along the entire length of the coast.	NE
Strigidae	**Owl Family**					
Athene cunicularia	burrowing owl	None	SSC	Prefers berms, ditches, and grasslands adjacent to rivers, agricultural, and scrub areas.	Local resident throughout CA excluding the central valley. Some seasonal movement away from nesting areas. Year-round resident of the lowlands of southern CA	NE
Hirundinidae	**Swallow Family**					
Riparia riparia	bank swallow	None	ST	Riparian scrub, riparian woodland; requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting holes. Colonial nester; nests primarily in riparian and other lowland habitats west of the desert.	A spring and fall migrant in the interior, less common on coast; an uncommon and very local summer resident. Casual in southern California in winter. Occurs along banks of the Sacramento and Feather rivers in the northern Central Valley, and along the central coast from Monterey to San Mateo counties, and northeastern California.	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix D (Continued)

Special-Status Wildlife Species

Scientific Name	Common Name	Federal	State	Preferred Habitat	Distribution	Occurrence On-site
Sylviidae	**Old World Warbler, Gnatcatcher Family**					
Polioptila californica californica	coastal California gnatcatcher	FT	SSC	Coastal sage scrub vegetation below 2,500 feet elevation in Riverside County and generally below 1,000 feet elevation along the costal slope; generally avoids steep slopes and dense vegetation.	Southern Ventura county, southward through Los Angeles, Orange, Riverside, San Bernardino counties, and south through the coastal foothills of San Diego county.	NE
Troglodytidae	**Wren Family**					
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	None	SSC	Coastal sage scrub, vegetation with thickets of prickly pear or cholla cactus.	Ventura Co. south to San Diego Co.	NE
Embirizidae	**Sparrow, Bunting, and Warbler Family**					
Ammodramus savannarum	grasshopper sparrow	None	SSC	Dense, dry or well-drained grassland, especially native grassland with a mix of grasses and forbs for foraging and nesting.	An uncommon and local, summer resident and breeder in foothills and lowlands west of the Cascade-Sierra Nevada crest from Mendocino and Trinity cos. south to San Diego Co.	NE
Passerculus sandwichensis beldingi	Belding's savannah sparrow	None	SE	Dense, moist grasslands, wet meadows, and salicornia wetlands, with or without scattered shrubs or clumps of tall herbs.	Coastal Santa Barbara to San Diego Cos	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix D (Continued)

Special-Status Wildlife Species

Scientific Name	Common Name	Federal	State	Preferred Habitat	Distribution	Occurrence On-site
Parulidae	**Wood-Warblers**					
Icteria virens	yellow-breasted chat	None	SSC	Riparian woodlands with a thick understory.	Uncommon summer resident and migrant in coastal CA and in foothills of the Sierra Nevada.	NE
Rallidae	**Rail Family**					
Laterallus jamaicensis	California black rail	None	ST	Prefers saline, brackish, and fresh emergent wetlands, and some coastal wetlands.	Coastal wetlands from Santa Barbara to San Diego County.	NE
Rallus longirostris levipes	light-footed clapper rail	FE	SE/SFP	Dense vegetation within coastal salt and brackish marshes, especially among cordgrass and pickleweed.	San Francisco Bay area, Monterey, San Luis Obispo, Santa Barbara, Ventura, San Bernardino, Orange, Riverside, Imperial, and San Diego Cos.	NE
Vireonidae	**Vireo Family**					
Vireo bellii pusillus	least Bell's vireo	FE	SE	Perennial and intermittent streams with low, dense riparian scrub and riparian woodland habitats below 2,000 feet elevation; nests primarily in willows and forages in the riparian and occasionally in adjoining upland habitats. Associated with willow, cottonwood, and mule fat.	Southern California	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix D (Continued)

Special-Status Wildlife Species

Scientific Name	Common Name	Federal	State	Preferred Habitat	Distribution	Occurrence On-site
MAMMALS						
Molossidae	**Free-tailed Bat Family**					
Eumops perotis californicus	western mastiff bat	None	SSC	Primarily arid lowlands, especially deserts. Open, semiarid to arid habitats including conifer and deciduous woodlands, coastal scrub, annual and perennial grasslands, palm oases, chaparral, desert scrub, and urban.	Uncommon resident of lower elevations in se San Joaquin Valley and Coastal Ranges from Monterey Co. southward through S CA from the coast eastward to the Colorado desert.	P (foraging)
Nyctinomops macrotis	big free-tailed bat	None	SSC	Pinyon-juniper regions of the arid parts of CA.	San Mateo Co. to southern CA.	P (foraging)
Phyllostomidae	**New World Leaf-Nosed Bat Family**					
Choeronycteris mexicana	Mexican long-tongued bat	None	SSC	Nests in dry, rocky habitats/caves, crevices in rocks, arid habitats including deserts, montane riparian, desert scrub, desert succulent shrub, and pinyon-juniper habitats.	California only from San Diego Co. and only as a summer resident	NE
Soricidae	**Shrew Family**					
Sorex ornatus salicornicus	southern California saltmarsh shrew	None	SSC	Dense coastal marshes	Tidal marshes of Los Angeles Basin	NE
Heteromyidae	**Pocket Mouse and Kangaroo Rat Family**					
Chaetodipus fallax fallax	San Diego pocket mouse	None	SSC	Chaparral; coastal scrub; valley and foothill grassland.	Found throughout California	P
Perognathus longimembris pacificus	Pacific pocket mouse	FE	SSC	Coastal scrub; prefers soils of fine alluvial sands near the ocean.	S CA; widely distributed in arid regions from S Oregon to W Utah and Arizona.	NE

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix D (Continued)

Special-Status Wildlife Species

Scientific Name	Common Name	Federal	State	Preferred Habitat	Distribution	Occurrence On-site
Cricetidae	**Mouse, Rat, and Vole Family**					
Neotoma lepida intermedia	San Diego desert woodrat	None	SSC	Chaparral, coastal sage scrub, and pinyon-juniper woodland.	S California	P
Mustelidae	**Weasel Family**					
Taxidea taxus	American badger	None	SSC	Open shrub, forest, and herbaceous habitats, with friable soils.	Common in most of the state except for the northern North Coast area.	NE

Key to Species Listing Status Codes

FE	*Federally Listed as Endangered*	SE	*State Listed as Endangered*	SSC	*California Species of Special Concern*
FT	*Federally Listed as Threatened*	ST	*State Listed as Threatened*	WL	*California Watch List*
FPE	*Federally Proposed as Endangered*	SCE	*State Candidate for Endangered*		
FPT	*Federally Proposed as Threatened*	SCT	*State Candidate for Threatened*		
FPD	*Federally Proposed for Delisting*	SFP	*State Fully Protected*		
FC	*Federal Candidate Species*	SR	*State Rare*		

OB = Observed; P = Potential; NE = Species not expected due to the lack of suitable habitat or not observed during surveys.

Appendix B
Cultural Resources Memo

PALEOWEST

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info@paleowest.com

SAN DIEGO
3990 Old Town Ave., Suite A105
San Diego, CA, 92110

March 16, 2023

Ms. Starla Barker
De Novo Planning Group
180 East Main Street #108
Tustin, California 92780

Transmitted via email to sbarker@denovoplanning.com

RE: Cultural Resources Technical Memorandum for the 2354 San Clemente Street Project, Laguna Beach, Orange County, California

Dear Ms. Barker,

PaleoWest, LLC. (PaleoWest) was retained by De Novo Planning Group (De Novo) to conduct a cultural resource record search and archival research for the 2354 San Clemente Street Project (Project) in the city of Laguna Beach, Orange County, California (Appendix A, Figures 1 and 2). The Project site (Assessor's Parcel Numbers [APN]: 656-122-04 and 656-122-05) occupies approximately 0.21 acre, with an existing residence on the Project site proposed to be demolished and replaced. The Project site is located at the terminus of San Clemente Street, adjacent to the terminus of the nearby Lomita Way directly east of the parcel.

PaleoWest understands that the Project is subject to the California Environmental Quality Act (CEQA) and the City of Laguna Beach (City) is CEQA lead agency. This technical memorandum summarizes the findings of the desktop cultural resource analysis. It was prepared to assist in the CEQA-level analysis required for the Project.

PROJECT DESCRIPTION AND LOCATION

The proposed Project involves the construction of a two-story, single-family home with a two-car garage, elevated deck, spa, and pool. Other proposed Project elements include new retaining walls, hardscape, and landscape, as well as a 44-foot-wide cul-de-sac out-of-grade improvement for a fire truck turnaround per City's requirements. The Project design is consistent with surrounding single-family homes.

The Project site is situated in a semi-rural area characterized by mixed-use development. The ground surface exhibits steep slopes that range between 30 and 50 degrees (United States Department of Agriculture Natural Resources Conservation Service 2023). The property is currently occupied by an approximately 500 square foot (sq ft) single-family residence that includes an attached one-car garage, as well as a 500 sq ft detached guest house. The house and accessory buildings are historic in age and were constructed between 1946 and 1953. All of the standing buildings on the site will be demolished prior to the construction of the new residence. Per the City's guidance, the current cultural resources study did not document or evaluate the historic-era buildings for listing on the California Register of Historical Resources (CRHR).

CALIFORNIA ENVIRONMENTAL QUALITY ACT

The proposed Project is subject to compliance with CEQA, as amended. Compliance with CEQA statutes and guidelines requires both public and private projects with financing or approval from a public agency to assess their project's impact on cultural resources (Public Resources Code Sections 21082, 21083.2 and 21084 and California Code of Regulations [CCR] 10564.5). The first step in the process is to identify cultural resources that may be impacted by the project and then determine whether the resources are "historically significant" resources.

CEQA defines historically significant resources as "resources listed or eligible for listing in the California Register of Historical Resources (CRHR)" (Public Resources Code Section 5024.1). A cultural resource may be considered historically significant if the resource is 45 years old or older, possesses integrity of location, design, setting, materials, workmanship, feeling, and association.[1] In addition, it must meet at least one of the following criteria for listing in the CRHR:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or,
4. Has yielded, or may be likely to yield, information important in prehistory or history (Public Resources Code Section 5024.1).

Cultural resources are buildings, sites, humanly modified landscapes, traditional cultural properties, structures, or objects that may have historical, architectural, cultural, or scientific importance. CEQA states that if a project will have a significant impact on important cultural resources, deemed "historically significant," then project alternatives and mitigation measures must be considered.

HISTORIC RESOURCES ELEMENT OF THE CITY OF LAGUNA BEACH GENERAL PLAN

The City's General Plan (City of Laguna Beach 2020a) includes three goals and associated policies associated with historic preservation. These include:

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[1] The Office of Historic Preservation (OHP) guidelines recognize a 45-year-old criteria threshold for documenting and evaluating cultural resources (assumes a 5-year lag between resource identification and the date that planning decisions are made) (OHP 1995:2). The age threshold is an operational guideline and not specific to CEQA statutory or regulatory codes.

Goal #1 Preserve and enhance buildings and structures of historical significance in Laguna Beach. Assure that neighborhoods which have a preponderance of older homes and which greatly contribute to the village atmosphere be maintained as cohesive neighborhood units through consistency of size, scale, and character."

Policies:

1.1 Implement an outreach program to promote the listing of historic structures on the Historic Register and improve the City's recognition program for owners of listed historic structures to acknowledge exemplary maintenance and preservation efforts.

1.2 Protect historic buildings through the implementation and expansion of incentive programs specifically designed to encourage rehabilitation and preservation. Incentive programs could include flexible development standards, fee waivers, and property tax reductions.

1.3 Expand the Mill's Act Contract program to include all Historic Register structures.

1.4 Provide a process for the City to initiate the rescission of registered structures that have been illegally modified so that they no longer meet the criteria for a historic resource.

1.5 Continue the current City policy to discourage the demolition of historic resources by providing incentives for relocation.

1.6 Ensure the preservation of historic homes by requiring the owners to record a document acknowledging their obligation and responsibilities.

Goal #2 Continue and expand programs practices that encourage an appreciation of history and historic preservation in Laguna Beach.

Policies:

2.1 Require Heritage Committee review when design review is required for modifications to a historic resource.

2.2 Support the requirement that the Design Review Board emphasize compatibility, including historic character and context within deliberations of new or remodeled structures.

2.3 Provide specific guidelines for the rehabilitation of historic structures, including "how-to" and pictures of illustrations of successful projects.

2.4 Foster community pride through identification and aesthetic improvement of historic sites and areas, such as plaque programs and historically relevant brochures.

2.5 Require the City to identify and list all eligible City-owned structures on the Historic Register.

2.6 Prepare a manual showing techniques of preservation to help property owners understand what to expect during remodeling/restoration process and to provide information on how preservation can be accomplished within local ordinances.

2.7 Disseminate information on the provisions of the Historic Preservation Ordinance.

2.8 Promote the use of the State Historical Building Code.

Goal #3 Promote community awareness of local history and historic architecture and enhance recognition of the City's historic role as an important art colony and seaside resort.

Policies:

3.1 Increase awareness and appreciation for Laguna Beach's cultural and historic heritage through activities and events, such as designating May, as the City's Heritage Month.

3.2 Appoint a City staff person to monitor remodeling activity of historic homes to ensure compliance with approvals.

3.3 Appoint a City staff person as a "Historic Preservation Administrator," to act in an advisory role to the Heritage Committee and Design Review Board.

3.4 Identify specific City owned vacant properties where historic buildings could be relocated when threatened with demolition.

3.5 Encourage property owners to seek listing for appropriate properties on the National Register of Historic Places and the California State Register of Historical Resources.

3.6 Work with local Historic Preservation groups to develop a program that informs new buyers of historic homes of the benefits and responsibilities of owning a historic resource.

LAGUNA BEACH MUNICIPAL CODE (LBMC) ORDINANCE NUMBER 1670

In addition to the goals and policies of the General Plan, the City has also enacted Ordinance No. 1670 of the Laguna Beach Municipal Code (LBMC) as part of their historic preservation program (City of Laguna Beach 2022). The ordinance was amended in 2022 to further protect cultural resources. The intent and purpose of the ordinance is described below:

25.45.002 Intent and Purpose. The purpose of this chapter is to promote the public health, safety, and general welfare by providing for the identification, protection, enhancement, perpetuation, and use of improvements, buildings and their settings, structures, objects, monuments, sites, places, and areas within the City that reflect special elements of the City's architectural, artistic, cultural, engineering, aesthetic, historical, political, social, and other heritage to achieve the following objectives:

(A) Safeguard the heritage of the City by encouraging the voluntary protection of historic resources representing significant elements of its history;

(B) Enhance the visual character of the City by encouraging and providing for the voluntary preservation of those buildings that reflect unique and established architectural traditions that contribute to the older neighborhoods of the City;

(C) Foster public appreciation of and civic pride in the beauty of the City and the accomplishments of its past;

(D) Strengthen the economy and improve property values of the City by protecting and enhancing the City's attraction to residents and visitors;

(E) Promote the private and public use of historic resources for the education, prosperity, and general welfare of the people;

(F) Stabilize and improve property values within the City; and

(G) Achieve historic preservation through the encouragement and promotion of voluntary additions to the City's Historic Register.

(H) Recognize that the previous historic resource inventory (adopted by Ordinance No. 82.111) is ineffective for the purposes of creating a presumption of historicity of any property identified thereon.

The following changes are key components of Ordinance No. 1670:

(1) Inclusion of the definition of the term "Historic resource" as consistent with California State law, and ensuring that the definition is not expanded beyond what is mandated by law;

(2) Addition of "owner consent" as criteria for eligibility for local register purposes;

(3) Elimination of references to the outdated 1981 Historic Resources Inventory;

(4) Expanded historic preservation incentives, such as the Mills Act being expanded to all Historic Register properties, density bonuses being included in additional zones, and relaxed open space or rear setback standards being offered to historic properties

CULTURAL RESOURCES RECORD SEARCH

PaleoWest conducted an in-person search of cultural resource records housed at the California Historic Resources Information Center (CHRIS), South Central Coastal Information Center (SCCIC) at California State University, Fullerton on March 1, 2023. The purpose of the record search was to identify all previous cultural resource work and previously recorded cultural resources within a half-mile (mi) radius of the Project area. A summary of the findings is provided below and in Appendix A. A Native American Heritage Commission Sacred Land File search and Native American outreach is being conducted as part of a separate effort by the De Novo Planning Group (Starla Barker, personal communication, March 16, 2023).

Previous Studies

The SCCIC records search identified five previous studies within a half-mi radius of the Project area. One of the previous surveys (OR-04179) included portions of the Project site. The study consisted of a historic resource inventory of buildings within the city of Laguna Beach (City of Laguna Beach 2008). A list of previous studies and their relation to the Project area is included as Table 1.

Table 1. Previous Cultural Resource Studies within a Half-mi Radius of the APE

Report Number	Author	Year	Title	Proximity to Project Area
OR-00567	Crabtree, Robert H.	1976	Scientific Resources Survey (Archaeology and Paleontology) of Arch Beach Heights - Portafina Project, Laguna Beach, California.	0.1 mi north
OR-01147	Whitney-Desautels, Nancy A. and Sundberg, Fred	1991	Archaeological Survey of the Diamond/Crestview Study Area Laguna Beach Orange County, California	0.1 mi north
OR-01926	Ezell, Paul H. and Carrico, Richard L.	1977	Archaeological Survey Report of Aliso Water Management Agency Project Committees 7, 11-A and 15	0.2 mi southwest
OR-02815	Shepard, Richard S.	2002	Historic Property Survey Report for the Laguna Beach Urban Runoff Diversion Project Laguna Beach, Orange County California	0.45 mi west
OR-04179*	City of Laguna Beach	2008	Laguna Beach Historic Resources Inventory	Within Project area

*Within or intersecting the Project area

Previously Recorded Cultural Resources

Six cultural resources are recorded within a half-mi of the Project area. These include two prehistoric shell midden sites, two historic-era buildings eligible for listing in the NRHP, a section of the South Coast Highway, and one historic-era sewer utility building (Table 2). None of these resources are within or adjacent to the Project area.

ARCHIVAL RESEARCH

The desktop cultural resource analysis conducted by PaleoWest also included archival research of available online sources and regional overviews. Resources examined as part of this effort include the National Register of Historic Places (NRHP), the California Historical Landmarks (CHL) list, and the Laguna Beach Historic Register. Available historical U.S. Geological Survey (USGS) 7.5-, 15-, and 30-minute quadrangle maps and aerial photographs were also reviewed.

National Register of Historic Places (NRHP)

On March 6, 2023, PaleoWest conducted a review of the U.S. Department of the Interior, National Park Service (NPS) online National Register of Historic Places (NRHP) Interactive Map (NPS 2014). One NRHP-listed resource was identified within 1 mi of the Project site. The resource consists of the Villa Rockledge which is located approximately 0.2-mi southwest of

Table 2. Previously Recorded Cultural Resources within a Half-mi Radius of the Project Area

Primary Number	Trinomial	Description	NRHP/CRHR Eligibility Status	Year Recorded (Recorder)	Relationship to Project Area
P-30-000576	CA-ORA-576	Prehistoric site consisting of shallow shell midden exposed along Bluebird Canyon and in gardens of adjacent residences. Likely destroyed by the construction of Bluebird Canyon Pumping Station.	Insufficient information	2017 (I. Strudwick)	Approximately 0.45-mi northwest
P-30-001683	–	Prehistoric site consisting of abundant shell in a cultural midden. Possible Fire-altered rock and one flake. Likely destroyed during construction of Mozambique restaurant parking lot.	Insufficient information	2017 (I. Strudwick)	Approximately 0.46-mi northwest
P-30-0157935	-	Historic period Ibesen home. Located at 2475 South Coast Highway and consists of a Hawaiian Colonial style two-story board and batten beach house.	3S; Eligible to be listed in the NRHP	1980 (Les)	Approximately 0.30-mi south/ southwest
P-30-0157936	-	Historic period Villa Rockledge, also known as the Frank Miller Home. Located at 2529 South Coast Highway. Property consists of a Spanish Mediterranean style estate with a complex of tile gabled buildings.	3S; Eligible to be listed in the NRHP	1981 (Les)	Approximately 0.30-mi south/ southwest
P-30-015939	-	Historic period South Coast Highway is a primary roadway through the City of Laguna Beach. The roadway was originally devoted largely to beach cottages and was an important commercial roadway starting in the mid-1920s. Buildings along this road were built as early as 1888.	Insufficient information	1981 (Les)	0.16-mi southwest
P-30-0177630	-	Historic period Sewer Station No. 5 for the City of Laguna Beach. Located at the end of Pearl Street, adjacent to and above Pearl Street beach access stairs. Consists of a small utility building housing a sewer station; flat-roofed with slight overhang.	6S; Ineligible to be listed in the NRHP	2016 (Demcak)	Approximately 0.35-mi west

Source: SCCIC, March 2023.

the Project site. Three additional NRHP-listed properties in the vicinity of the Project site include: St. Francis-by-the-Sea American Catholic Church approximately 2 mi to the north/northwest; the Griffith, Edward, and America House, approximately 3 mi to the south/southeast; and the Crystal Cove Historic District approximately 4 mi to the northwest.

California Historical Landmarks

There are 26 CHLs recorded within Orange County, California (California Office of Historic Preservation 2023). One of these resources (CHL Number 1050, Crystal Cove Historic District) is within the City of Laguna Beach. The resource is located 5.4 mi from the Project site.

Laguna Beach Historic Register

There are 74 properties listed in the Laguna Beach Historic Register (City of Laguna Beach 2020b). The closest property to the Project area is a single-family residence at 454 Alta Vista Way. This property is located approximately 0.1 mile south of the Project area.

Review of Historical Maps and Aerial Photographs

PaleoWest reviewed historic period topographical maps to confirm the Project Area's land use history. The 1902 USGS topographic map for *Corona, California* (1:125,000) shows the Project site as undeveloped at the turn of the century. Aerial images from 1938 and 1946, as well an 1942 USGS topographic map for *Santa Ana, California* (1:62,500), also depict no development in the immediate vicinity of the Project site though a road is shown running from the South Pacific Coast Highway north towards the Project area. A single-family residence, garage, and detached guest house are shown on a 1949 USGS topographic map of *Laguna Beach California* (1:24,000). Historic aerials confirm that the residence, garage, and detached guest house appeared by 1953, so sometime between 1942 and 1949, this property was constructed. The most recent 2012 USGS topographic map for *Laguna Beach, California* (1:24,000) shows that the entire area surrounding the Project site is moderately developed. On this map, San Clemente Street is shown leading to its terminus at the Project site.

DISCUSSIONS AND RECOMMENDATIONS

The findings of the desktop analysis indicate that the Project area exhibits a low potential for containing archaeological resources. Results of the records search and archival research identified no previously documented cultural resources within or adjacent to the Project area. Additionally, the steep slopes that characterize the property suggest it is unlikely that archaeological remains would be encountered during ground-disturbing activities.

According to historical maps and aerial photographs, the single-family residence, garage, and guesthouse were built on the Project site between 1946 and 1949. As such, the property meets the OHP's (1995) age guidelines to be documented as a cultural resource and evaluated for listing on the CRHR. Per the City's guidance, the historic buildings on the property do not require documentation or evaluation for the proposed Project. As such, no further cultural resources management is recommended for the Project.

Please do not hesitate to contact PaleoWest if you have any questions regarding these findings or recommendations.

Sincerely,

PALEOWEST

Paige Kohler, M.A.
Project Manager

Kevin Hunt
Office Principal

Attachments

Attachment A: References

Attachment B: Figures

Attachment C: SCCIC Records Search Results

Attachment A: References

REFERENCES

City of Laguna Beach

2008 Laguna Beach Historic Resources Inventory. OR-04179. On file at the South Central Coastal Information Center (SCCIC) at California State University, Fullerton.

2020a City of Laguna Beach Historic Resources Element. Electronic document. Accessed on March 14, 2023 at: https://www.lagunabeachcity.net/home/showpublisheddocument/8150/638001342413000000.

2020b Laguna Beach Historic Register. Electronic document. Accessed on March 15, 2023 at: https://www.lagunabeachcity.net/home/showpublisheddocument/9102/637527417362100000.

2022 Ordinance No. 1670: An Ordinance of the City of Laguna Beach, California Amending Chapters 25.45, 25.05, 25.17, 25.18, 25.22, 25.38, 25.54, and 7.70 of the Laguna Beach Municipal Code Relating to Historic Preservation. Electronic document. Accessed on March 16, 2023 at: https://lagunabeachgis.net/PublicAccess/api/Document/ASR41uo1a4e9uk2ÁQQBÁtG7sk0pnnTwTVws57kVF3WRRGMÁCRKNUtZ36jhaIZbZTaRNhZ0EOmBA3MIIKQNZJoOg%3D/.

Office of Historic Preservation (OHP)

1995 Instructions for Recording Historical Resources. Electronic document. Accessed on March 14, 2023 at: https://ohp.parks.ca.gov/pages/1054/files/manual95.pdf.

United States Department of Agriculture Natural Resources Conservation Service

2023 Web Soil Survey. Website accessed on March 15, 2023 at: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

Attachment B: Figures

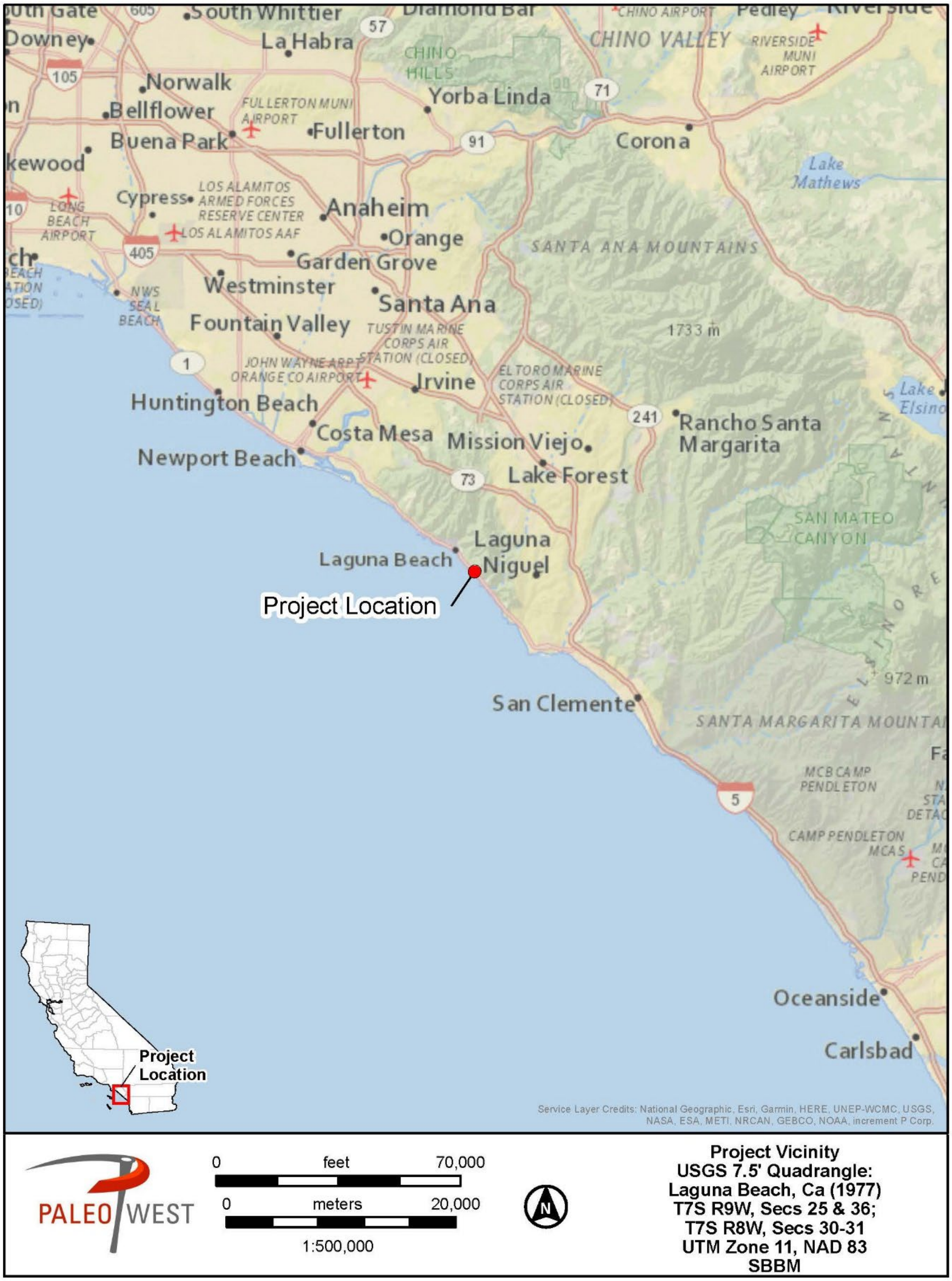

Figure 1. Project vicinity map

Figure 2. Project location map

Attachment C: SCCIC Records Search Results

SCCIC Resource Table

PrimaryString	TrinomialString	ResourceName	ResType	Age	Attribs	ResourceDisclosure	RecordingEvents	Reports	Address
P-30-000576	CA-ORA-000576	Site 1	Site	Prehistoric	AP02; AP15	Not for publication	1975 (LEONARD); 2017 (Ivan Strudwick, LSA)	OR-01926, OR-01995, OR-03937	1590-1600 S Coast Hwy Laguna Beach 92651
P-30-001683	CA-ORA-001683	AWMA-1	Site	Prehistoric	AP02; AP15	Not for publication	1976 (R. C. Carrico, Westec); 2017 (Ivan Strudwick, LSA)	OR-01926, OR-03937	Agate and Pacific Coast Hwy Laguna Beach; 1710-1740 S Coast Hwy Laguna Beach 92651
P-30-157935		Ibesen Home	Building, Element of district	Historic	HP02	Unrestricted	1981 (Kathleen Les, Environmental Coalition)		2475 S Coast Hwy Laguna Beach
P-30-157936		Frank Miller Home, Villa Rockledge	Building, Element of district	Historic	HP03; HP29	Unrestricted	1981 (Kathleen Les, Environmental Coalition); 1983 (Kathleen Les, Heritage Orange County)		2529 S Coast Hwy Laguna Beach
P-30-177630		Pearl1; Sewer Station No. 5, City of Laguna Beach	Building	Historic	HP09	Unrestricted	2016 (Carol Demcak, ARMC)	OR-04625	Pearl St Laguna Beach 92651

SCCIC Report Table

ReportNum	Authors	CitYear	CitTitle	CitPublisher	ReportType	Resources
OR-00567	Crabtree, Robert H.	1976	Scientific Resources Survey (Archaeology and Paleontology) of Arch Beach Heights - Portafina Project, Laguna Beach, California.	Archaeological Research, Inc.	Archaeological, Field study	
OR-01147	Whitney-Desautels, Nancy A. and Sundberg, Fred	1991	Archaeological Survey of the Diamond/Crestview Study Area Laguna Beach Orange County, California	Scientific Resource Surveys, Inc.	Archaeological, Field study	
OR-01926	Ezell, Paul H. and Carrico, Richard L.	1977	Archaeological Survey Report of Aliso Water Management Agency Project Committees 7, 11-A and 15	Westec Service, Inc.	Archaeological, Field study	30-000009, 30-000074, 30-000109, 30-000280, 30-000281, 30-000285, 30-000286, 30-000334, 30-000335, 30-000576, 30-000577, 30-000578, 30-000583, 30-000596, 30-001683
OR-02815	Shepard, Richard S.	2002	Historic Property Survey Report for the Laguna Beach Urban Runoff Diversion Project Laguna Beach, Orange County California	Chambers Group, Inc.	Archaeological, Field study	19-000755
OR-04179	unknown	2008	Laguna Beach Historic Resources Inventory	City of Laguna Beach	Architectural/historical	30-157939

Appendix C
Geotechnical Report

Geofirm
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(949) 494-2122 • FAX (949) 497-0270

December 3, 2020

Kevin Aaronson
32741 Seven Seas
Dana Point, California 92629

Project No: 72447-00
Report No: 20-8818

Subject: **Geotechnical Investigation for Residential Foundation Design and Right-of-Way Improvements**
2354 San Clemente Street
Laguna Beach, California

References: Geofirm, 2007, “Geotechnical Investigation for Residential Foundation Design, 2354 and 2360 San Clemente Street, Laguna Beach, California”; dated February 21, Project No. 71695-00, Report No. 07-5883.

Geofirm, 2008, “Response to City of Laguna Beach Geotechnical Report Review Sheet, dated May 16, 2008, 2360 San Clemente Street, Laguna Beach, California”, dated June 27, Project No. 71695-01, Report No. 08-6303.

Geofirm, 2008, “Response to City of Laguna Beach Geotechnical Report Review Sheet, dated July 17, 2008, 2360 San Clemente Street, Laguna Beach, California”, dated August 6, Project No. 71695-01, Report No. 08-6338.

INTRODUCTION

Purpose of Investigation

This report presents results and recommendations from an investigation undertaken to relate onsite and certain regional geotechnical conditions to the construction of a new three-story residence, including basement, at the subject site, as well as improvements to the San Clemente Street right-of-way (ROW) to accommodate a fire truck turnaround and loading of a Laguna Beach Fire Department fire apparatus. Analysis for this investigation is based upon conceptual plans provided by Geoff Sumich Design.

The conclusions and recommendations of this report are preliminary due to the absence of specific foundation plans, the formulation of which is partially dependent upon the recommendations of this report.

Scope of Investigation

The investigation included the following:

1. Review of geotechnical literature including certain regional and site-specific reports, including those previously produced by our office.
2. Review of surface observation of the property and reconnaissance of nearby areas.
3. Review of excavation and logging of two previous exploratory test pits in the proposed building area to obtain representative samples, undertake in situ testing and determine the geometrical distribution of subsurface earth materials.
4. Review of laboratory testing of previously collected representative samples to determine expansion index, Atterberg limits, maximum density and optimum moisture, soluble sulfate and corrosivity.
6. Geotechnical analysis of the subsurface conditions as related to proposed residential foundation design and construction.
7. Preparation of this report and illustrations.

Accompanying Illustrations and Appendices

Figure 1	-	USGS Geologic Location Map
Figure 2	-	CDMG Seismic Hazards Map
Figure 3	-	Typical Retaining Wall Subdrain Detail
Figure 4	-	Conceptual Shoring/Retaining Wall Subdrain Detail
Figure 5	-	Typical Slab Subdrain Detail
Figure 6	-	Geotechnical Plot Plan
Figure 7	-	Geotechnical Cross-Section A-A’
Figure 8	-	Geotechnical Cross-Section B-B’
Appendix A	-	References
Appendix B	-	Previous Test Pit Logs
Appendix C	-	Previous Laboratory Test Results
Appendix D	-	Standard Grading Specifications
Appendix E	-	Utility Trench Backfill Guidelines
Appendix F	-	Maintenance of Hillside Homes

Site Description

The combined triangular-shaped 0.3-acre lot fronts 160± feet on San Clemente Street to the southwest and extends 225± feet northerly to the rear property corner below Lomita Way. The property consists of two terraced pads excavated within a slope descending to the northwest adjacent to and below the end of the street. The property is flanked to the east by existing residential properties. Existing improvements to the site are limited to two small single-story residences and an out-building. Grading of the lot and construction of the homes appears to have been performed in the early 1940's.

Proposed Development

The proposed construction consists of the removal of the existing structures and the development of a three-story single-family residence with terraced basement in the central portion of the combined lot. The proposed structure will be founded on retaining wall and conventional foundation systems. Proposed retaining walls are envisioned to be maximum of 15± feet high. Cut and fill earthwork is also proposed for the property. According to plans presented to our office by Toal Engineering, a total of 440 CY of export are planned in the area of the proposed residence. San Clemente Street right-of-way improvements are to require 250 CY of import material.

Improvements to the San Clemente Street right-of-way are to include the widening of the existing dead-end street to accommodate a cul-de-sac style Fire Department turn-around. Retaining walls are envisioned to support the improvements to a maximum height of 13± feet high.

GEOTECHNICAL CONDITIONS

Geologic Setting

The property is situated on the northwest flank of a ridgeline extending from the seaward margin of the San Joaquin Hills. The ridge and adjoining hillside have been uplifted over the past million years by tectonic forces acting on this region of southern California. Throughout this tectonic uplift, a succession of marine and nonmarine erosional events eroded the adjoining rock and carved out the local canyons, forming the site. Recently, local road building and property development further modified the area to its present configuration and morphology.

Earth Materials

The property is underlain at shallow depths by bedrock strata assigned on the basis of regional mapping to the San Onofre Formation of Miocene Age, Figure 1. Where exposed in the test pits, the bedrock consists of moderately to strongly cemented, light olive brown to yellow brown, fine to medium grained sandstone with thinly interbedded siltstone. The bedrock is mantled by residual soil (severely weathered bedrock) consisting of dark brown silt and clay, and by undocumented fill consisting of gravelly clay. The residual soil and fill are considered unsuitable for structural support in their present condition. These deposits can be reworked into suitable engineered fill materials.

The bedrock is suitable for foundation support. At the designed depths for excavation, hard rock should be anticipated in most cuts. Shoring should be anticipated where slope laybacks are not feasible.

Structures

Regional mapping of the Laguna Beach area indicates bedding typically strikes approximately east-west and dips at shallow to moderate angles south. Based on field observation bedrock strata in the vicinity of the site strikes northwesterly and dips gently to the southwest at 30 degrees from horizontal, obliquely into the topographic slope. This is a structural-topographic condition that generally promotes gross bedrock stability.

Slope Stability

No evidence of gross bedrock instability was observed during our field investigation or our literature-map review. Based upon good historical performance, a favorable topographic-structural relationship, and generally high strength bedrock materials, it is our opinion that the slope is grossly stable. However, the slope is considered surficially unstable.

Groundwater

No evidence of groundwater activity was noted during the field exploration. Perched water in the form of wet soils is anticipated to occur seasonally at the overburden-bedrock contact. However, groundwater is not anticipated to adversely affect the proposed construction providing proper subsurface and surface drainage is incorporated into design and construction.

Surficial Runoff

No evidence of uncontrolled, concentrated, erosive runoff onto or from the property was noted during our field reconnaissance. However, early residential construction typically did not provide adequate surface drainage controls. Proposed development will modify or may increase post-development surficial discharge, which should be addressed by the project Civil Engineer.

Seismic Considerations

Local and Regional Faults

The closest published active fault to the site is the offshore extension of the Newport-Inglewood Fault Zone, approximately 3.0 miles west-southwest, (Blake, T.F., 2000, CGS/2004). Other active faults in the vicinity of the site include the San Joaquin Hills Fault approximately 3.9 miles from the site, the Palos Verdes Fault approximately 17.8 miles northwest, the Coronado Bank Fault, approximately 20.3 miles southwest, the Elsinore Fault, approximately 21.9 miles to the east; and the San Andreas Fault, approximately 52.9 miles to the northeast.

The offshore portion of the Newport-Inglewood Fault zone is indicated in published reports as being a Potentially Active and Quaternary fault, (Jennings, C.W.; 1994). This interpretation is not universally shared, as this portion of the Newport-Inglewood Fault is included as a potential seismic source in the computer programs utilized to model ground motions for this study, (Blake, T.F.; 2000). With the fault's location approximately 3.0 miles to the west and given the present level of understanding of this offshore structure it is, in our opinion, appropriate to include this portion of the fault as a causative seismic feature.

The California Geological Survey updated the Fault Parameters and Earthquake Catalog for the probabilistic Seismic Hazards Maps, (CGS, 2004). This update included the addition of the "San Joaquin Hills" blind thrust fault, theorized to exist from Newport Beach to Dana Point, and ramping up inland to the Irvine area, and essentially underlying the site. Given that earthquakes of significant magnitude (M6.6) are presently postulated for this structure, it is calculated as the most significant seismic source to affect this site.

Ground Motion Analyses

Potential ground motions from earthquakes which could impact the sites were analyzed through probabilistic methods. The probabilistic method considers the regional seismic history and the slip rates of faults within a 100-mile radius of the subject site. Utilizing attenuation relationships (Bozorgnia, et al.; 1999, unconstrained/soft-rock), one can estimate the ground motion history of the site and attempt to predict the probability of future accelerations within a given period of time. The study indicates the maximum site acceleration from 1800 to 2004 was approximately 0.15g and occurred during a magnitude 6.3 Long Beach Earthquake 13.2 miles from the site on March 11, 1933. The closest earthquake greater than magnitude 5.0 to occur during that time period was a magnitude 5.2 earthquake aftershock from the Long Beach Earthquake, approximately 13.0 miles from the site. For the purposes of prediction and design, the peak acceleration with a 10 percent probability of exceedance in 50 years is determined to range from 0.34 to 0.40g. These values are consistent with published reports estimating this value for the subject location (Petersen, et. al., 1996-1999).

It is noted that the estimation of peak ground accelerations presented above is provided for the interest of the client and is required by local (City or County) review agencies. With the exception of use in liquefaction analysis, the values derived are not directly utilized in structural design of residential structures. Seismic parameters for use by the structural engineer in accordance with 2019 California Building Code for design of the proposed structure are presented in the recommendations portion of this report.

Secondary Seismic Hazards

Review of the Seismic Hazards Zones Map (CDMG, 1998) for the Laguna Beach Quadrangle, Figure 2, indicates the site is not located within a "zone of required investigation" for liquefaction or earthquake-induced landsliding.

Other secondary seismic hazards to the sites include deep rupture, shallow ground cracking, and settlement. With the absence of active faulting onsite, the potential for deep fault rupture is not present. The potential for shallow ground cracking to occur during an earthquake is a possibility at any site, but does not pose a significant hazard to site development. The potential for seismically induced settlement to occur is considered remote for bedrock sites.

CONCLUSIONS

1. The proposed construction is considered feasible and safe from a geotechnical viewpoint provided the recommendations of this report are followed during design, construction, and maintenance of the subject property. The proposed design should not adversely affect or be adversely affected by adjoining properties.
2. The property and right-of-way are underlain at shallow depth by competent sandstone bedrock strata of the San Onofre Formation. The bedrock is overlain by thin overburden of residual soils and fill. Based on observation, the bedrock is suitable in its present form for support of improvements. Residual/undocumented fill materials are not considered suitable in their present form to support new construction but may be removed to produce acceptable engineered fill. Fine-grained soils are not recommended for wall backfill.
3. The San Onofre bedrock materials have a low expansion potential and negligible sulfate concentration. Minimum resistivity results indicate a moderate potential for corrosion of buried metal. Hard rock excavation should be anticipated.
4. The slope is considered grossly stable but surficially unstable. Appropriate slope setbacks will be required as recommended herein.
5. Adverse groundwater conditions are not anticipated assuming appropriate drainage design.
6. Adverse surface discharge onto or off the site is not anticipated, provided proper engineering design is implemented.
7. The site is geotechnically unsuitable for the onsite discharge and/or infiltration of storm water due to the potential for adverse perching of groundwater on shallow impermeable bedrock.
8. The proposed residence is recommended to be supported on conventional foundations constructed in bedrock. Deepened foundations or caissons may be required to achieve

the recommended bedrock structural setbacks. Temporary shoring may be required to construct the basement level if temporary slopes are not feasible.

9. The proposed exterior hardscape elements and minor landscape walls may be constructed on bedrock or new engineered fill. Significant exterior landscape retaining walls are recommended to be supported on foundations constructed in bedrock.

RECOMMENDATIONS

Site Preparation and Grading

1. General

Grading should be performed in accordance with the Standard Grading Specifications in Appendix D. In general, grading is anticipated to include the excavation and export of existing soils and bedrock to create new design grades for the proposed improvements.

2. Remedial Grading

Remedial grading will include minor removals of locally unsuitable near-surface soils pending field review by the geologist in areas to receive fill or hardscape patios. Processing, over-excavation and re-compaction should be observed, tested and approved in writing by a representative of this firm. The depth of removal is anticipated to be approximately 3 feet; however, deeper removals may be necessary pending field-review by the geologist during grading, particularly in San Clemente Street.

Remedial grading beneath structural slabs is not required.

3. Removal of Existing Improvements

Any existing vegetation and/or construction/demolition and irrigation debris should be removed and disposed of offsite.

4. Compaction Standard

Onsite soil materials are anticipated to be suitable for re-use as compacted fill if necessary, except for retaining wall backfill, providing oversized rock fragments (greater than 4-inches, greatest dimension) are excluded from the fills. Such materials should be placed at approximately 120 percent of optimum moisture content and compacted under the observation and testing of the soil engineer to at least 90 percent of the maximum dry density as evaluated by ASTM D 1557.

5. Temporary Construction Slopes

A. Protection of Property

In order to reduce the potential risk to adjoining properties from potential slope failures, temporary construction slopes exposing onsite earth materials may be excavated vertically to 5 feet, with higher slopes laid back at 1:1 (horizontal:vertical) pending field review by the geologist during grading.

Shoring should be anticipated where space or grading limitations preclude temporary slope layback or in locations where workers may be in close proximity to vertical cuts.

The maximum estimated height of proposed temporary slopes is uncertain at this time and is dependent on the foundation system chosen by the owner. Removal depths up to 10± feet or more are likely. Such cuts, where slope layback is feasible, may remain open for a period of 30 days pending field review by the geologist.

B. Worker Safety

As the safety of onsite personnel affected by the performance of temporary construction slopes is the responsibility of the general contractor, the contractor is recommended to implement the safety practices as defined in Section 1541, Subchapter 4, of Cal/OSHA T8 Regulations (2006).

The geometry of permissible temporary cuts varies based on soil type and may differ significantly from the geometry presented in Section A above. The earth materials exposed in temporary excavations should be evaluated and classified by the contractor during construction.

6. Temporary Shoring

Shoring may be required to construct the proposed garage depending on its final design and location relative to the existing residence. Temporary shoring may be designed using an equivalent fluid density of 35 pounds per cubic foot. Vibratory techniques for placement of piles or steel sheet lagging should not be utilized, as damage to adjoining property improvements may otherwise occur. It is the contractor's responsibility to develop appropriate means and methods of construction to avoid damage to adjacent properties.
If temporary shoring elements are to be removed, the builder and homeowner must be aware that such removal could result in settlement and possible damage to improvements on the adjacent property. The adjacent property owners must be advised of the risks and

the builder should provide arrangements to repair any possible damages. The contractor should also recognize the risk of leaving voids during removal of shoring elements. Lagging plates and piles should therefore be removed slowly and the voids created should be filled immediately. Consideration should be given to continuously injecting grout at the base of the piles and plates as they are being removed to fill the resultant voids.

Monitoring

Complete documentation of the pre- and post-construction conditions of existing and adjacent improvements should be undertaken. In addition, monitoring of ground movement and construction vibrations should be made by the Geotechnical Consultant as an integral part of the construction.

Structural Design of Foundations

Earth materials to be exposed within foundation excavations are anticipated to exhibit a low expansion potential. It is anticipated that a conventional foundation system will be utilized and embedded into bedrock. We recommend that the foundations be designed in accordance with the 2019 California Building Code. Foundations and slabs should be designed for the intended use and loading by the Structural Engineer.

1. Conventional Foundations and Slabs-on-Grade

Conventional spread footings founded in bedrock may be designed for an allowable bearing value of 4,000 pounds per square foot with a minimum width of 18 inches and a minimum embedment into bedrock of 18 inches below the lowest adjacent grade. The design value may be increased one-third for short duration wind or seismic loading. Settlement is anticipated to be less than approximately 3/4 -inch total and 1/2-inch differential over a distance of 20 feet.

Lateral loads may be resisted by passive pressure forces and friction acting on the bottom of footings. The passive pressure forces may be computed using equivalent fluid densities of 400 pounds per cubic foot for bedrock, up to a maximum of 4,000 pounds per square foot. If caissons are utilized, the passive resistance may be applied over a tributary area of twice the caisson diameter. A coefficient of friction of 0.35 may be used in computing the frictional resistance in bedrock. These values may be combined. No lateral resistance may be utilized for existing loose fill and residual soil.

Conventional foundations should be reinforced in conformance with the requirements of the structural engineer. From a geotechnical viewpoint, a minimum of two No. 5 bars should be incorporated at the top and bottom of footings and grade beams in order to reduce the potential for cracking due to seismic shaking.

Slabs should be underlain by 4 inches of 1/2- and 3/4-inch open-graded gravel. Slab underlayment is deferred to the project architect; however, in accordance with the American Concrete Institute, we suggest that slabs be underlain by a 15-mil thick vapor retarder/barrier (Stego Wrap or equivalent) placed over the gravel in accordance with the requirements of ASTM E:1745 and E:1643.

2. Moisture Content of Slab Subgrade Soils

Pre-moistening of slab subgrade soils is recommended prior to construction of slabs.

3. Slab Subdrains

Percolating irrigation and meteoric water may perch on top of less pervious layers at shallow depth beneath the site. Groundwater effects on the lower levels can be reduced by intercepting the groundwater with a subdrain constructed beneath the slab. The subdrain should be constructed in accordance with the detail presented on Figure 5. The slab subdrain system should consist of 4-inch diameter perforated pipe graded to flow at one percent in the base of 12-inch deep trench around the perimeter of the slab and spaced in a 10 feet grid pattern within the interior. The trench should be lined with non-woven filter fabric and backfilled with ½- or ¾-inch rock. The slab subdrain piping system should be outlet per the Civil Engineer.

As an alternative to the recommended slab subdrain system, the lower slab may be waterproofed. Slab waterproofing design and details should be provided by the project architect or waterproofing consultant.

4. Structural Slab

Structural slabs should be designed by the structural engineer. Structural slabs should be designed to span between foundations with no soil support.

Caissons

Possible caissons utilized for foundation support or shoring should be at least twenty-four inches in diameter and embedded a minimum of 10 feet into competent bedrock. Caissons may be designed for a dead plus live load end bearing value of 8,000 pounds per square foot and skin friction of 400 pounds per square foot for bedrock. These values may be increased by one-third for wind and seismic forces. Lateral resistance may be computed utilizing 400 pounds per square foot per foot of depth for bedrock, acting on a tributary area of twice the caisson diameter.

Settlement is anticipated to be less than 1/4 inch. A minimum 24-inch diameter caisson is required in order to observe proper cleanout by the contractor and to allow visual observation and confirmation by the engineering geologist.

Structural Design of Retaining Walls

1. Lateral Loads

   Active pressure forces acting on walls retaining level or 2:1 (horizontal:vertical) sloping backfill may be designed using an equivalent fluid pressures of 35 or 50 pounds per cubic foot, respectively, if backfilled with geotechnically approved, granular non-cohesive soils and free to rotate during backfilling (refer to Figure 3 for backcut and backfill geometry). Restrained walls should be designed for a 50 percent greater active pressure loading. Retaining wall design must consider topographic and structural surcharges.

   It is our understanding that the San Clemente Street right-of-way needs to support the LBFD fire trucks. The assumed loads of LBFD fire apparatus include a total weight of 68,000 pounds. Apparatus weight is distributed as 46,000 pounds on tandem rear axles and 22,000 pounds on the front axle. Based on the assumed fire truck loads, we have calculated lateral earth pressure loads for use in the design of the fire truck turnaround retaining wall. The turnaround retaining wall should be designed for a uniform lateral pressure of 300 pounds per square foot.

   The site is classified as being in Seismic Design Category D (Type II occupancy, SDs $\geq$ 0.5g, SD1 $\geq$ 0.2g). Seismic design of retaining walls over 6 feet in height may be based on the Mononobe-Okabe method, as updated by Atik and Sitar (2010), using an additional dynamic load of 17 pounds per cubic foot equivalent fluid pressure, respectively for active wall condition. These seismic wall loads may be assumed to act at 1/3 H above the base of the wall height, H. Final design requirements should be determined by the structural engineer.

2. Subdrains

   The drainage scheme depicted on Figure 3 or 4, or a geotechnically approved alternative, should be used to reduce the potential for seepage forces behind retaining walls. Waterproofing of retaining walls is recommended and should be applied in accordance with the architect's specifications or those of a waterproofing consultant.

3. Wall Excavations

   Wall excavations should be cut in accordance the Temporary Construction Slopes section presented above.

Hardscape Design and Construction

Hardscape improvements may utilize conventional foundations embedded in compacted fill. Conventional spread footings founded in fill may be designed for an allowable bearing value of 2,000 pounds per square foot with a minimum embedment into the underlying soil of 18 inches below the lowest adjacent exterior grade. Lateral loads may be resisted by passive pressure forces and by friction acting on the bottom of footings. The allowable passive pressure forces may be computed using an equivalent fluid density of 150 pounds per cubic foot up to a maximum of 1,500 pounds per square foot. A coefficient of friction of 0.25 may be used in computing the frictional resistance in compacted fill. Friction resistance and passive pressure may be combined without reduction.

Concrete flatwork should be divided into as nearly square panels as possible. Joints should be provided at maximum 6 feet intervals to give articulation to the concrete panels. Landscaping and planters adjacent to concrete flatwork should be designed in such a manner as to direct drainage away from concrete areas to approved outlets. Planters located adjacent to principal foundation elements should be sealed and drained; this is especially important if located upon retaining wall backfills.

Flatwork elements should be a minimum 5 inches thick (actual) and reinforced with No. 4 bars 16 inches on center both ways.

Slope Setback

The bottom of all footings should be set back a minimum of 25 feet from the slope face, and a minimum of 10 feet from the bedrock face, whichever is greater. Actual embedment depths may exceed the minimum where structural design requirements supersede the slope setback requirement.

Concrete

Onsite derived soils have a negligible soluble sulfate content. It is recommended that a concrete expert be retained to design an appropriate concrete mix to address soil soluble sulfate content and the structural requirements. In lieu of retaining a concrete expert, the 2019 California Building Code, Section 1904.1 should be utilized, which refers to ACI 318, Table 4.3.1.

Seismic Structural Design

Based on the geotechnical data and site parameters, the following is provided by the USGS (ASCE 7-16) to satisfy the 2019 CBC design criteria:

Seismic Design Criteria per 2019 CBC

Design Parameters	**Recommended Values**
Site Class	C
Site Longitude (degrees)	-117.7643
Site Latitude (degrees)	33.5265
Ss (g) B	1.327
S_1 (g) B	0.471
SMs (g) D	1.592
SM_1 (g) D	0.706
SDs (g) D	1.061
SD_1 (g) D	0.471
F_A	1.2
F_V	1.5
PGA (g)	0.582
Seismic Design Category	D

Pavement Design

General

Pavement areas for vehicle traffic may consist of concrete, asphalt concrete, or concrete pavers. Recommendations for each are given below. For design, we have used an assumed R-value of 20. In general, the site subgrade soils are expected to be mostly comprised of imported or onsite materials with a low expansion potential. A Traffic Index of 5 has been used for the design.

The upper 1-foot of subgrade soils directly supporting any structural section should be compacted to a minimum 90 percent of the maximum dry density at moisture contents at least above optimum moisture content (ASTM: D1557). This 1-foot layer of fill soils subgrade should be founded on competent engineered fill.

The untreated base material should consist of crushed aggregate base, crushed miscellaneous base, or processed miscellaneous base as defined in the Standard Specification for Public Works Construction. Base materials should be compacted to at least 95 percent relative compaction (ASTM: D1557) at or above optimum moisture content.

Concrete

We recommend the following concrete section:
Portland Cement Concrete Slab: 5-inches thick

Reinforcing: No. 3 rebar each way in middle third of section at 24-inch spacing
Minimum Concrete Modulus of Rupture: 550 psi

Asphalt Concrete (AC)

Typical or stamped asphalt concrete pavement sections at the site should be in accordance with those in the following table.

TABLE 1 – PAVEMENT SECTIONS

Area	Assumed Traffic Indices	R-Value (assumed)	AC/AB (Inches)	Full Depth AC/SG (Inches)
Drive/Parking Areas	5	20	4/5	6.5

Explanation: AC denotes Asphalt Concrete
AB denotes Base
SG denotes Competent Subgrade

Concrete Pavers

Typical concrete pavers for use in driveways and parking areas should be approximately 3-inches thick and underlain by 1 to 1.5-inches of clean sand. The pavers and sand should be supported on a minimum of 6-inches of untreated base material placed in two 3-inch thick lifts. All lifts should be placed at 95 percent relative compaction (ASTM: D1557). The base should be at or above optimum moisture content.

Concrete pavers for use in pedestrian traffic areas should be underlain with 1 to 1.5 inches of clean sand and 4-inches of base compacted to 95 percent relative compaction.

Finish Grading and Surface Drainage

Finished grades should be designed and constructed so that no water ponds in the vicinity of footings, or drains over the rear slope. Drainage design in accordance with the California Building Code, Section 1804.4, is recommended. Drainage should be conducted away from the house and rear slope in a non-erosive manner as specified by the project civil engineer or landscape architect. Proper interception and disposal of onsite surface discharge is presumed to be a matter of civil engineering or landscape architectural design.
The site is considered geotechnical unsuitable for the local onsite infiltration of storm water due to the impermeable character of the shallow bedrock and sloping conditions. The offsite discharge of storm water is recommended.

Utility Trench Backfill

Utility trench backfill should be placed in accordance with Appendix E, Utility Trench Backfill Guidelines. It is the owners and contractors responsibility to inform subcontractors of these requirements and to notify Geofirm when backfill placement is to begin. In addition, the owner or his representative should prepare a map on an ongoing basis which depicts the location of all underground utilities for inclusion in the as-built geotechnical report.

Foundation Plan Review

In order to help assure conformance with recommendations of this report and as a condition of the use of this report, the undersigned should review final foundation plans and specifications prior to submission of such to the building official for issuance of permits. Such review is to be performed only for the limited purpose of checking for conformance with the design concept and the information provided herein. This review shall not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction means or methods, coordination of the work with other trades or construction safety precautions, all of which are the sole responsibility of the Contractor. Geofirm's review shall be conducted with reasonable promptness while allowing sufficient time in our judgment to permit adequate review. Review of a specific item shall not indicate that Geofirm has reviewed the entire system of which the item is a component. Geofirm shall not be responsible for any deviation from the Construction Documents not brought to our attention in writing by the Contractor. Geofirm shall not be required to review partial submissions or those for which submissions of correlated items have not been received.

Observation and Testing

The 2019 California Building Code, Section 1705.6 requires geotechnical observation and testing during construction to verify proper removal of unsuitable materials, that foundation excavations are clean and founded in competent material, to test for proper moisture content and proper degree of compaction of fill, to test and observe placement of wall and trench backfill materials, and to confirm geotechnical design assumptions. It is noted that the CBC requires continuous geologic observation during the drilling of deep foundation elements and observation and testing during placement of fill.

A Geofirm representative shall visit the site at intervals appropriate to the stage of construction, as notified by the Contractor, in order to observe the progress and quality of the work completed by the Contractor. Such visits and observation are not intended to be an exhaustive check or a detailed inspection of the Contractor's work but rather are to allow Geofirm, as an experienced professional, to become generally familiar with the work in progress and to evaluate, in general, if the work is proceeding in accordance with the recommendations of this report.
Geofirm shall not supervise, direct, or have control over the Contractor's work nor have any

responsibility for the construction means, methods, techniques, sequences, or procedures selected by the Contractor nor the Contractor's safety precautions or programs in connection with the work. These rights and responsibilities are solely those of the Contractor.

Geofirm shall not be responsible for any acts or omission of the Contractor, subcontractor, any entity performing any portion of the work, or any agents or employees of any of them. Geofirm does not guarantee the performance of the Contractor and shall not be responsible for the Contractor's failure to perform its work in accordance with the Contractor documents or any applicable law, codes, rules or regulations.

These observations are beyond the scope of this investigation and budget and are conducted on a time and material basis. The responsibility for timely notification of the start of construction and ongoing geotechnically involved phases of construction is that of the owner and his contractor. Typically, at least 24 hours notice is required.

JOBSITE SAFETY

Neither the professional activities of Geofirm, nor the presence of Geofirm's employees and subconsultants at a construction/project site, shall relieve the General Contractor of its obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending and coordination the work in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. Geofirm and its personnel have no authority to exercise any control over any construction contractor or its employees in connection with their work or any health or safety programs or procedures. The General Contractor shall be solely responsible for jobsite safety.

LIMITATIONS

This investigation has been conducted in accordance with generally accepted practice in the engineering geologic and soils engineering field. No further warranty is offered or implied. Conclusions and recommendations presented are based on subsurface conditions encountered and are not meant to imply a control of nature. As site geotechnical conditions may alter with time, the recommendations presented herein are considered valid for a time period of one year from the report date. The recommendations are also specific to the current proposed development. Changes in proposed land use or development may require supplemental investigation or recommendations. Also, independent use of this report in any form cannot be approved unless specific written verification of the applicability of the recommendations is obtained from this firm.

December 3, 2020

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Thank you for this opportunity to be of service. If you have any questions, please contact this office.

Respectfully submitted,

GEOFIRM

Kevin A. Trigg, P.G.
Chief Engineering Geologist, E.G. 1619

REGISTERED GEOLOGIST
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CERTIFIED
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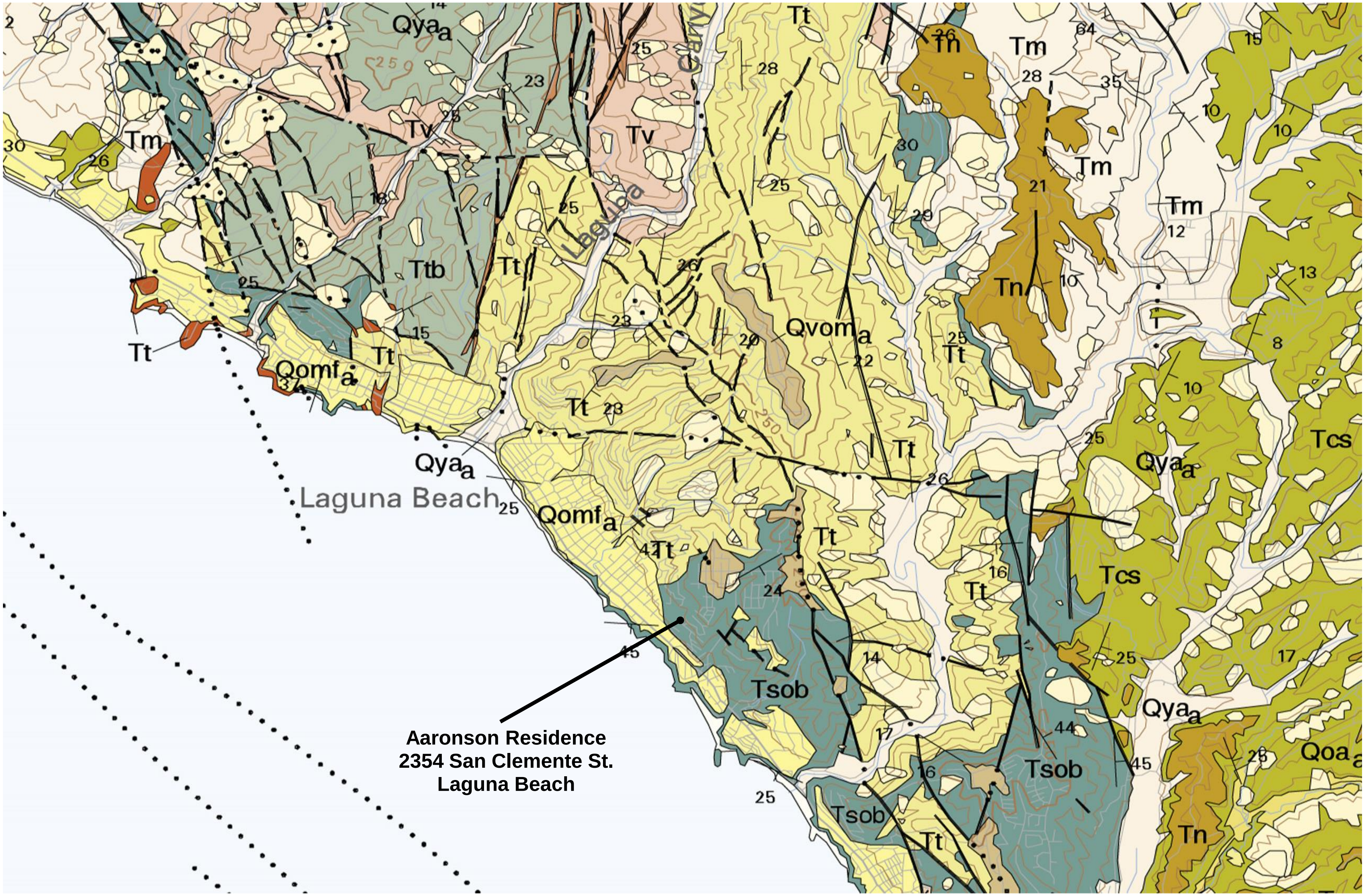
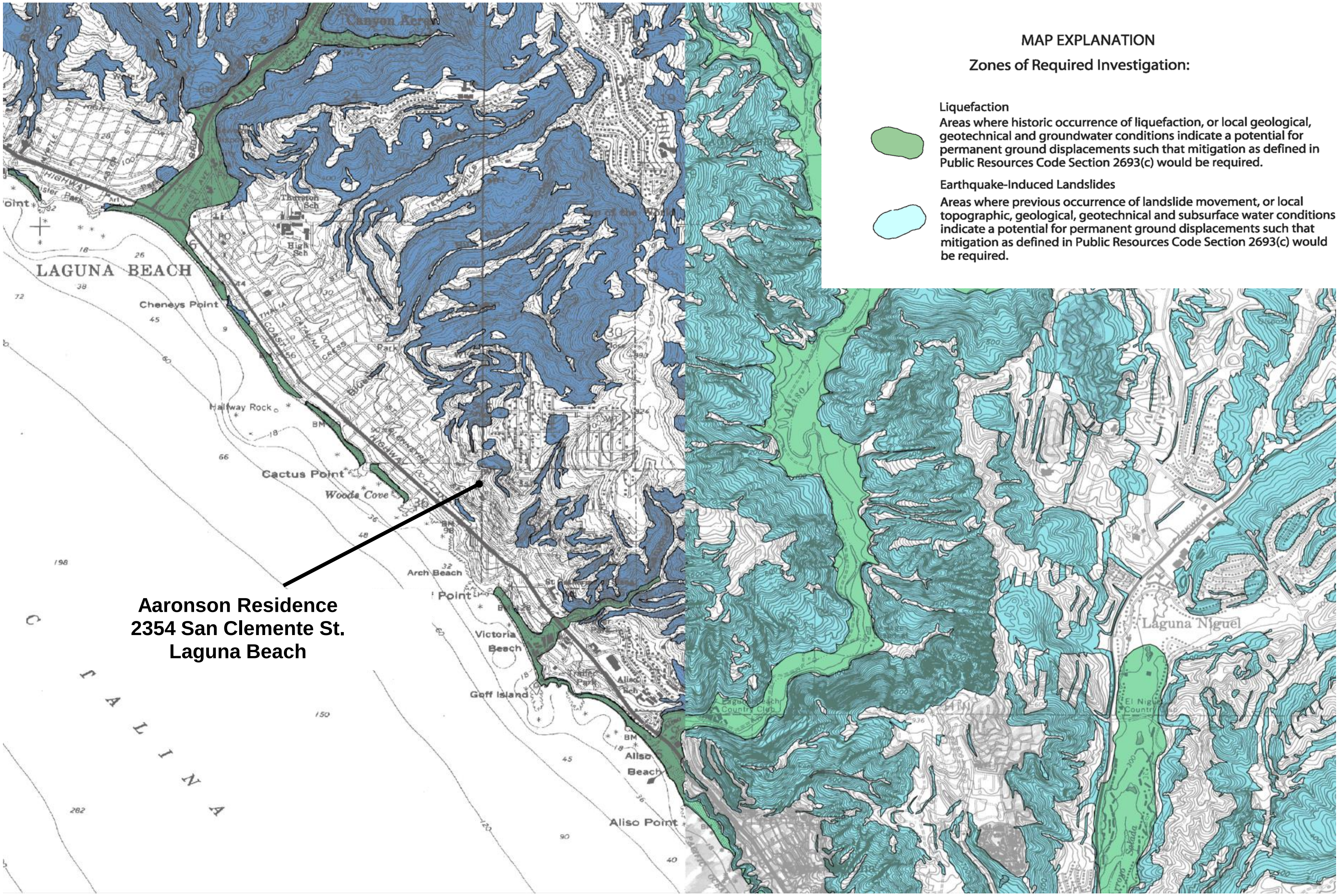


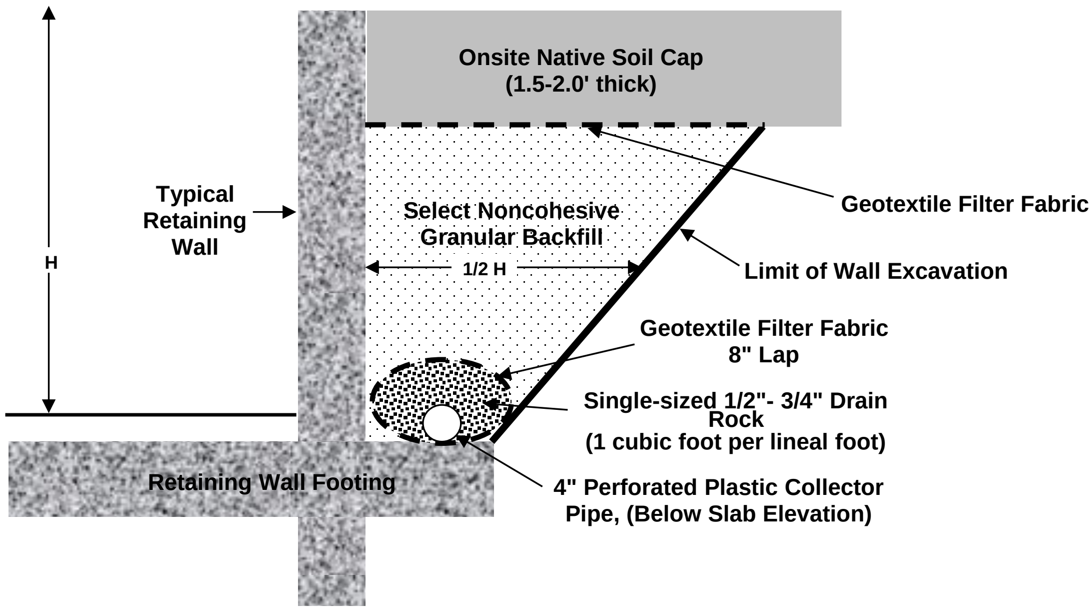
Geofirm

USGS Geologic Location Map, Santa Ana 30' x 60' Quadrangle

JOB NO.:	DATE:	FIGURE:
72447-00	December 2020	1



Geofirm	CDMG Seismic Hazards Map, San Juan Capistrano and Laguna Beach Quadrangle		
	JOB NO.: 72447-00	DATE: December 2020	FIGURE: 2

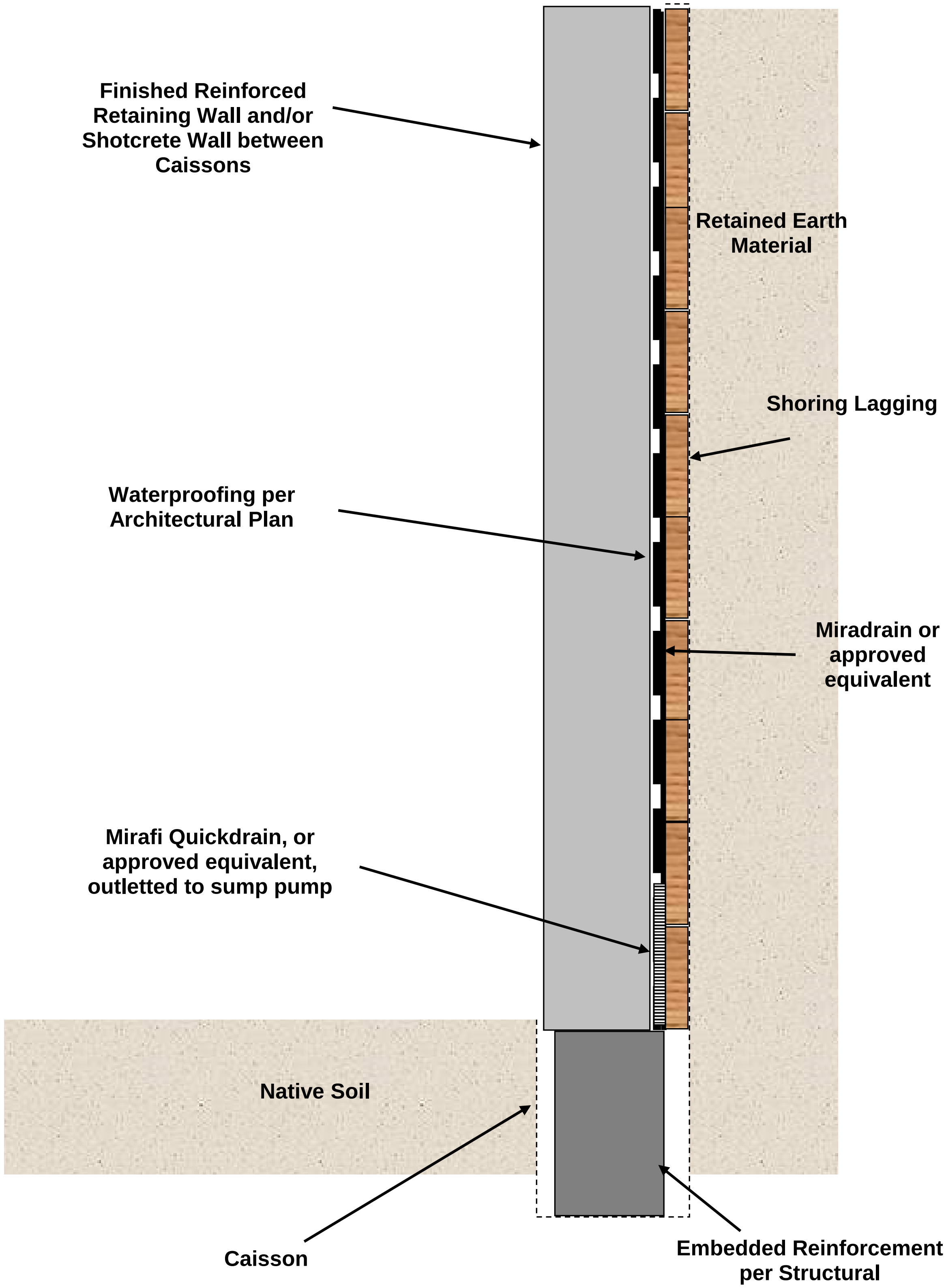


Notes: This system consists of a geotextile fabric-wrapped gravel envelope. Collection is with a 4-inch diameter perforated plastic pipe embedded in the gravel envelope and tied to a 4-inch diameter non-perforated plastic pipe which discharges at convenient locations. The outlet pipe should be placed such that the flow gradient is not less than 2.0 percent. The geotextile fabric-wrapped gravel envelope should be placed at a similar gradient

All drain pipes should be Schedule 40 PVC or ABS SDR-35. Perforations may be either bored 1/4-inch diameter holes or 3/16-inch slots placed on the bottom one-third of the pipe perimeter. If the pipe is to be bored, a minimum of 10 holes should be uniformly placed per foot of length. If slots are made, they should not exceed 2-1/2 inches in length and should not be closer than 2 inches. Total length of slots should not be less than 50 percent of the pipe length and should be uniformly spaced.

The fabric pore spaces should not exceed equivalent 30 mesh openings or be less than equivalent 100 mesh openings. The fabric should be placed such that a minimum lap of 8-inches exists at all splices.

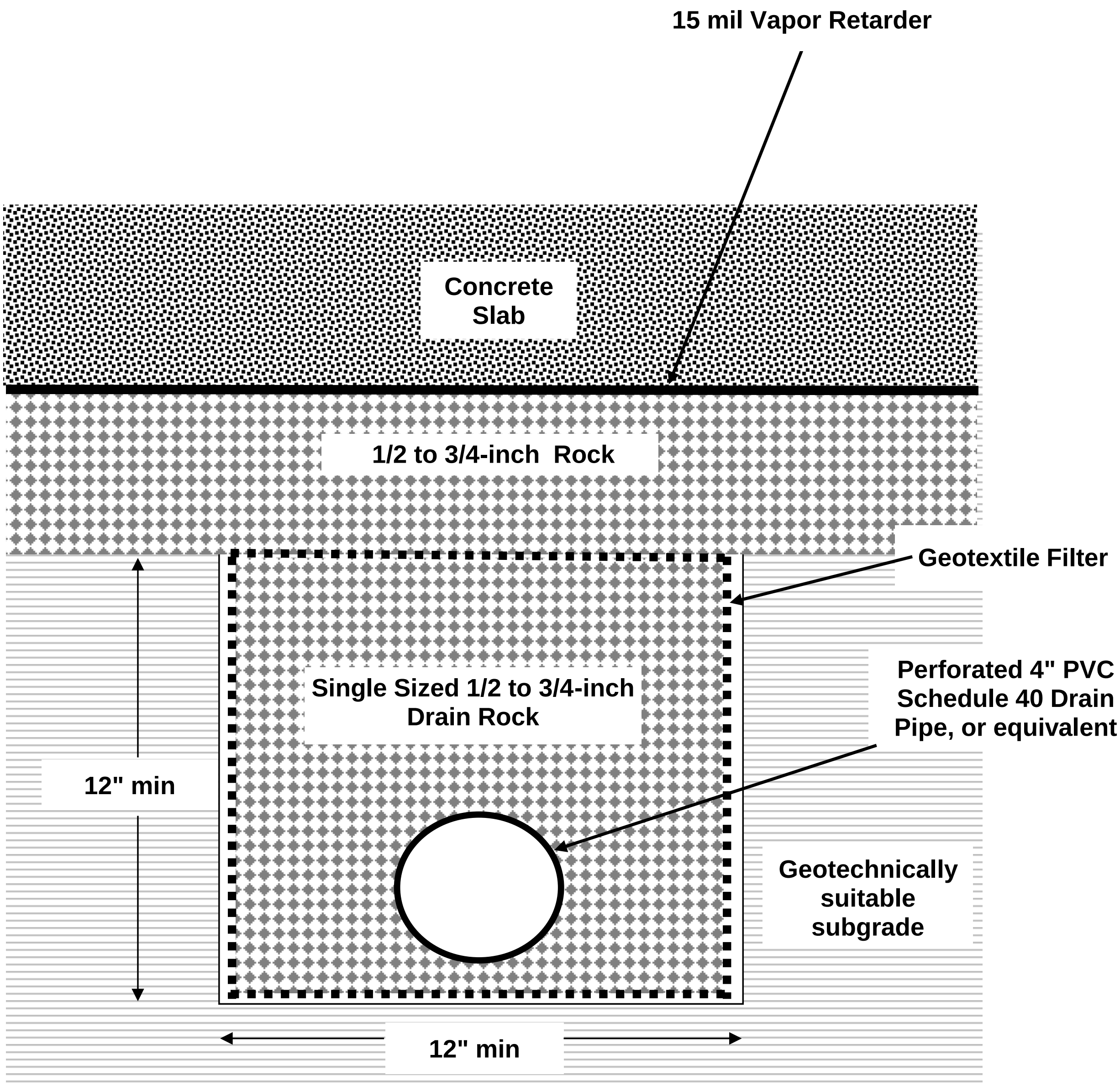
Geofirm	Typical Retaining Wall Subdrain Detail		
	JOB NO.: 72447-00	DATE: December 2020	FIGURE: 3



Geofirm

Conceptual Shoring/Retaining Wall Subdrain Detail

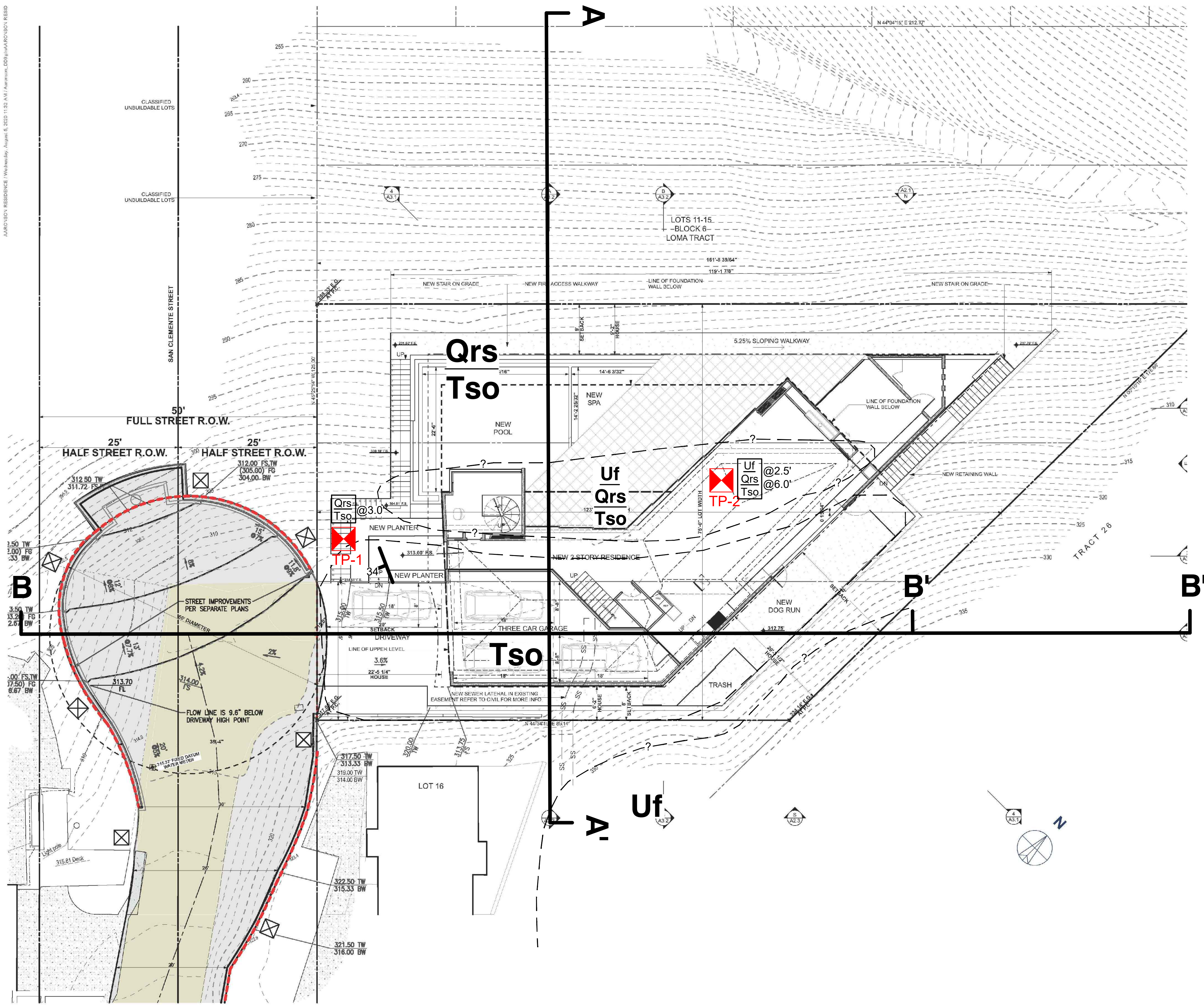
JOB NO.:	DATE:	FIGURE:
72447-00	December 2020	4



Geofirm

Typical Slab Subdrain Detail

JOB NO.:	DATE:	FIGURE:
72447-00	December 2020	5



EXPLANATION

Uf UNDOCUMENTED FILL

Qrs RESIDUAL SOIL

Tso BEDROCK: SAN ONOFRE FORMATION

LITHOLOGIC CONTACT; QUERIED WHERE INFERRED

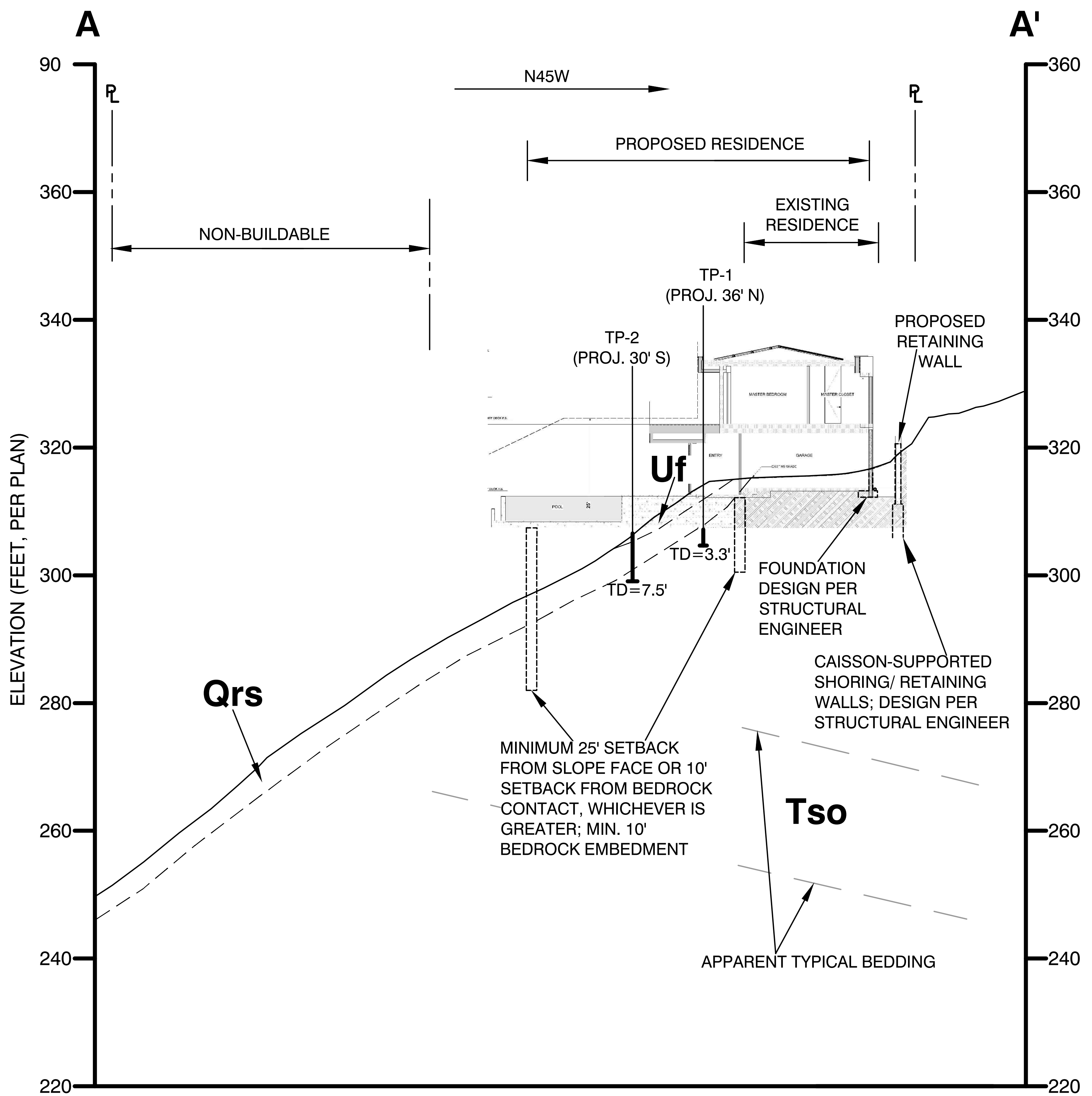
TP-2 (2007) APPROXIMATE TEST PIT LOCATION

34 MEASURED STRIKE AND DIP OF BEDDING

GEOTECHNICAL PLOT PLAN
2354 SAN CLEMENTE STREET
LAGUNA BEACH, CALIFORNIA

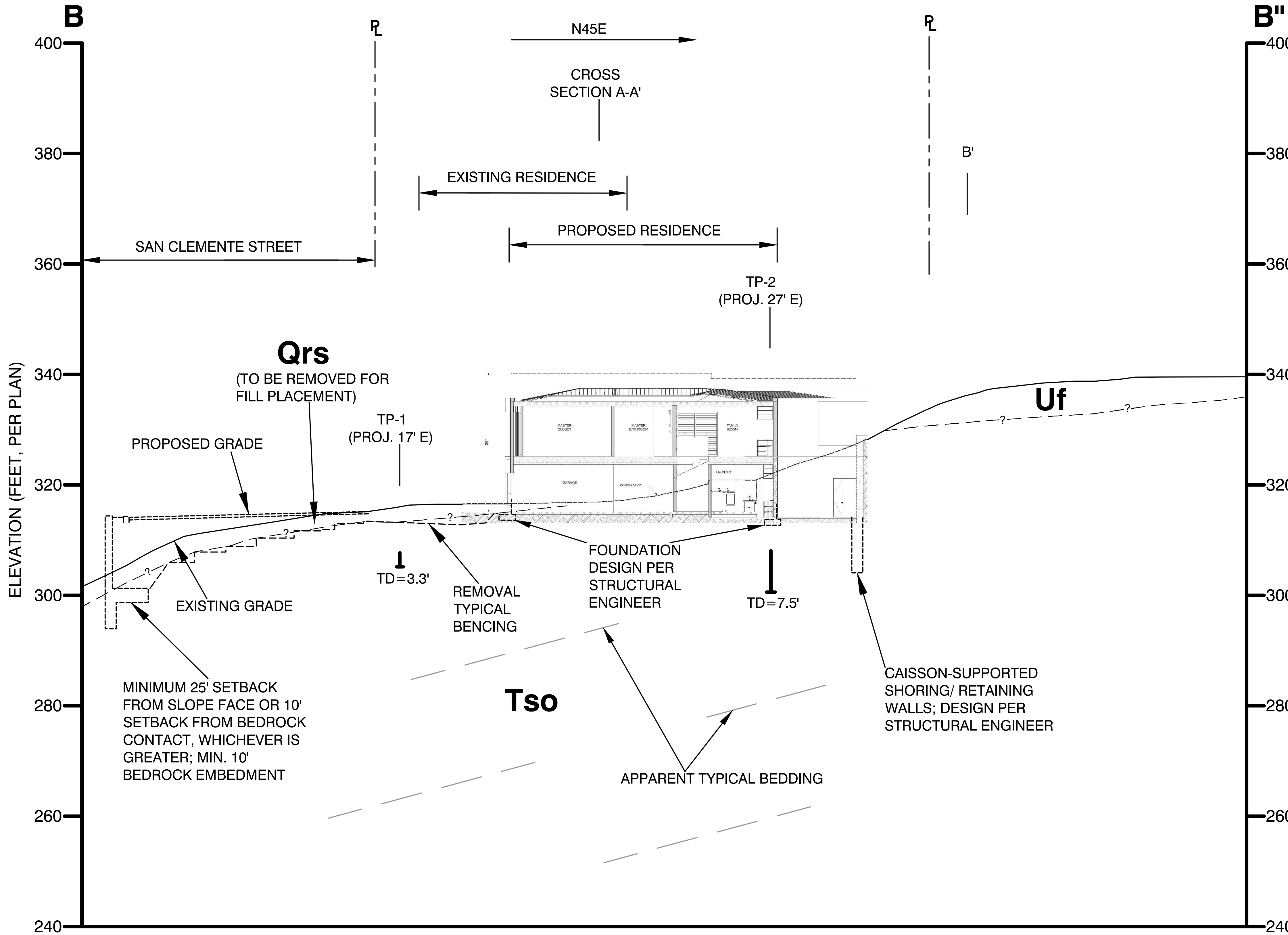
Geofirm

JOB NO.:	REPORT NO.:	DATE:	FIGURE:
72447-00A	20-8818	DECEMBER 2020	6



GEOTECHNICAL CROSS SECTION A-A'
2354 SAN CLEMENTE STREET
LAGUNA BEACH, CALIFORNIA

JOB NO.:	REPORT NO.:	DATE:	FIGURE:
72447-00A	20-8818	DECEMBER 2020	7



GEOTECHNICAL CROSS SECTION B-B"
2354 SAN CLEMENTE STREET
LAGUNA BEACH, CALIFORNIA

Geofirm

JOB NO.:	REPORT NO.:	DATE:	FIGURE:
72447-00A	20-8818	DECEMBER 2020	8

APPENDIX A

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APPENDIX A

REFERENCES

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APPENDIX B

PREVIOUS TEST PIT LOGS

Date(s) Logged: 1/22/2007
Logged By: ERH

LOCATION: 2354 San Clemente Dr.

Ground Elevation:

Method of Drilling: Manual
Drilling Company: Custom Landscape
Drop: N/A
Weight(s): N/A

BORING NO.: TP-1

Depth (feet)	Soil Classification	Blows/ft	Undisturbed Sample	Bulk Sample	Moisture Content (%)	In-place Dry Density (pcf)	Description	Geologic Attitudes	Depth (feet)
0							Qrs - Residual Soil Upper ~13" consists of dry, crumbly and fractured sandy and gravelly CLAY, orangish brown to dark brown; abundant rootlets. Grades to sandy CLAY, damp.		0
1									1
2									2
3							Tso - Bedrock - San Onofre Formation: Moderately to strongly cemented fine to medium SANDSTONE with thin SILTSTONE interbeds; light olive brown to yellowish brown.		3
4									4
5									5
6									6
7									7
8									8
9									9
10									10
11							Total Depth - 40"		11
12							Backfilled & compacted		12
13									13
14									14
15									15
16									16
17									17
18									18
19									19
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21									21
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36									36
37									37
38									38
39									39
40									40

Project No.: **LOG OF BORING** Figure No.:

Date(s) Logged: 1/22/2007

Logged By: ERH

LOCATION: 2354 San Clemente Dr.

Ground Elevation:

Method of Drilling: Manual

Drilling Company: Custom Landscape

Drop: N/A

Weight(s): N/A

BORING NO.: TP-2

Depth (feet)	Soil Classification	Blows/ft	Undisturbed Sample	Bulk Sample	Moisture Content (%)	In-place Dry Density (pcf)	Description	Geologic Attitudes	Depth (feet)
0							Uf - Undocumented Fill Dry, very weakly cemented gravelly CLAY derived from local residual soil.		0
1									1
2									2
3							Qrs - Residual Soil Dry to damp sandy and gravelly CLAY, abundant to scattered rootlets; orangish dark brown to dark brown.		3
4									4
5									5
6							Tso - Bedrock - San Onofre Formation: Moderately to strongly cemented fine to medium SANDSTONE, light olive brown to yellowish brown.		6
7									7
8									8
9									9
10									10
11							Total Depth = 90"		11
12							Backfilled and compacted		12
13									13
14									14
15									15
16									16
17									17
18									18
19									19
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40									40

Project No.: **LOG OF BORING** Figure No.:

APPENDIX C

PREVIOUS FIELD INVESTIGATION, SAMPLING AND LABORATORY TESTING

APPENDIX C

PREVIOUS FIELD INVESTIGATION, SAMPLING AND LABORATORY TESTING

I. Field Exploration Procedures

A. Field Exploration

Electrical spades and hand digging tools were utilized to expose subsurface soil of two test pits.

B. Sampling, Disaggregated Samples

Bulk samples of typical soil types were bagged and transported to the laboratory for classification and physical testing.

II. Laboratory Testing Procedures

A. Corrosivity Series

Soluble sulfates, pH and minimum resistivity were determined in accordance with California Test Method 417, ASTM D 4972-89, and California Test Method 643, respectively. The results are presented below:

Sample Designation	-	TP-1 @ 2-3’
pH	-	7.8
Soluble Sulfate per CA417	-	73 mg/kg
Minimum Resistivity per CA 643	-	3,600 ohm-cm (saturated)

B. Expansion Test

An expansion index test was performed in accordance with UBC Standard No. 29-2. The results are tabulated below:

Sample Designation	-	TP-1 @ 2-3 ft
Expansion Index	-	14
Expansion Classification	-	Low

C. Atterberg Limits Determination

Atterberg Limits were determined in accordance with ASTM D 4318. The results are tabulated below:

Sample Location	Liquid Limit	Plastic Limit	Plasticity Index	Soil Classification
TP-1@ 2-3 ft	25	22	3	ML-CL

D. <u>Maximum Density-Optimum Moisture</u>

A maximum density-optimum moisture determination was performed in accordance with ASTM test method D1557-02. The results of the test are tabulated below:

Sample Designation	-	TP-1 @ 2-3’
Maximum Density	-	125 pcf
Optimum Moisture Content	-	11%

APPENDIX D

STANDARD GRADING SPECIFICATIONS

APPENDIX D

STANDARD GRADING SPECIFICATIONS

GENERAL

These specifications present the usual and minimum requirements for grading operations observed by **Geofirm** or its designated representative. No deviation from these specifications will be allowed, except where specifically superseded in the geotechnical report signed by a registered geotechnical engineer.

The placement, spreading, mixing, watering, and compaction of the fills in strict accordance with these guidelines shall be the sole responsibility of the contractor. The construction, excavation, and placement of fill shall be under the direct observation of the soils engineer signing the soils report. If unsatisfactory soil-related conditions exist, the soils engineer shall have the authority to reject the compacted fill ground and, if necessary, excavation equipment will be shut down to permit completion of compaction. Conformance with these specifications will be discussed in the final report issued by the soils engineer.

SITE PREPARATION

All brush, vegetation and other deleterious material such as rubbish shall be collected, piled and removed from the site prior to placing fill, leaving the site clear and free from objectionable material.

Soil, alluvium, or rock materials determined by the soils engineer as being unsuitable for placement in compacted fills shall be removed from the site. Any material incorporated as part of a compacted fill must be approved by the soils engineer.

The surface shall then be plowed or scarified to a minimum depth of 6 inches until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment used. After the area to receive fill has been cleared and scarified, it shall be diced or bladed by the contractor until it is uniform and free from large clods, brought to the proper moisture content and compacted to minimum requirements. If the scarified zone is greater than 12 inches in depth, the excess shall be removed and placed in lifts restricted to 6 inches.

Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipe lines or others not located prior to grading are to be removed or treated in a manner prescribed by the soils engineer.

MATERIALS

Materials for compacted fill shall consist of materials approved by the soils engineer. These materials may be excavated from the cut area or imported from other approved sources, and soils from one or more sources may be blended. Fill soils shall be free from organic vegetable matter and other unsuitable substances. Normally, the material shall contain no rocks or hard lumps greater than 6 inches in size and shall contain at least 50 percent of material smaller than 1/4-

inch in size. Materials greater than 4 inches in size shall be placed so that they are completely surrounded by compacted fines; no nesting of rocks shall be permitted. No material of a perishable, spongy, or otherwise of an unsuitable nature shall be used in the fill soils.

Representative samples of materials to be utilized as compacted fill shall be analyzed in the laboratory by the soils engineer to determine their physical properties. If any material other than that previously tested is encountered during grading, the appropriate analysis of this material shall be conducted by the geotechnical engineer as soon as possible.

PLACING, SPREADING, AND COMPACTING FILL MATERIAL

The material used in the compacting process shall be evenly spread, watered, processed, and compacted in thin lifts not to exceed 6 inches in thickness to obtain a uniformly dense layer.

When the moisture content of the fill material is below that specified by the soils engineer, water shall be added by the contractor until the moisture content is near optimum as specified.

When the moisture content of the fill material is above that specified by the geotechnical engineer, the fill material shall be aerated by the contractor by blading, mixing, or other satisfactory methods until the moisture content is near optimum as specified.

After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted to 90 percent of the maximum laboratory density in compliance with ASTM D: 1557-91 (five layers). Compaction shall be accomplished by sheepsfoot rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers, or other types of acceptable compacting equipment. Equipment shall be of such design that it will be able to compact the fill to the specified density. Compaction shall be continuous over the entire area and the equipment shall make sufficient passes to obtain the desired density uniformly.

A minimum relative compaction of 90 percent out to the finished slope face of all fill slopes will be required. Compacting of the slopes shall be accomplished by backrolling the slopes in increments of 2 to 5 feet in elevation gain or by overbuilding and cutting back to the compacted inner core, or by any other procedure which produces the required compaction.

GRADING OBSERVATIONS

The soils engineer shall observe the placement of fill during the grading process and will file a written report upon completion of grading stating his observations as to compliance with these specifications.

One density test shall be required for each 2 vertical feet of fill placed, or one for each 1,000 cubic yards of fill, whichever requires the greater number of tests.

Any cleanouts and processed ground to receive fill must be observed by the soils engineer and/or engineering geologist prior to any fill placement. The contractor shall notify the geotechnical engineer when these areas are ready for observation.

PROTECTION OF WORK

During the grading process and prior to the complete construction of permanent drainage controls, it shall be the responsibility of the contractor to provide good drainage and prevent ponding of water and damage to adjoining properties or to finished work on the site.

After the geotechnical engineer has terminated his observations of the completed grading, no further excavations and/or filling shall be performed without the approval of the soils engineer, if it is to be subject to the recommendations of this report.

APPENDIX E

UTILITY TRENCH BACKFILL GUIDELINES

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UTILITY TRENCH BACKFILL GUIDELINES

The following guidelines pertinent to utility trench backfills have been adopted by the County of Orange, Environmental Management Agency Grading Section, effective March 31, 1986. The application of the guidelines is strictly enforced by the County reviewers and inspectors.

1. Each utility subcontractor (gas, electric, water, sewer, telephone, cable TV, irrigation, drainage, etc.) shall submit to the developer for dissemination to his consultants (civil engineer, geotechnical engineer, and utility contractor) a plot plan of all utility lines installed under his purview which identifies line type, material, size, depth, and approximate location.

2. The developer or his agent shall provide a composite plot plan of all utilities or a copy of all individual utility plot plans to his geotechnical engineer for use in evaluating whether all utility trench backfills are suitable for the intended use.

3. The geotechnical engineer shall provide the County with a report which includes a plot plan showing the location of all utility trenches which:

   A. Are located within the load influence zone of a structure (1:1 projection)

   B. Are located beneath any hardscape

   C. Are parallel and in close proximity to the top or toe of a slope and may adversely impact slope stability if improperly backfilled

   D. Are located on the face of a slope in a trench 18 or more inches in depth.

   Typically, trenches that are less than 18 inches in depth will not be within the load influence zone if located next to a structure, and will not have a significant effect on slope stability if constructed near the top or toe of a slope and need not be shown on the plot plan unless determined to be significant by the geotechnical engineer. This plot plan may be prepared by someone other than the soil engineer, but must meet his approval.

4. Backfill compaction test locations must be shown on the plot plan described in No. 3 above, and a table of test data provided in the geotechnical report.

5. The geotechnical report (utility trench backfill) must state that all utility trenches within the subject lots have been backfilled in a manner suitable for the intended use. This includes the backfill of all trenches shown on the plot plan described in No. 3 and the backfill of those trenches which did not need to be plotted on this plan.

APPENDIX F

MAINTENANCE OF HILLSIDE LOTS

APPENDIX F

MAINTENANCE OF HILLSIDE LOTS

Sites graded in hillsides require maintenance and repair of slopes and drainage. The City of Los Angeles, Department of Building and Safety has published a Homeowner's Guide (June 1974) containing "Recommendations for Maintenance of Graded Sites," which are pertinent to all graded sites. It is incumbent upon the hillside property owner to maintain his property in a manner which will assure the continued stability of the property. The following are recommendations regarding slope and yard maintenance in graded hillside areas:

1. Maintain existing slope planting, provide new approved planting where indicated, and maintain irrigation systems in working order.
2. Maintain paved diverter terraces, interceptor terraces, downdrains, appurtenances such as inlets, and velocity reducer structures in a clean condition and in good repair.
3. Earth berms prevent water from flowing over slope. It is important that these berms be maintained.
4. Standing storm water on the pad area directly above the descending slopes, whether natural, cut or fill, is a major contributor toward slope failure. It is important that the pad drainage be maintained at a minimum of 2 percent to the street or other approved location to prevent this situation.
5. Side swales which direct water around the house should be maintained so that they will not become ineffective.
6. Catch basins, grates, and subsurface drainage piping should be kept free of silt and debris.
7. Roof gutters and downspouts should be inspected periodically to assure that they are not broken or clogged. All non-erosive drainage devices should be kept clean and in good repair.
8. Extensive landscaping or revision to the property may seriously alter the surface drainage pattern. When landscaping, homeowners should avoid disrupting flow patterns created when the property was original graded. It should be remembered that normal property drainage in hillside areas is from the rear yard to the street. Some properties drain to natural water courses.
9. Any problems such as erosion should be repaired immediately in order that more serious problems may be averted.
10. Rodent activity should be controlled to prevent water penetration and loosening of the soil.
11. Care should be exercised to prevent loose fill from being placed on a grading site, especially on slopes."

Appendix D
Hydrology Study

HYDROLOGY STUDY

San Clemente Street & Lomita Way
Laguna Beach, California 92651

Prepared for:

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Tel: (949) 388-5194

Prepared by:

Toal Engineering, Inc.
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Tel: (949) 492-8586
Fax: (949) 498-8625

03/09/21

3.9.21

REGISTERED PROFESSIONAL ENGINEER
CALEB RIOS
No. 57587
CIVIL
★ STATE OF CALIFORNIA ★

Caleb Rios R.C.E. 59275

JN 18156

1.0 PURPOSE

This report has been prepared to accompany the Street Improvement Plan for the proposed construction of a cul-de-sac at the Northwesterly terminus of San Clemente Street and the Precise grading plan for the proposed private residence at 2354 San Clemente Street.

2.0 DESCRIPTION OF SITE

San Clemente Street is bounded to the East and West be existing residential developments, to the South by Alta Vista Way and to the North by a descending slope and natural drainage course.

Lomita Way is parallel and easterly of San Clemente street and is bounded to the East and West be existing residential developments, to the South by Alta Vista Way and to the North by a descending slope and natural drainage course.

Site soils are classified as Hydrologic Soil Group D per the Orange County Hydrology Manual Plate B.

See Figure 1 for a depiction of the project location and Figure 2 for an aerial photograph of the site, all in Appendix A.

3.0 EXISTING DRAINAGE

Runoff from San Clemente street flows generally as surface flow in a northwesterly direction toward the existing terminus of the street. Site runoff currently sheet flows down the slope from the street terminus to the natural drainage course.

Runoff from Lomita Way flows generally as surface flow in a northwesterly direction toward the existing terminus of the street where it enters an existing 12” diameter pipe that currently outlets at the slope within the property at 2354 San Clemente Street.

The natural drainage course discharges to Glenneyre Street below where it enters the City Storm Drain System.

4.0 PROPOSED DEVELOPMENT

As requested by the city, the developer proposes to construct a cul-de-sac at the northwesterly terminus of San Clemente Street. The construction will include appurtenant curb/gutter, curb-opening manhole structure and a storm drainline that outlets to the natural drainage course below. The proposed improvements are shown on the Street Improvement Plans for San Clemente Street referenced above.

The developer proposes to demolish and reconstruct a single family residence project at 2354 San Clemente Street. The proposed improvements are shown on the Precise grading plans for 2354 San Clemente Street.

5.0 PROPOSED DRAINAGE

Stormwater runoff from San Clemente Street will be collected in a storm drain system and discharged directly to the natural drainage course below. This proposed runoff/discharge will avoid sheet flowing over the slope, allow for energy dissipation at the outlet and reduce the potential for erosion and slope issues associated with street runoff.

The existing 12" storm drainline from Lomita Way currently discharges within the proposed development of 2354 San Clemente Street. This 12" line is being redirected to a similar point near the bottom of the slope and will have energy dissipation at the outlet to reduce the potential for erosion and slope issues associated with street runoff. The runoff was discharged at the limit of the "non-buildable" lots.

Stormwater runoff from the proposed project at 2354 San Clemente Street will be collected in a storm drain system and discharged to the natural drainage course below. This proposed runoff/discharge will sheet flow over the slope with energy dissipation at the outlet to reduce the potential for erosion and slope issues associated with the project runoff. The project runoff was discharged at the limit of the "non-buildable" lots.

6.0 METHODOLOGY

For project conditions, we divided the site into drainage subareas (Each street is a subarea and the single family residence is also a subarea) and performed a rational method hydrologic analysis and small unity hydrology model (Using AES software) based on Orange County Hydrology Manual (OCHM) Section D to estimate the peak runoff quantities and runoff volumes discharged from the areas.

Peak runoff quantities and total catchment runoff volumes were compared to the full flow capacity of the pipes discharging from each subarea to ensure adequate drainage system capacity and to calculate the storm drain storage requirements for the proposed project. Full flow capacity of proposed drain lines was estimated using the AES hydraulic element software.

The energy dissipators at the outlet to the natural drainage course were sized per CASQA EC-10 shown on the post-construction drainage map H2 in Appendix C.

All calculations are shown in Appendix B. The Drainage Maps in Appendix C graphically depicts the project watershed and data relevant to the runoff calculations. A map showing the existing and proposed impervious areas has been added in Appendix C as Map H3.

7.0 RESULTS AND ANALYSIS

Our hydrologic and hydraulic analysis of the site yielded the following results:

Table 1. 100-Yr Peak Runoff.

Street	*Pre-project runoff volume* (Acre-ft)	*Post-project runoff volume* (Acre-ft)	*Δ V* Acre-ft	*Pre-project* Q_{100} (cfs)	*Post-project* Q_{100} (cfs)	*Δ Q (cfs)*	Flow Depth at Curb Inlet (ft)	Min Curb Inlet Width Req'd (ft)
Area A (Lomita Way)	0.35	0.36	0.01	5.52	5.83	0.31	n/a	n/a
Area B (San Clemente St)	0.16	0.16	0	2.71	2.71	0	0.21	9.12

Table 2. Proposed Pipe Capacity Verification.

Pipe	Size (in)	Q_{100} (cfs)	Flow Depth (inches)	Energy Dissipator min Length (ft)
1	12	2.71	0.2	10'
2	12	3.43	0.25	n/a
3	18	5.55	0.48	10'

Table 1 shows that the proposed 10' wide curb opening manhole structure has been sized to accommodate the 100 year storm event tributary to San Clemente Street. The difference in peak runoff of 0.31 cfs equates to a volume increase of 0.01 acre-ft (435.6 cu-ft). This volume is contained by the provided storage system (42" dia x 48' long stormwater detention pipe with capacity of 462 cu-ft).

Table 2 shows for all pipes the proposed pipe slope is sized to accommodate the 100 year storm event. The energy dissipators have been sized to meet the energy dissipation requirements related for the peak flow.

Policy 9I from the City of Laguna Beach zoning standards states that new development shall control the increase in volume, velocity, and sediment load of runoff from the greatest development areas at or near the source of increase to the greatest extent feasible. To comply with this policy, Toal Engineering, Inc. has proposed energy dissipaters and a stormwater storage system to address the calculated increase in flowrate of 0.31 cfs which equates to a volume of 435.6 cu-ft.

Policy 9J from the City of Laguna Beach zoning standards states that new development shall maintain runoff characteristics as near as possible to natural discharge characteristics by maintaining the natural conditions of the watershed. To comply, the proposed site design is consistent with the existing site conditions, the drainage pattern is largely unchanged, and the project will implement the Policy 9I compliance items listed above.

8.0 CONCLUSIONS

The proposed storm drain system has sufficient capacity to convey estimated peak discharges to the community storm drain system and to meet the energy dissipation requirements. Additionally, the provided stormwater detention pipe has sufficient capacity to address the increase in runoff volume due to the private development at 2354 San Clemente Street.

APPENDIX A

Vicinity Map, Aerial Image, Soil Map

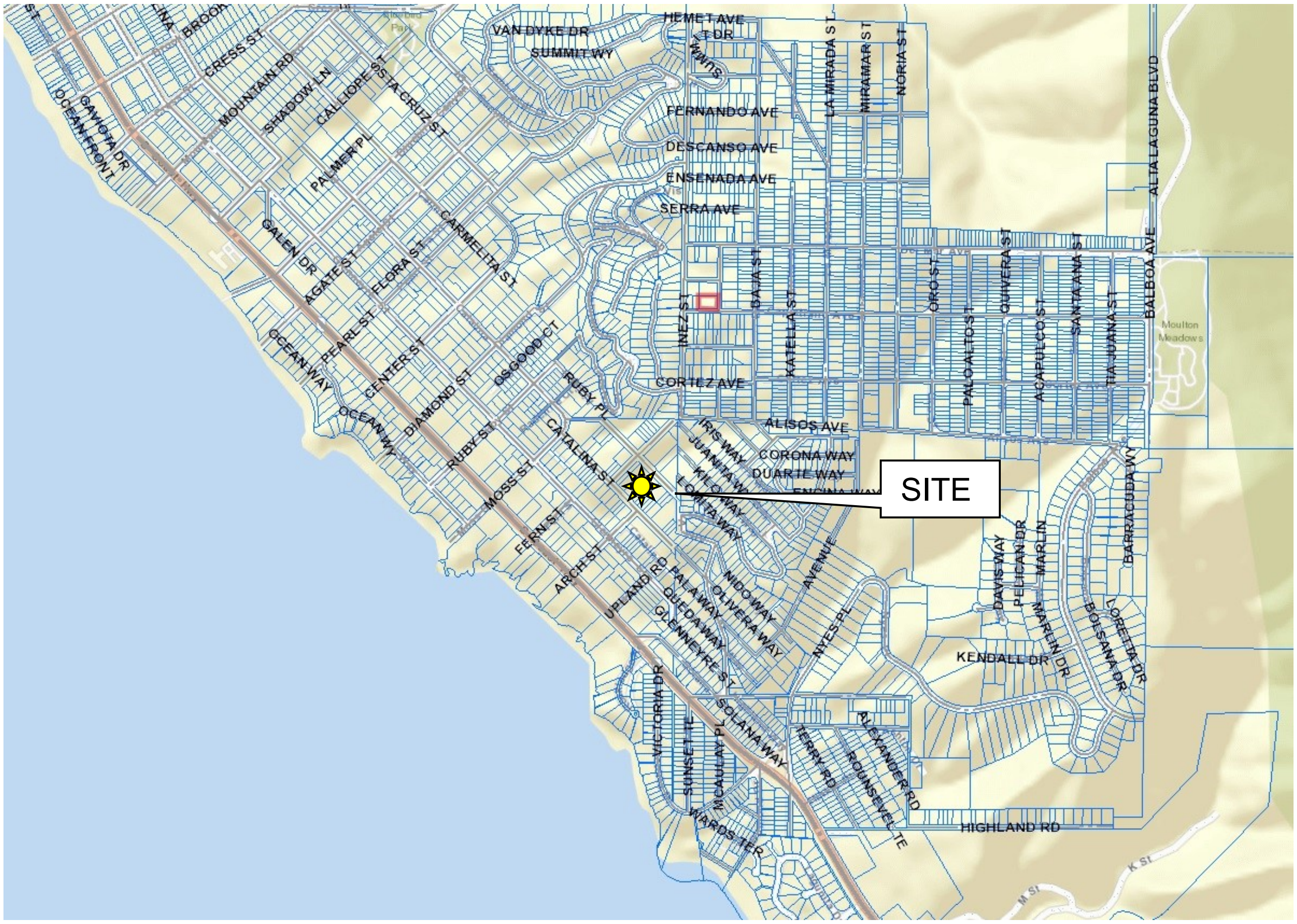

Figure 1. Vicinity Map
maps.google.com

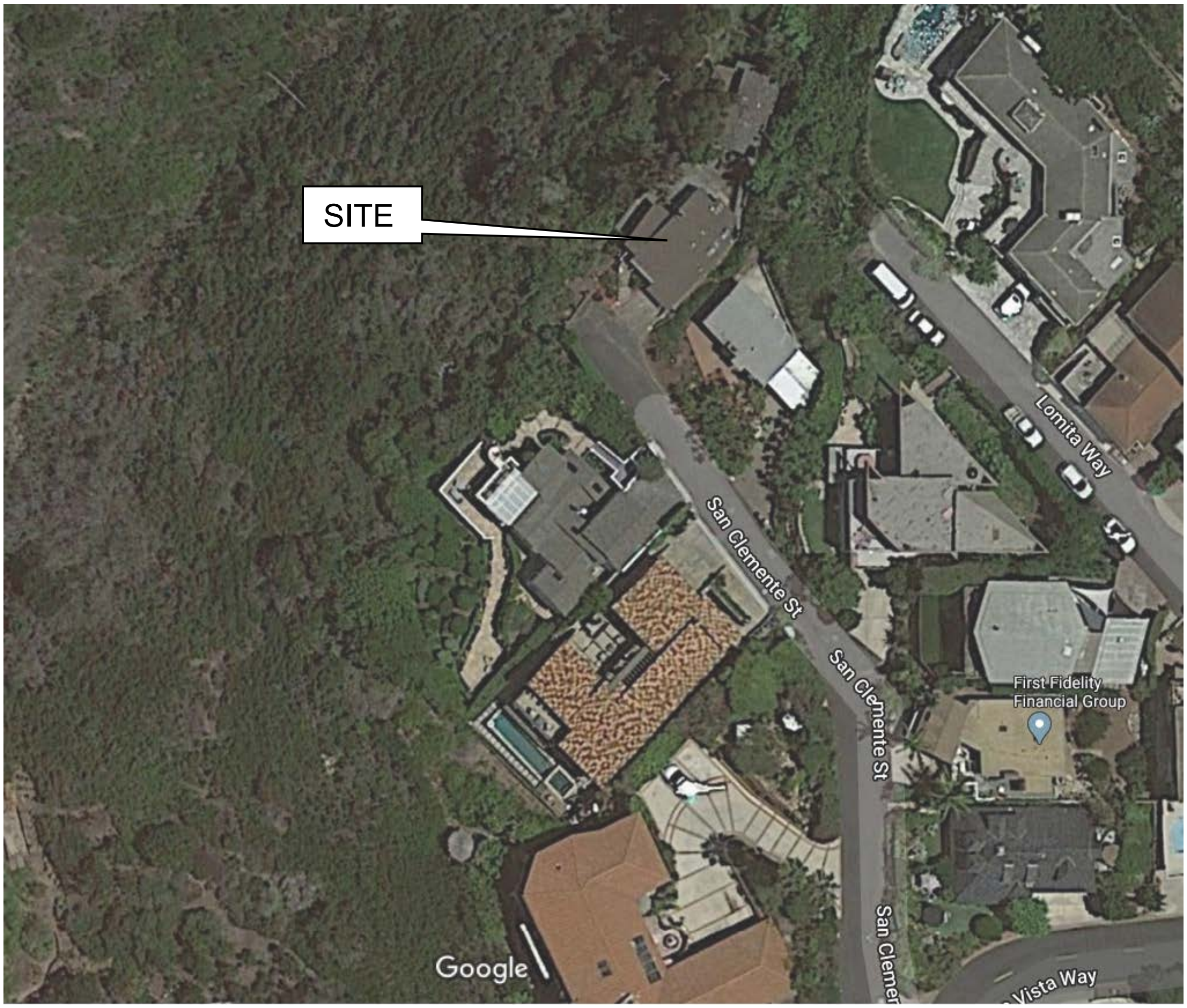

Figure 2. Aerial Image
maps.google.com

APPENDIX B

Calculations

```
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2012 Advanced Engineering Software (aes)
              Ver. 18.2  Release Date: 05/08/2012  License ID 1448

                           Analysis prepared by:

                            Toal Engineering, Inc.
                             139 Avenida Navarro
                              San Clemente, CA
                                949-492-8586
```

Pre-Project Area A

```
----------------------------------------------------------------------------
  FILE NAME: 18156E1.DAT
  TIME/DATE OF STUDY: 15:45 03/03/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    406.50  DOWNSTREAM(FEET) =    342.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.485
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.868
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.66      0.20     0.500    75    5.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.43
  TOTAL AREA(ACRES) =      0.66   PEAK FLOW RATE(CFS) =      3.43

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   342.00  DOWNSTREAM(FEET) =   300.90
  FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.38
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.43
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    5.61
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     427.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.7  TC(MIN.) =      5.61
  EFFECTIVE AREA(ACRES) =      0.66  AREA-AVERAGED Fm(INCH/HR)=  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.500
  PEAK FLOW RATE(CFS)   =      3.43
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
                     SMALL AREA UNIT HYDROGRAPH MODEL
============================================================================
           (C) Copyright 1989-2012 Advanced Engineering Software (aes)
               Ver. 19.0  Release Date: 06/01/2012  License ID 1448

                          Analysis prepared by:
                           Toal Engineering, Inc.
                            139 Avenida Navarro
                               949-492-8586



****************************************************************************
----------------------------------------------------------------------------
```

Problem Descriptions: Pre-Project Area A

```
----------------------------------------------------------------------------

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    1.07
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.100
    LOW LOSS FRACTION = 0.306
    TIME OF CONCENTRATION(MIN.) =  5.61
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

----------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.35
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.16

****************************************************************************
  TIME      VOLUME        Q     0.         2.5        5.0        7.5       10.0
 (HOURS)     (AF)       (CFS)
----------------------------------------------------------------------------
  0.01      0.0000      0.00  Q          .          .          .          .
  0.10      0.0002      0.06  Q          .          .          .          .
  0.20      0.0007      0.06  Q          .          .          .          .
  0.29      0.0011      0.06  Q          .          .          .          .
  0.39      0.0016      0.06  Q          .          .          .          .
```

0.48	0.0020	0.06	Q	.	.	.	.
0.57	0.0025	0.06	Q	.	.	.	.
0.67	0.0030	0.06	Q	.	.	.	.
0.76	0.0034	0.06	Q	.	.	.	.
0.85	0.0039	0.06	Q	.	.	.	.
0.95	0.0044	0.06	Q	.	.	.	.
1.04	0.0048	0.06	Q	.	.	.	.
1.13	0.0053	0.06	Q	.	.	.	.
1.23	0.0058	0.06	Q	.	.	.	.
1.32	0.0062	0.06	Q	.	.	.	.
1.41	0.0067	0.06	Q	.	.	.	.
1.51	0.0072	0.06	Q	.	.	.	.
1.60	0.0077	0.06	Q	.	.	.	.
1.69	0.0082	0.06	Q	.	.	.	.
1.79	0.0086	0.06	Q	.	.	.	.
1.88	0.0091	0.06	Q	.	.	.	.
1.97	0.0096	0.06	Q	.	.	.	.
2.07	0.0101	0.06	Q	.	.	.	.
2.16	0.0106	0.06	Q	.	.	.	.
2.26	0.0111	0.06	Q	.	.	.	.
2.35	0.0116	0.06	Q	.	.	.	.
2.44	0.0121	0.06	Q	.	.	.	.
2.54	0.0126	0.06	Q	.	.	.	.
2.63	0.0131	0.07	Q	.	.	.	.
2.72	0.0136	0.07	Q	.	.	.	.
2.82	0.0141	0.07	Q	.	.	.	.
2.91	0.0146	0.07	Q	.	.	.	.
3.00	0.0151	0.07	Q	.	.	.	.
3.10	0.0156	0.07	Q	.	.	.	.
3.19	0.0161	0.07	Q	.	.	.	.
3.28	0.0167	0.07	Q	.	.	.	.
3.38	0.0172	0.07	Q	.	.	.	.
3.47	0.0177	0.07	Q	.	.	.	.
3.56	0.0182	0.07	Q	.	.	.	.
3.66	0.0188	0.07	Q	.	.	.	.
3.75	0.0193	0.07	Q	.	.	.	.
3.84	0.0198	0.07	Q	.	.	.	.
3.94	0.0204	0.07	Q	.	.	.	.
4.03	0.0209	0.07	Q	.	.	.	.
4.13	0.0214	0.07	Q	.	.	.	.
4.22	0.0220	0.07	Q	.	.	.	.
4.31	0.0225	0.07	Q	.	.	.	.
4.41	0.0231	0.07	Q	.	.	.	.
4.50	0.0236	0.07	Q	.	.	.	.
4.59	0.0242	0.07	Q	.	.	.	.
4.69	0.0247	0.07	Q	.	.	.	.
4.78	0.0253	0.07	Q	.	.	.	.
4.87	0.0258	0.07	Q	.	.	.	.
4.97	0.0264	0.07	Q	.	.	.	.
5.06	0.0270	0.07	Q	.	.	.	.
5.15	0.0276	0.07	Q	.	.	.	.
5.25	0.0281	0.07	Q	.	.	.	.
5.34	0.0287	0.07	Q	.	.	.	.
5.43	0.0293	0.08	Q	.	.	.	.

5.53	0.0299	0.08	Q	.	.	.	.
5.62	0.0305	0.08	Q	.	.	.	.
5.71	0.0311	0.08	Q	.	.	.	.
5.81	0.0316	0.08	Q	.	.	.	.
5.90	0.0322	0.08	Q	.	.	.	.
6.00	0.0328	0.08	Q	.	.	.	.
6.09	0.0334	0.08	Q	.	.	.	.
6.18	0.0341	0.08	Q	.	.	.	.
6.28	0.0347	0.08	Q	.	.	.	.
6.37	0.0353	0.08	Q	.	.	.	.
6.46	0.0359	0.08	Q	.	.	.	.
6.56	0.0365	0.08	Q	.	.	.	.
6.65	0.0372	0.08	Q	.	.	.	.
6.74	0.0378	0.08	Q	.	.	.	.
6.84	0.0384	0.08	Q	.	.	.	.
6.93	0.0391	0.08	Q	.	.	.	.
7.02	0.0397	0.08	Q	.	.	.	.
7.12	0.0403	0.08	Q	.	.	.	.
7.21	0.0410	0.08	Q	.	.	.	.
7.30	0.0417	0.09	Q	.	.	.	.
7.40	0.0423	0.09	Q	.	.	.	.
7.49	0.0430	0.09	Q	.	.	.	.
7.58	0.0436	0.09	Q	.	.	.	.
7.68	0.0443	0.09	Q	.	.	.	.
7.77	0.0450	0.09	Q	.	.	.	.
7.87	0.0457	0.09	Q	.	.	.	.
7.96	0.0464	0.09	Q	.	.	.	.
8.05	0.0471	0.09	Q	.	.	.	.
8.15	0.0478	0.09	Q	.	.	.	.
8.24	0.0485	0.09	Q	.	.	.	.
8.33	0.0492	0.09	Q	.	.	.	.
8.43	0.0499	0.09	Q	.	.	.	.
8.52	0.0506	0.09	Q	.	.	.	.
8.61	0.0513	0.09	Q	.	.	.	.
8.71	0.0521	0.09	Q	.	.	.	.
8.80	0.0528	0.10	Q	.	.	.	.
8.89	0.0535	0.10	Q	.	.	.	.
8.99	0.0543	0.10	Q	.	.	.	.
9.08	0.0550	0.10	Q	.	.	.	.
9.17	0.0558	0.10	Q	.	.	.	.
9.27	0.0566	0.10	Q	.	.	.	.
9.36	0.0573	0.10	Q	.	.	.	.
9.45	0.0581	0.10	Q	.	.	.	.
9.55	0.0589	0.10	Q	.	.	.	.
9.64	0.0597	0.10	Q	.	.	.	.
9.74	0.0605	0.10	Q	.	.	.	.
9.83	0.0613	0.11	Q	.	.	.	.
9.92	0.0621	0.11	Q	.	.	.	.
10.02	0.0630	0.11	Q	.	.	.	.
10.11	0.0638	0.11	Q	.	.	.	.
10.20	0.0646	0.11	Q	.	.	.	.
10.30	0.0655	0.11	Q	.	.	.	.
10.39	0.0664	0.11	Q	.	.	.	.
10.48	0.0672	0.11	Q	.	.	.	.

10.58	0.0681	0.11	Q	.	.	.	.
10.67	0.0690	0.12	Q	.	.	.	.
10.76	0.0699	0.12	Q	.	.	.	.
10.86	0.0708	0.12	Q	.	.	.	.
10.95	0.0717	0.12	Q	.	.	.	.
11.04	0.0726	0.12	Q	.	.	.	.
11.14	0.0736	0.12	Q	.	.	.	.
11.23	0.0745	0.12	Q	.	.	.	.
11.32	0.0755	0.12	Q	.	.	.	.
11.42	0.0764	0.13	Q	.	.	.	.
11.51	0.0774	0.13	Q	.	.	.	.
11.61	0.0784	0.13	Q	.	.	.	.
11.70	0.0794	0.13	Q	.	.	.	.
11.79	0.0805	0.13	Q	.	.	.	.
11.89	0.0815	0.13	Q	.	.	.	.
11.98	0.0826	0.14	Q	.	.	.	.
12.07	0.0836	0.15	Q	.	.	.	.
12.17	0.0849	0.18	Q	.	.	.	.
12.26	0.0863	0.18	Q	.	.	.	.
12.35	0.0877	0.18	Q	.	.	.	.
12.45	0.0891	0.18	Q	.	.	.	.
12.54	0.0905	0.19	Q	.	.	.	.
12.63	0.0920	0.19	Q	.	.	.	.
12.73	0.0934	0.19	Q	.	.	.	.
12.82	0.0949	0.19	Q	.	.	.	.
12.91	0.0965	0.20	Q	.	.	.	.
13.01	0.0980	0.20	Q	.	.	.	.
13.10	0.0996	0.21	Q	.	.	.	.
13.20	0.1012	0.21	Q	.	.	.	.
13.29	0.1028	0.21	Q	.	.	.	.
13.38	0.1044	0.22	Q	.	.	.	.
13.48	0.1061	0.22	Q	.	.	.	.
13.57	0.1079	0.23	Q	.	.	.	.
13.66	0.1096	0.23	Q	.	.	.	.
13.76	0.1115	0.24	Q	.	.	.	.
13.85	0.1134	0.25	Q	.	.	.	.
13.94	0.1153	0.25	.Q	.	.	.	.
14.04	0.1173	0.27	.Q	.	.	.	.
14.13	0.1194	0.27	.Q	.	.	.	.
14.22	0.1216	0.29	.Q	.	.	.	.
14.32	0.1238	0.29	.Q	.	.	.	.
14.41	0.1262	0.31	.Q	.	.	.	.
14.50	0.1286	0.32	.Q	.	.	.	.
14.60	0.1311	0.34	.Q	.	.	.	.
14.69	0.1337	0.35	.Q	.	.	.	.
14.78	0.1365	0.37	.Q	.	.	.	.
14.88	0.1394	0.38	.Q	.	.	.	.
14.97	0.1425	0.41	.Q	.	.	.	.
15.07	0.1457	0.43	.Q	.	.	.	.
15.16	0.1491	0.46	.Q	.	.	.	.
15.25	0.1528	0.48	.Q	.	.	.	.
15.35	0.1567	0.54	. Q	.	.	.	.
15.44	0.1607	0.51	. Q	.	.	.	.
15.53	0.1649	0.56	. Q	.	.	.	.

15.63	0.1694	0.61	. Q . . . .
15.72	0.1747	0.76	. Q . . . .
15.81	0.1810	0.87	. Q . . . .
15.91	0.1892	1.27	. Q . . . .
16.00	0.2009	1.77	. Q . . . .
16.09	**0.2291**	**5.52**	**. . . Q . .**
16.19	0.2543	1.02	. Q . . . .
16.28	0.2609	0.68	. Q . . . .
16.37	0.2655	0.52	. Q . . . .
16.47	0.2695	0.51	. Q . . . .
16.56	0.2732	0.44	.Q . . . .
16.65	0.2764	0.39	.Q . . . .
16.75	0.2793	0.36	.Q . . . .
16.84	0.2819	0.33	.Q . . . .
16.93	0.2844	0.30	.Q . . . .
17.03	0.2866	0.28	.Q . . . .
17.12	0.2887	0.26	.Q . . . .
17.22	0.2906	0.24	Q . . . .
17.31	0.2925	0.23	Q . . . .
17.40	0.2942	0.22	Q . . . .
17.50	0.2959	0.21	Q . . . .
17.59	0.2975	0.20	Q . . . .
17.68	0.2990	0.20	Q . . . .
17.78	0.3005	0.19	Q . . . .
17.87	0.3020	0.19	Q . . . .
17.96	0.3034	0.18	Q . . . .
18.06	0.3047	0.18	Q . . . .
18.15	0.3060	0.14	Q . . . .
18.24	0.3070	0.13	Q . . . .
18.34	0.3080	0.13	Q . . . .
18.43	0.3090	0.13	Q . . . .
18.52	0.3099	0.12	Q . . . .
18.62	0.3109	0.12	Q . . . .
18.71	0.3118	0.12	Q . . . .
18.81	0.3127	0.11	Q . . . .
18.90	0.3136	0.11	Q . . . .
18.99	0.3144	0.11	Q . . . .
19.09	0.3153	0.11	Q . . . .
19.18	0.3161	0.11	Q . . . .
19.27	0.3169	0.10	Q . . . .
19.37	0.3177	0.10	Q . . . .
19.46	0.3185	0.10	Q . . . .
19.55	0.3193	0.10	Q . . . .
19.65	0.3200	0.10	Q . . . .
19.74	0.3208	0.10	Q . . . .
19.83	0.3215	0.09	Q . . . .
19.93	0.3222	0.09	Q . . . .
20.02	0.3229	0.09	Q . . . .
20.11	0.3236	0.09	Q . . . .
20.21	0.3243	0.09	Q . . . .
20.30	0.3250	0.09	Q . . . .
20.39	0.3256	0.09	Q . . . .
20.49	0.3263	0.08	Q . . . .
20.58	0.3270	0.08	Q . . . .

```
  20.67       0.3276      0.08  Q          .          .          .          .
  20.77       0.3282      0.08  Q          .          .          .          .
  20.86       0.3289      0.08  Q          .          .          .          .
  20.96       0.3295      0.08  Q          .          .          .          .
  21.05       0.3301      0.08  Q          .          .          .          .
  21.14       0.3307      0.08  Q          .          .          .          .
  21.24       0.3313      0.08  Q          .          .          .          .
  21.33       0.3319      0.08  Q          .          .          .          .
  21.42       0.3325      0.08  Q          .          .          .          .
  21.52       0.3330      0.07  Q          .          .          .          .
  21.61       0.3336      0.07  Q          .          .          .          .
  21.70       0.3342      0.07  Q          .          .          .          .
  21.80       0.3347      0.07  Q          .          .          .          .
  21.89       0.3353      0.07  Q          .          .          .          .
  21.98       0.3358      0.07  Q          .          .          .          .
  22.08       0.3364      0.07  Q          .          .          .          .
  22.17       0.3369      0.07  Q          .          .          .          .
  22.26       0.3375      0.07  Q          .          .          .          .
  22.36       0.3380      0.07  Q          .          .          .          .
  22.45       0.3385      0.07  Q          .          .          .          .
  22.55       0.3390      0.07  Q          .          .          .          .
  22.64       0.3395      0.07  Q          .          .          .          .
  22.73       0.3401      0.07  Q          .          .          .          .
  22.83       0.3406      0.06  Q          .          .          .          .
  22.92       0.3411      0.06  Q          .          .          .          .
  23.01       0.3415      0.06  Q          .          .          .          .
  23.11       0.3420      0.06  Q          .          .          .          .
  23.20       0.3425      0.06  Q          .          .          .          .
  23.29       0.3430      0.06  Q          .          .          .          .
  23.39       0.3435      0.06  Q          .          .          .          .
  23.48       0.3440      0.06  Q          .          .          .          .
  23.57       0.3444      0.06  Q          .          .          .          .
  23.67       0.3449      0.06  Q          .          .          .          .
  23.76       0.3454      0.06  Q          .          .          .          .
  23.85       0.3458      0.06  Q          .          .          .          .
  23.95       0.3463      0.06  Q          .          .          .          .
  24.04       0.3467      0.06  Q          .          .          .          .
  24.13       0.3470      0.00  Q          .          .          .          .
 -----------------------------------------------------------------------------
-------------------------------------------------------------------------------
-
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
              0%                             1441.8
             10%                               50.5
             20%                               16.8
             30%                               11.2
             40%                                5.6
             50%                                5.6
```

60%	5.6
70%	5.6
80%	5.6
90%	5.6

```
****************************************************************************
                      SMALL AREA UNIT HYDROGRAPH MODEL
============================================================================
         (C) Copyright 1989-2012 Advanced Engineering Software (aes)
             Ver. 19.0  Release Date: 06/01/2012  License ID 1448

                              Analysis prepared by:
                               Toal Engineering, Inc.
                                139 Avenida Navarro
                                   949-492-8586
```

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****************************************************************************
----------------------------------------------------------------------------
```

Problem Descriptions: Post-Project Area A

```
----------------------------------------------------------------------------

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    1.07
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.090
    LOW LOSS FRACTION = 0.278
    TIME OF CONCENTRATION(MIN.) =  5.57
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

----------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =      0.36
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =      0.15

****************************************************************************
  TIME      VOLUME        Q     0.        2.5        5.0        7.5       10.0
 (HOURS)     (AF)       (CFS)
----------------------------------------------------------------------------
  0.03      0.0000      0.00  Q         .          .          .          .
  0.13      0.0002      0.06  Q         .          .          .          .
  0.22      0.0007      0.06  Q         .          .          .          .
```

0.31	0.0012	0.06	Q	.	.	.	.
0.40	0.0016	0.06	Q	.	.	.	.
0.50	0.0021	0.06	Q	.	.	.	.
0.59	0.0026	0.06	Q	.	.	.	.
0.68	0.0031	0.06	Q	.	.	.	.
0.78	0.0035	0.06	Q	.	.	.	.
0.87	0.0040	0.06	Q	.	.	.	.
0.96	0.0045	0.06	Q	.	.	.	.
1.05	0.0050	0.06	Q	.	.	.	.
1.15	0.0055	0.06	Q	.	.	.	.
1.24	0.0060	0.06	Q	.	.	.	.
1.33	0.0065	0.06	Q	.	.	.	.
1.43	0.0069	0.06	Q	.	.	.	.
1.52	0.0074	0.06	Q	.	.	.	.
1.61	0.0079	0.06	Q	.	.	.	.
1.70	0.0084	0.06	Q	.	.	.	.
1.80	0.0089	0.07	Q	.	.	.	.
1.89	0.0094	0.07	Q	.	.	.	.
1.98	0.0099	0.07	Q	.	.	.	.
2.07	0.0104	0.07	Q	.	.	.	.
2.17	0.0109	0.07	Q	.	.	.	.
2.26	0.0115	0.07	Q	.	.	.	.
2.35	0.0120	0.07	Q	.	.	.	.
2.45	0.0125	0.07	Q	.	.	.	.
2.54	0.0130	0.07	Q	.	.	.	.
2.63	0.0135	0.07	Q	.	.	.	.
2.72	0.0140	0.07	Q	.	.	.	.
2.82	0.0146	0.07	Q	.	.	.	.
2.91	0.0151	0.07	Q	.	.	.	.
3.00	0.0156	0.07	Q	.	.	.	.
3.10	0.0161	0.07	Q	.	.	.	.
3.19	0.0167	0.07	Q	.	.	.	.
3.28	0.0172	0.07	Q	.	.	.	.
3.37	0.0177	0.07	Q	.	.	.	.
3.47	0.0183	0.07	Q	.	.	.	.
3.56	0.0188	0.07	Q	.	.	.	.
3.65	0.0194	0.07	Q	.	.	.	.
3.75	0.0199	0.07	Q	.	.	.	.
3.84	0.0205	0.07	Q	.	.	.	.
3.93	0.0210	0.07	Q	.	.	.	.
4.02	0.0216	0.07	Q	.	.	.	.
4.12	0.0221	0.07	Q	.	.	.	.
4.21	0.0227	0.07	Q	.	.	.	.
4.30	0.0233	0.07	Q	.	.	.	.
4.40	0.0238	0.07	Q	.	.	.	.
4.49	0.0244	0.07	Q	.	.	.	.
4.58	0.0250	0.07	Q	.	.	.	.
4.67	0.0255	0.08	Q	.	.	.	.
4.77	0.0261	0.08	Q	.	.	.	.
4.86	0.0267	0.08	Q	.	.	.	.
4.95	0.0273	0.08	Q	.	.	.	.
5.05	0.0279	0.08	Q	.	.	.	.
5.14	0.0285	0.08	Q	.	.	.	.
5.23	0.0291	0.08	Q	.	.	.	.

5.32	0.0297	0.08	Q	.	.	.	.
5.42	0.0303	0.08	Q	.	.	.	.
5.51	0.0309	0.08	Q	.	.	.	.
5.60	0.0315	0.08	Q	.	.	.	.
5.70	0.0321	0.08	Q	.	.	.	.
5.79	0.0327	0.08	Q	.	.	.	.
5.88	0.0333	0.08	Q	.	.	.	.
5.97	0.0339	0.08	Q	.	.	.	.
6.07	0.0345	0.08	Q	.	.	.	.
6.16	0.0352	0.08	Q	.	.	.	.
6.25	0.0358	0.08	Q	.	.	.	.
6.35	0.0364	0.08	Q	.	.	.	.
6.44	0.0371	0.08	Q	.	.	.	.
6.53	0.0377	0.08	Q	.	.	.	.
6.62	0.0384	0.08	Q	.	.	.	.
6.72	0.0390	0.08	Q	.	.	.	.
6.81	0.0397	0.09	Q	.	.	.	.
6.90	0.0403	0.09	Q	.	.	.	.
7.00	0.0410	0.09	Q	.	.	.	.
7.09	0.0417	0.09	Q	.	.	.	.
7.18	0.0423	0.09	Q	.	.	.	.
7.27	0.0430	0.09	Q	.	.	.	.
7.37	0.0437	0.09	Q	.	.	.	.
7.46	0.0444	0.09	Q	.	.	.	.
7.55	0.0451	0.09	Q	.	.	.	.
7.64	0.0458	0.09	Q	.	.	.	.
7.74	0.0465	0.09	Q	.	.	.	.
7.83	0.0472	0.09	Q	.	.	.	.
7.92	0.0479	0.09	Q	.	.	.	.
8.02	0.0486	0.09	Q	.	.	.	.
8.11	0.0493	0.09	Q	.	.	.	.
8.20	0.0500	0.09	Q	.	.	.	.
8.29	0.0508	0.10	Q	.	.	.	.
8.39	0.0515	0.10	Q	.	.	.	.
8.48	0.0522	0.10	Q	.	.	.	.
8.57	0.0530	0.10	Q	.	.	.	.
8.67	0.0537	0.10	Q	.	.	.	.
8.76	0.0545	0.10	Q	.	.	.	.
8.85	0.0552	0.10	Q	.	.	.	.
8.94	0.0560	0.10	Q	.	.	.	.
9.04	0.0568	0.10	Q	.	.	.	.
9.13	0.0576	0.10	Q	.	.	.	.
9.22	0.0584	0.10	Q	.	.	.	.
9.32	0.0592	0.10	Q	.	.	.	.
9.41	0.0600	0.11	Q	.	.	.	.
9.50	0.0608	0.11	Q	.	.	.	.
9.59	0.0616	0.11	Q	.	.	.	.
9.69	0.0624	0.11	Q	.	.	.	.
9.78	0.0633	0.11	Q	.	.	.	.
9.87	0.0641	0.11	Q	.	.	.	.
9.97	0.0649	0.11	Q	.	.	.	.
10.06	0.0658	0.11	Q	.	.	.	.
10.15	0.0667	0.11	Q	.	.	.	.
10.24	0.0675	0.11	Q	.	.	.	.

10.34	0.0684	0.12	Q	.	.	.	.
10.43	0.0693	0.12	Q	.	.	.	.
10.52	0.0702	0.12	Q	.	.	.	.
10.62	0.0711	0.12	Q	.	.	.	.
10.71	0.0720	0.12	Q	.	.	.	.
10.80	0.0730	0.12	Q	.	.	.	.
10.89	0.0739	0.12	Q	.	.	.	.
10.99	0.0749	0.12	Q	.	.	.	.
11.08	0.0758	0.13	Q	.	.	.	.
11.17	0.0768	0.13	Q	.	.	.	.
11.27	0.0778	0.13	Q	.	.	.	.
11.36	0.0788	0.13	Q	.	.	.	.
11.45	0.0798	0.13	Q	.	.	.	.
11.54	0.0808	0.13	Q	.	.	.	.
11.64	0.0818	0.14	Q	.	.	.	.
11.73	0.0829	0.14	Q	.	.	.	.
11.82	0.0840	0.14	Q	.	.	.	.
11.92	0.0850	0.14	Q	.	.	.	.
12.01	0.0861	0.14	Q	.	.	.	.
12.10	0.0873	0.17	Q	.	.	.	.
12.19	0.0887	0.19	Q	.	.	.	.
12.29	0.0901	0.19	Q	.	.	.	.
12.38	0.0916	0.19	Q	.	.	.	.
12.47	0.0930	0.19	Q	.	.	.	.
12.57	0.0945	0.20	Q	.	.	.	.
12.66	0.0960	0.20	Q	.	.	.	.
12.75	0.0975	0.20	Q	.	.	.	.
12.84	0.0991	0.20	Q	.	.	.	.
12.94	0.1007	0.21	Q	.	.	.	.
13.03	0.1023	0.21	Q	.	.	.	.
13.12	0.1039	0.21	Q	.	.	.	.
13.22	0.1056	0.22	Q	.	.	.	.
13.31	0.1072	0.22	Q	.	.	.	.
13.40	0.1090	0.22	Q	.	.	.	.
13.49	0.1107	0.23	Q	.	.	.	.
13.59	0.1125	0.24	Q	.	.	.	.
13.68	0.1144	0.25	Q	.	.	.	.
13.77	0.1163	0.25	.Q	.	.	.	.
13.86	0.1182	0.26	.Q	.	.	.	.
13.96	0.1202	0.27	.Q	.	.	.	.
14.05	0.1223	0.28	.Q	.	.	.	.
14.14	0.1245	0.28	.Q	.	.	.	.
14.24	0.1267	0.30	.Q	.	.	.	.
14.33	0.1290	0.31	.Q	.	.	.	.
14.42	0.1314	0.32	.Q	.	.	.	.
14.51	0.1339	0.33	.Q	.	.	.	.
14.61	0.1365	0.35	.Q	.	.	.	.
14.70	0.1392	0.36	.Q	.	.	.	.
14.79	0.1421	0.38	.Q	.	.	.	.
14.89	0.1450	0.39	.Q	.	.	.	.
14.98	0.1481	0.42	.Q	.	.	.	.
15.07	0.1514	0.44	.Q	.	.	.	.
15.16	0.1549	0.47	.Q	.	.	.	.
15.26	0.1586	0.50	.Q	.	.	.	.

```
15.35      0.1626      0.55  . Q       .         .         .         .
15.44      0.1667      0.52  . Q       .         .         .         .
15.54      0.1709      0.57  . Q       .         .         .         .
15.63      0.1755      0.63  . Q       .         .         .         .
15.72      0.1809      0.77  .  Q      .         .         .         .
15.81      0.1872      0.88  .  Q      .         .         .         .
15.91      0.1955      1.28  .    Q    .         .         .         .
16.00      0.2072      1.78  .      Q  .         .         .         .
16.09      0.2354      5.55  .         .         . Q       .         .
16.19      0.2606      1.03  .   Q     .         .         .         .
16.28      0.2672      0.69  . Q       .         .         .         .
16.37      0.2719      0.53  . Q       .         .         .         .
16.46      0.2760      0.52  . Q       .         .         .         .
16.56      0.2797      0.45  .Q        .         .         .         .
16.65      0.2830      0.41  .Q        .         .         .         .
16.74      0.2860      0.37  .Q        .         .         .         .
16.84      0.2887      0.34  .Q        .         .         .         .
16.93      0.2912      0.31  .Q        .         .         .         .
17.02      0.2935      0.29  .Q        .         .         .         .
17.11      0.2957      0.27  .Q        .         .         .         .
17.21      0.2977      0.26  .Q        .         .         .         .
17.30      0.2996      0.24  Q         .         .         .         .
17.39      0.3014      0.23  Q         .         .         .         .
17.49      0.3031      0.22  Q         .         .         .         .
17.58      0.3047      0.21  Q         .         .         .         .
17.67      0.3064      0.21  Q         .         .         .         .
17.76      0.3079      0.20  Q         .         .         .         .
17.86      0.3094      0.19  Q         .         .         .         .
17.95      0.3109      0.19  Q         .         .         .         .
18.04      0.3123      0.18  Q         .         .         .         .
18.14      0.3136      0.14  Q         .         .         .         .
18.23      0.3146      0.14  Q         .         .         .         .
18.32      0.3157      0.13  Q         .         .         .         .
18.41      0.3167      0.13  Q         .         .         .         .
18.51      0.3177      0.13  Q         .         .         .         .
18.60      0.3187      0.13  Q         .         .         .         .
18.69      0.3196      0.12  Q         .         .         .         .
18.78      0.3206      0.12  Q         .         .         .         .
18.88      0.3215      0.12  Q         .         .         .         .
18.97      0.3224      0.11  Q         .         .         .         .
19.06      0.3232      0.11  Q         .         .         .         .
19.16      0.3241      0.11  Q         .         .         .         .
19.25      0.3249      0.11  Q         .         .         .         .
19.34      0.3258      0.11  Q         .         .         .         .
19.43      0.3266      0.10  Q         .         .         .         .
19.53      0.3274      0.10  Q         .         .         .         .
19.62      0.3281      0.10  Q         .         .         .         .
19.71      0.3289      0.10  Q         .         .         .         .
19.81      0.3297      0.10  Q         .         .         .         .
19.90      0.3304      0.10  Q         .         .         .         .
19.99      0.3312      0.10  Q         .         .         .         .
20.08      0.3319      0.09  Q         .         .         .         .
20.18      0.3326      0.09  Q         .         .         .         .
20.27      0.3333      0.09  Q         .         .         .         .
```

```
  20.36      0.3340      0.09  Q          .          .          .          .
  20.46      0.3347      0.09  Q          .          .          .          .
  20.55      0.3354      0.09  Q          .          .          .          .
  20.64      0.3360      0.09  Q          .          .          .          .
  20.73      0.3367      0.09  Q          .          .          .          .
  20.83      0.3373      0.08  Q          .          .          .          .
  20.92      0.3380      0.08  Q          .          .          .          .
  21.01      0.3386      0.08  Q          .          .          .          .
  21.11      0.3392      0.08  Q          .          .          .          .
  21.20      0.3399      0.08  Q          .          .          .          .
  21.29      0.3405      0.08  Q          .          .          .          .
  21.38      0.3411      0.08  Q          .          .          .          .
  21.48      0.3417      0.08  Q          .          .          .          .
  21.57      0.3423      0.08  Q          .          .          .          .
  21.66      0.3429      0.08  Q          .          .          .          .
  21.76      0.3434      0.08  Q          .          .          .          .
  21.85      0.3440      0.07  Q          .          .          .          .
  21.94      0.3446      0.07  Q          .          .          .          .
  22.03      0.3451      0.07  Q          .          .          .          .
  22.13      0.3457      0.07  Q          .          .          .          .
  22.22      0.3462      0.07  Q          .          .          .          .
  22.31      0.3468      0.07  Q          .          .          .          .
  22.41      0.3473      0.07  Q          .          .          .          .
  22.50      0.3479      0.07  Q          .          .          .          .
  22.59      0.3484      0.07  Q          .          .          .          .
  22.68      0.3489      0.07  Q          .          .          .          .
  22.78      0.3495      0.07  Q          .          .          .          .
  22.87      0.3500      0.07  Q          .          .          .          .
  22.96      0.3505      0.07  Q          .          .          .          .
  23.06      0.3510      0.07  Q          .          .          .          .
  23.15      0.3515      0.07  Q          .          .          .          .
  23.24      0.3520      0.07  Q          .          .          .          .
  23.33      0.3525      0.06  Q          .          .          .          .
  23.43      0.3530      0.06  Q          .          .          .          .
  23.52      0.3535      0.06  Q          .          .          .          .
  23.61      0.3540      0.06  Q          .          .          .          .
  23.71      0.3545      0.06  Q          .          .          .          .
  23.80      0.3549      0.06  Q          .          .          .          .
  23.89      0.3554      0.06  Q          .          .          .          .
  23.98      0.3559      0.06  Q          .          .          .          .
  24.08      0.3563      0.06  Q          .          .          .          .
  24.17      0.3566      0.00  Q          .          .          .          .
 ----------------------------------------------------------------------------
------------------------------------------------------------------------------
-
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                Duration
        Peak Flow Rate                     (minutes)
    =======================                =========
              0%                            1442.6
             10%                              50.1
```

20%	16.7
30%	11.1
40%	5.6
50%	5.6
60%	5.6
70%	5.6
80%	5.6
90%	5.6

```
****************************************************************************
               RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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               Ver. 18.2  Release Date: 05/08/2012  License ID 1448

                              Analysis prepared by:
                              Toal Engineering, Inc.
                               139 Avenida Navarro
                                San Clemente, CA
                                  949-492-8586
```

Post-Project Area A

```
----------------------------------------------------------------------------
  FILE NAME: 18156E2.DAT
  TIME/DATE OF STUDY: 09:17 03/08/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
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  ELEVATION DATA: UPSTREAM(FEET) =    406.50  DOWNSTREAM(FEET) =    342.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.485
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.868
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.66      0.20     0.500    75    5.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.43
  TOTAL AREA(ACRES) =      0.66   PEAK FLOW RATE(CFS) =      3.43

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   342.00  DOWNSTREAM(FEET) =   293.00
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.02
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.43
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.57
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     445.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.815
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               D        0.41      0.20     0.350    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    0.41      SUBAREA RUNOFF(CFS) =    2.12
  EFFECTIVE AREA(ACRES) =      1.07   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =       5.51
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =      5.57
  EFFECTIVE AREA(ACRES) =      1.07  AREA-AVERAGED Fm(INCH/HR)=  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.443
  PEAK FLOW RATE(CFS)   =       5.51
============================================================================
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END OF RATIONAL METHOD ANALYSIS

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                      SMALL AREA UNIT HYDROGRAPH MODEL
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Ver. 19.0  Release Date: 06/01/2012  License ID 1448

             Analysis prepared by:
             Toal Engineering, Inc.
              139 Avenida Navarro
                 949-492-8586

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Problem Descriptions: Pre & Post Project Area B

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----------------------------------------------------------------------------

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    0.49
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.100
    LOW LOSS FRACTION = 0.306
    TIME OF CONCENTRATION(MIN.) =  5.00
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

----------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.16
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.07
```

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*****************************************************************************
  TIME      VOLUME       Q     0.          2.5         5.0         7.5        10.0
 (HOURS)     (AF)      (CFS)

-----------------------------------------------------------------------------
  0.08      0.0001      0.03  Q          .           .           .           .
  0.17      0.0003      0.03  Q          .           .           .           .
  0.25      0.0005      0.03  Q          .           .           .           .
  0.33      0.0006      0.03  Q          .           .           .           .
  0.42      0.0008      0.03  Q          .           .           .           .
  0.50      0.0010      0.03  Q          .           .           .           .
  0.58      0.0012      0.03  Q          .           .           .           .
  0.67      0.0014      0.03  Q          .           .           .           .
  0.75      0.0016      0.03  Q          .           .           .           .
  0.83      0.0018      0.03  Q          .           .           .           .
  0.92      0.0020      0.03  Q          .           .           .           .
  1.00      0.0022      0.03  Q          .           .           .           .
  1.08      0.0023      0.03  Q          .           .           .           .
  1.17      0.0025      0.03  Q          .           .           .           .
  1.25      0.0027      0.03  Q          .           .           .           .
  1.33      0.0029      0.03  Q          .           .           .           .
  1.42      0.0031      0.03  Q          .           .           .           .
  1.50      0.0033      0.03  Q          .           .           .           .
  1.58      0.0035      0.03  Q          .           .           .           .
  1.67      0.0037      0.03  Q          .           .           .           .
  1.75      0.0039      0.03  Q          .           .           .           .
  1.83      0.0041      0.03  Q          .           .           .           .
  1.92      0.0043      0.03  Q          .           .           .           .
  2.00      0.0045      0.03  Q          .           .           .           .
  2.08      0.0047      0.03  Q          .           .           .           .
  2.17      0.0049      0.03  Q          .           .           .           .
  2.25      0.0051      0.03  Q          .           .           .           .
  2.33      0.0053      0.03  Q          .           .           .           .
  2.42      0.0055      0.03  Q          .           .           .           .
  2.50      0.0057      0.03  Q          .           .           .           .
  2.58      0.0059      0.03  Q          .           .           .           .
  2.67      0.0061      0.03  Q          .           .           .           .
  2.75      0.0063      0.03  Q          .           .           .           .
  2.83      0.0065      0.03  Q          .           .           .           .
  2.92      0.0067      0.03  Q          .           .           .           .
  3.00      0.0070      0.03  Q          .           .           .           .
  3.08      0.0072      0.03  Q          .           .           .           .
  3.17      0.0074      0.03  Q          .           .           .           .
  3.25      0.0076      0.03  Q          .           .           .           .
  3.33      0.0078      0.03  Q          .           .           .           .
  3.42      0.0080      0.03  Q          .           .           .           .
  3.50      0.0082      0.03  Q          .           .           .           .
  3.58      0.0084      0.03  Q          .           .           .           .
  3.67      0.0086      0.03  Q          .           .           .           .
  3.75      0.0089      0.03  Q          .           .           .           .
  3.83      0.0091      0.03  Q          .           .           .           .
```

3.92	0.0093	0.03	Q	.	.	.	.
4.00	0.0095	0.03	Q	.	.	.	.
4.08	0.0097	0.03	Q	.	.	.	.
4.17	0.0100	0.03	Q	.	.	.	.
4.25	0.0102	0.03	Q	.	.	.	.
4.33	0.0104	0.03	Q	.	.	.	.
4.42	0.0106	0.03	Q	.	.	.	.
4.50	0.0109	0.03	Q	.	.	.	.
4.58	0.0111	0.03	Q	.	.	.	.
4.67	0.0113	0.03	Q	.	.	.	.
4.75	0.0115	0.03	Q	.	.	.	.
4.83	0.0118	0.03	Q	.	.	.	.
4.92	0.0120	0.03	Q	.	.	.	.
5.00	0.0122	0.03	Q	.	.	.	.
5.08	0.0125	0.03	Q	.	.	.	.
5.17	0.0127	0.03	Q	.	.	.	.
5.25	0.0129	0.03	Q	.	.	.	.
5.33	0.0132	0.03	Q	.	.	.	.
5.42	0.0134	0.03	Q	.	.	.	.
5.50	0.0136	0.03	Q	.	.	.	.
5.58	0.0139	0.03	Q	.	.	.	.
5.67	0.0141	0.03	Q	.	.	.	.
5.75	0.0144	0.04	Q	.	.	.	.
5.83	0.0146	0.04	Q	.	.	.	.
5.92	0.0149	0.04	Q	.	.	.	.
6.00	0.0151	0.04	Q	.	.	.	.
6.08	0.0153	0.04	Q	.	.	.	.
6.17	0.0156	0.04	Q	.	.	.	.
6.25	0.0158	0.04	Q	.	.	.	.
6.33	0.0161	0.04	Q	.	.	.	.
6.42	0.0163	0.04	Q	.	.	.	.
6.50	0.0166	0.04	Q	.	.	.	.
6.58	0.0169	0.04	Q	.	.	.	.
6.67	0.0171	0.04	Q	.	.	.	.
6.75	0.0174	0.04	Q	.	.	.	.
6.83	0.0176	0.04	Q	.	.	.	.
6.92	0.0179	0.04	Q	.	.	.	.
7.00	0.0181	0.04	Q	.	.	.	.
7.08	0.0184	0.04	Q	.	.	.	.
7.17	0.0187	0.04	Q	.	.	.	.
7.25	0.0189	0.04	Q	.	.	.	.
7.33	0.0192	0.04	Q	.	.	.	.
7.42	0.0195	0.04	Q	.	.	.	.
7.50	0.0198	0.04	Q	.	.	.	.
7.58	0.0200	0.04	Q	.	.	.	.
7.67	0.0203	0.04	Q	.	.	.	.
7.75	0.0206	0.04	Q	.	.	.	.
7.83	0.0209	0.04	Q	.	.	.	.
7.92	0.0211	0.04	Q	.	.	.	.
8.00	0.0214	0.04	Q	.	.	.	.
8.08	0.0217	0.04	Q	.	.	.	.
8.17	0.0220	0.04	Q	.	.	.	.

8.25	0.0223	0.04	Q	.	.	.	.
8.33	0.0226	0.04	Q	.	.	.	.
8.42	0.0229	0.04	Q	.	.	.	.
8.50	0.0232	0.04	Q	.	.	.	.
8.58	0.0234	0.04	Q	.	.	.	.
8.67	0.0237	0.04	Q	.	.	.	.
8.75	0.0240	0.04	Q	.	.	.	.
8.83	0.0243	0.04	Q	.	.	.	.
8.92	0.0247	0.04	Q	.	.	.	.
9.00	0.0250	0.04	Q	.	.	.	.
9.08	0.0253	0.05	Q	.	.	.	.
9.17	0.0256	0.05	Q	.	.	.	.
9.25	0.0259	0.05	Q	.	.	.	.
9.33	0.0262	0.05	Q	.	.	.	.
9.42	0.0265	0.05	Q	.	.	.	.
9.50	0.0268	0.05	Q	.	.	.	.
9.58	0.0272	0.05	Q	.	.	.	.
9.67	0.0275	0.05	Q	.	.	.	.
9.75	0.0278	0.05	Q	.	.	.	.
9.83	0.0282	0.05	Q	.	.	.	.
9.92	0.0285	0.05	Q	.	.	.	.
10.00	0.0288	0.05	Q	.	.	.	.
10.08	0.0292	0.05	Q	.	.	.	.
10.17	0.0295	0.05	Q	.	.	.	.
10.25	0.0299	0.05	Q	.	.	.	.
10.33	0.0302	0.05	Q	.	.	.	.
10.42	0.0306	0.05	Q	.	.	.	.
10.50	0.0309	0.05	Q	.	.	.	.
10.58	0.0313	0.05	Q	.	.	.	.
10.67	0.0316	0.05	Q	.	.	.	.
10.75	0.0320	0.05	Q	.	.	.	.
10.83	0.0324	0.05	Q	.	.	.	.
10.92	0.0327	0.05	Q	.	.	.	.
11.00	0.0331	0.05	Q	.	.	.	.
11.08	0.0335	0.06	Q	.	.	.	.
11.17	0.0339	0.06	Q	.	.	.	.
11.25	0.0343	0.06	Q	.	.	.	.
11.33	0.0347	0.06	Q	.	.	.	.
11.42	0.0351	0.06	Q	.	.	.	.
11.50	0.0355	0.06	Q	.	.	.	.
11.58	0.0359	0.06	Q	.	.	.	.
11.67	0.0363	0.06	Q	.	.	.	.
11.75	0.0367	0.06	Q	.	.	.	.
11.83	0.0371	0.06	Q	.	.	.	.
11.92	0.0375	0.06	Q	.	.	.	.
12.00	0.0380	0.06	Q	.	.	.	.
12.08	0.0385	0.08	Q	.	.	.	.
12.17	0.0390	0.08	Q	.	.	.	.
12.25	0.0396	0.08	Q	.	.	.	.
12.33	0.0402	0.08	Q	.	.	.	.
12.42	0.0407	0.08	Q	.	.	.	.
12.50	0.0413	0.08	Q	.	.	.	.

12.58	0.0419	0.09	Q	.	.	.	.
12.67	0.0425	0.09	Q	.	.	.	.
12.75	0.0431	0.09	Q	.	.	.	.
12.83	0.0437	0.09	Q	.	.	.	.
12.92	0.0443	0.09	Q	.	.	.	.
13.00	0.0450	0.09	Q	.	.	.	.
13.08	0.0456	0.09	Q	.	.	.	.
13.17	0.0463	0.09	Q	.	.	.	.
13.25	0.0469	0.10	Q	.	.	.	.
13.33	0.0476	0.10	Q	.	.	.	.
13.42	0.0483	0.10	Q	.	.	.	.
13.50	0.0490	0.10	Q	.	.	.	.
13.58	0.0497	0.11	Q	.	.	.	.
13.67	0.0504	0.11	Q	.	.	.	.
13.75	0.0512	0.11	Q	.	.	.	.
13.83	0.0519	0.11	Q	.	.	.	.
13.92	0.0527	0.12	Q	.	.	.	.
14.00	0.0535	0.12	Q	.	.	.	.
14.08	0.0544	0.13	Q	.	.	.	.
14.17	0.0552	0.13	Q	.	.	.	.
14.25	0.0561	0.13	Q	.	.	.	.
14.33	0.0571	0.14	Q	.	.	.	.
14.42	0.0580	0.14	Q	.	.	.	.
14.50	0.0590	0.15	Q	.	.	.	.
14.58	0.0601	0.15	Q	.	.	.	.
14.67	0.0611	0.16	Q	.	.	.	.
14.75	0.0622	0.17	Q	.	.	.	.
14.83	0.0634	0.17	Q	.	.	.	.
14.92	0.0646	0.18	Q	.	.	.	.
15.00	0.0659	0.19	Q	.	.	.	.
15.08	0.0672	0.20	Q	.	.	.	.
15.17	0.0687	0.21	Q	.	.	.	.
15.25	0.0702	0.23	Q	.	.	.	.
15.33	0.0718	0.24	Q	.	.	.	.
15.42	0.0734	0.23	Q	.	.	.	.
15.50	0.0750	0.24	Q	.	.	.	.
15.58	0.0768	0.28	.Q	.	.	.	.
15.67	0.0788	0.30	.Q	.	.	.	.
15.75	0.0811	0.37	.Q	.	.	.	.
15.83	0.0839	0.43	.Q	.	.	.	.
15.92	0.0875	0.62	. Q	.	.	.	.
16.00	0.0926	0.87	. Q	.	.	.	.
16.08	**0.1049**	**2.71**	**.**	**Q**	**.**	**.**	**.**
16.17	0.1160	0.50	. Q	.	.	.	.
16.25	0.1189	0.33	.Q	.	.	.	.
16.33	0.1209	0.26	.Q	.	.	.	.
16.42	0.1227	0.25	.Q	.	.	.	.
16.50	0.1243	0.22	Q	.	.	.	.
16.58	0.1257	0.19	Q	.	.	.	.
16.67	0.1270	0.18	Q	.	.	.	.
16.75	0.1281	0.16	Q	.	.	.	.
16.83	0.1292	0.15	Q	.	.	.	.

16.92	0.1302	0.14	Q	.	.	.	.
17.00	0.1311	0.13	Q	.	.	.	.
17.08	0.1320	0.12	Q	.	.	.	.
17.17	0.1328	0.11	Q	.	.	.	.
17.25	0.1336	0.11	Q	.	.	.	.
17.33	0.1343	0.10	Q	.	.	.	.
17.42	0.1350	0.10	Q	.	.	.	.
17.50	0.1357	0.10	Q	.	.	.	.
17.58	0.1363	0.09	Q	.	.	.	.
17.67	0.1370	0.09	Q	.	.	.	.
17.75	0.1376	0.09	Q	.	.	.	.
17.83	0.1382	0.09	Q	.	.	.	.
17.92	0.1388	0.08	Q	.	.	.	.
18.00	0.1393	0.08	Q	.	.	.	.
18.08	0.1398	0.06	Q	.	.	.	.
18.17	0.1403	0.06	Q	.	.	.	.
18.25	0.1407	0.06	Q	.	.	.	.
18.33	0.1411	0.06	Q	.	.	.	.
18.42	0.1415	0.06	Q	.	.	.	.
18.50	0.1419	0.06	Q	.	.	.	.
18.58	0.1423	0.06	Q	.	.	.	.
18.67	0.1426	0.05	Q	.	.	.	.
18.75	0.1430	0.05	Q	.	.	.	.
18.83	0.1434	0.05	Q	.	.	.	.
18.92	0.1437	0.05	Q	.	.	.	.
19.00	0.1441	0.05	Q	.	.	.	.
19.08	0.1444	0.05	Q	.	.	.	.
19.17	0.1448	0.05	Q	.	.	.	.
19.25	0.1451	0.05	Q	.	.	.	.
19.33	0.1454	0.05	Q	.	.	.	.
19.42	0.1457	0.05	Q	.	.	.	.
19.50	0.1461	0.05	Q	.	.	.	.
19.58	0.1464	0.04	Q	.	.	.	.
19.67	0.1467	0.04	Q	.	.	.	.
19.75	0.1470	0.04	Q	.	.	.	.
19.83	0.1473	0.04	Q	.	.	.	.
19.92	0.1476	0.04	Q	.	.	.	.
20.00	0.1479	0.04	Q	.	.	.	.
20.08	0.1481	0.04	Q	.	.	.	.
20.17	0.1484	0.04	Q	.	.	.	.
20.25	0.1487	0.04	Q	.	.	.	.
20.33	0.1490	0.04	Q	.	.	.	.
20.42	0.1492	0.04	Q	.	.	.	.
20.50	0.1495	0.04	Q	.	.	.	.
20.58	0.1498	0.04	Q	.	.	.	.
20.67	0.1500	0.04	Q	.	.	.	.
20.75	0.1503	0.04	Q	.	.	.	.
20.83	0.1506	0.04	Q	.	.	.	.
20.92	0.1508	0.04	Q	.	.	.	.
21.00	0.1511	0.04	Q	.	.	.	.
21.08	0.1513	0.04	Q	.	.	.	.
21.17	0.1516	0.04	Q	.	.	.	.

```
  21.25       0.1518      0.04  Q         .         .         .         .
  21.33       0.1520      0.03  Q         .         .         .         .
  21.42       0.1523      0.03  Q         .         .         .         .
  21.50       0.1525      0.03  Q         .         .         .         .
  21.58       0.1527      0.03  Q         .         .         .         .
  21.67       0.1530      0.03  Q         .         .         .         .
  21.75       0.1532      0.03  Q         .         .         .         .
  21.83       0.1534      0.03  Q         .         .         .         .
  21.92       0.1537      0.03  Q         .         .         .         .
  22.00       0.1539      0.03  Q         .         .         .         .
  22.08       0.1541      0.03  Q         .         .         .         .
  22.17       0.1543      0.03  Q         .         .         .         .
  22.25       0.1545      0.03  Q         .         .         .         .
  22.33       0.1548      0.03  Q         .         .         .         .
  22.42       0.1550      0.03  Q         .         .         .         .
  22.50       0.1552      0.03  Q         .         .         .         .
  22.58       0.1554      0.03  Q         .         .         .         .
  22.67       0.1556      0.03  Q         .         .         .         .
  22.75       0.1558      0.03  Q         .         .         .         .
  22.83       0.1560      0.03  Q         .         .         .         .
  22.92       0.1562      0.03  Q         .         .         .         .
  23.00       0.1564      0.03  Q         .         .         .         .
  23.08       0.1566      0.03  Q         .         .         .         .
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  23.67       0.1580      0.03  Q         .         .         .         .
  23.75       0.1582      0.03  Q         .         .         .         .
  23.83       0.1584      0.03  Q         .         .         .         .
  23.92       0.1585      0.03  Q         .         .         .         .
  24.00       0.1587      0.03  Q         .         .         .         .
  24.08       0.1588      0.00  Q         .         .         .         .

----------------------------------------------------------------------------
----------------------------------------------------------------------------
----
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                Duration
        Peak Flow Rate                     (minutes)
    =======================                =========
              0%                            1440.0
             10%                              45.0
             20%                              15.0
             30%                              10.0
             40%                               5.0
             50%                               5.0
```

60%	5.0
70%	5.0
80%	5.0
90%	5.0

Area B Curb Inlet Calculations

```
Hydraulic Element Results:

****************************************************************************
 >>>>SUMP TYPE BASIN INPUT INFORMATION<<<<
 ----------------------------------------------------------------------------


     Curb Inlet Capacities are approximated based on the Bureau of
     Public Roads nomograph plots for flowby basins and sump basins.


     BASIN INFLOW(CFS) =    2.71
     BASIN OPENING(FEET) =  0.66
     DEPTH OF WATER(FEET) =  0.21

     >>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) =       9.12

 ============================================================================
```

Area B Street Depth Calculations

Hydraulic Element Results:

```
****************************************************************************
 >>>>STREETFLOW MODEL INPUT INFORMATION<<<<
 ----------------------------------------------------------------------------
    CONSTANT STREET GRADE(FEET/FEET) = 0.050000
    CONSTANT STREET FLOW(CFS) =    2.71
    AVERAGE STREETFLOW FRICTION FACTOR(MANNING) = 0.014000
    CONSTANT SYMMETRICAL STREET HALF-WIDTH(FEET) =   25.00
    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   23.00
    INTERIOR STREET CROSSFALL(DECIMAL) = 0.020000
    OUTSIDE  STREET CROSSFALL(DECIMAL) = 0.020000
    CONSTANT SYMMETRICAL CURB HEIGHT(FEET) =   0.50
    CONSTANT SYMMETRICAL GUTTER-WIDTH(FEET) =   2.00
    CONSTANT SYMMETRICAL GUTTER-LIP(FEET) =  0.03125
    CONSTANT SYMMETRICAL GUTTER-HIKE(FEET) =  0.12500
    FLOW ASSUMED TO FILL STREET EVENLY ON BOTH SIDES
 ============================================================================
    STREET FLOW MODEL RESULTS:
 ----------------------------------------------------------------------------
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.86
    PRODUCT OF DEPTH&VELOCITY =    0.80
 ============================================================================
```

Area B Pipe Flow Calculations
Pipe #1

Hydraulic Element Results:

```
****************************************************************************
 >>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
 ----------------------------------------------------------------------------
     PIPE DIAMETER(FEET) =   1.000
     PIPE SLOPE(FEET/FEET) =  0.5000
     PIPEFLOW(CFS) =         2.71
     MANNINGS FRICTION FACTOR = 0.011000
 ============================================================================
     CRITICAL-DEPTH FLOW INFORMATION:
 ----------------------------------------------------------------------------
     CRITICAL DEPTH(FEET) =      0.71
     CRITICAL FLOW AREA(SQUARE FEET) =     0.592
     CRITICAL FLOW TOP-WIDTH(FEET) =   0.911
     CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =           35.55
     CRITICAL FLOW VELOCITY(FEET/SEC.) =     4.575
     CRITICAL FLOW VELOCITY HEAD(FEET) =            0.32
     CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.65
     CRITICAL FLOW SPECIFIC ENERGY(FEET) =            1.03
 ============================================================================
     NORMAL-DEPTH FLOW INFORMATION:
 ----------------------------------------------------------------------------
     NORMAL DEPTH(FEET) =      0.20
     FLOW AREA(SQUARE FEET) =      0.11
     FLOW TOP-WIDTH(FEET) =     0.806
     FLOW PRESSURE + MOMENTUM(POUNDS) =          124.46
     FLOW VELOCITY(FEET/SEC.) =          23.582
```

FLOW VELOCITY HEAD(FEET) = 8.636

HYDRAULIC DEPTH(FEET) = 0.14

FROUDE NUMBER = 11.004

SPECIFIC ENERGY(FEET) = 8.84

==

```
****************************************************************************
 >>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
```

Area A Pipe Flow Calculations

PIPE #3

```
----------------------------------------------------------------------------
    PIPE DIAMETER(FEET) =   1.500
    PIPE SLOPE(FEET/FEET) =  0.0500
    PIPEFLOW(CFS) =          5.55
    MANNINGS FRICTION FACTOR = 0.012000
============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
----------------------------------------------------------------------------
    CRITICAL DEPTH(FEET) =      0.91
    CRITICAL FLOW AREA(SQUARE FEET) =     1.119
    CRITICAL FLOW TOP-WIDTH(FEET) =   1.466
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =           80.76
    CRITICAL FLOW VELOCITY(FEET/SEC.) =     4.958
    CRITICAL FLOW VELOCITY HEAD(FEET) =            0.38
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.76
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =            1.29
============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
----------------------------------------------------------------------------
```

NORMAL DEPTH(FEET) =   0.48

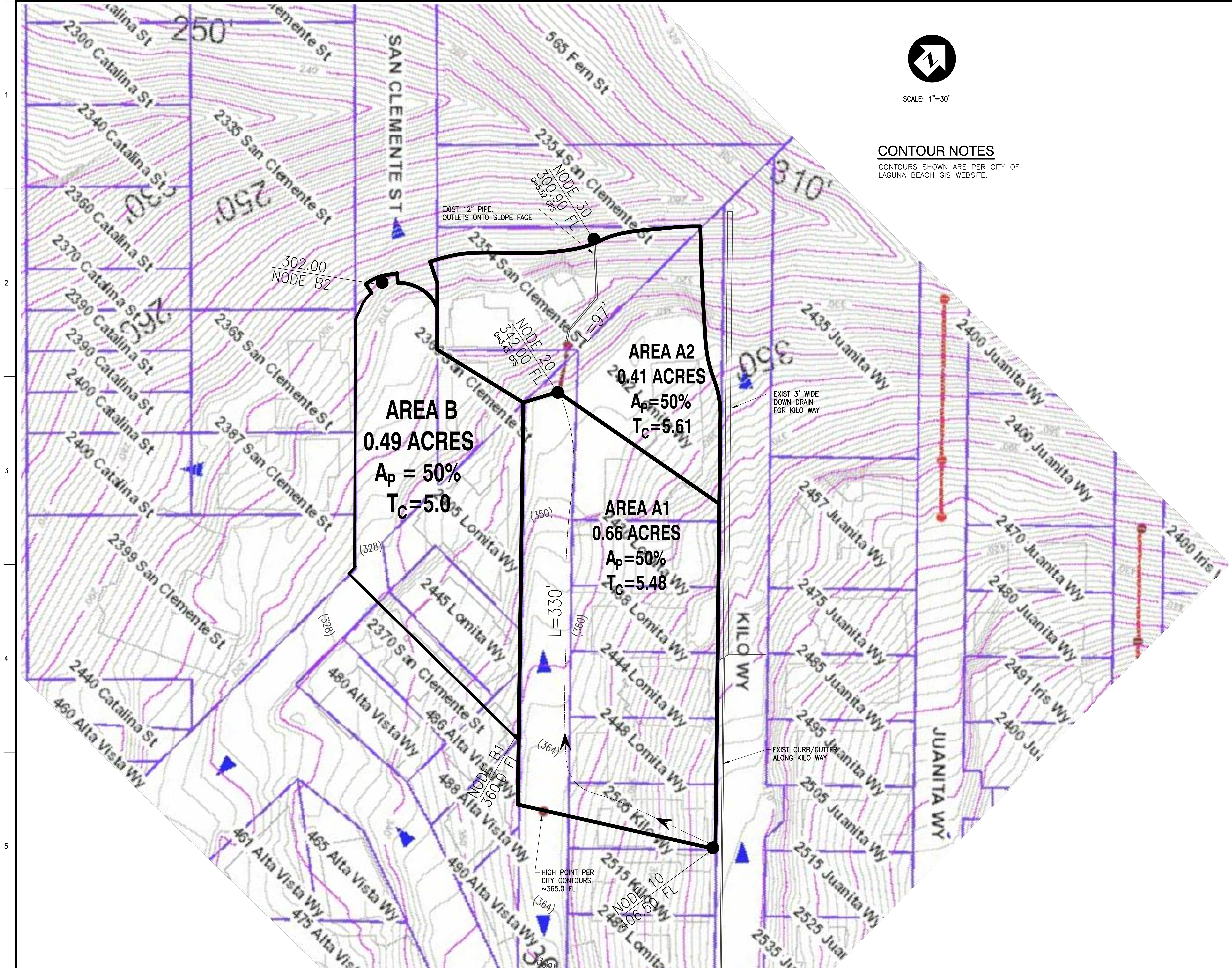
```
    FLOW AREA(SQUARE FEET) =      0.48
    FLOW TOP-WIDTH(FEET) =     1.396
    FLOW PRESSURE + MOMENTUM(POUNDS) =          129.87
```

FLOW VELOCITY(FEET/SEC.) =   11.521

```
    FLOW VELOCITY HEAD(FEET) =            2.061
    HYDRAULIC DEPTH(FEET) =      0.35
    FROUDE NUMBER =     3.457
    SPECIFIC ENERGY(FEET) =            2.54
```

APPENDIX C

Drainage Maps



PLANS PREPARED BY:

TOAL ENGINEERING, INC.

CIVIL ENGINEERING
LAND SURVEYING
STORMWATER QUALITY

139 Avenida Navarro
San Clemente, CA 92672
949.492.8586
www.toalengineering.com

REGISTERED PROFESSIONAL ENGINEER
CALEB RIOS
No. 57587
CIVIL
STATE OF CALIFORNIA

CALEB RIOS
R.C.E. 57587
DATE:

PREPARED FOR:

KEVIN AARONSON

DATE	BY	DATE	APVD.	REVISIONS

AARONSON RESIDENCE

EXISTING DRAINAGE MAP SAN CLEMENTE & LOMITA WAY

LOTS 11-15, BLOCK 6, LOMA TRACT
2354 SAN CLEMENTE, LAGUNA BEACH CA

DATE: 3/9/21	H. SCALE: 1"=30'
SURVEY DATE: 10/01/18	V. SCALE: N/A
DRN.: O.R.	DWG. NO.
CHD.: C.R.	H1
APPD.: C.R.	
JOB NO. 18156	SHEET 1 OF 1

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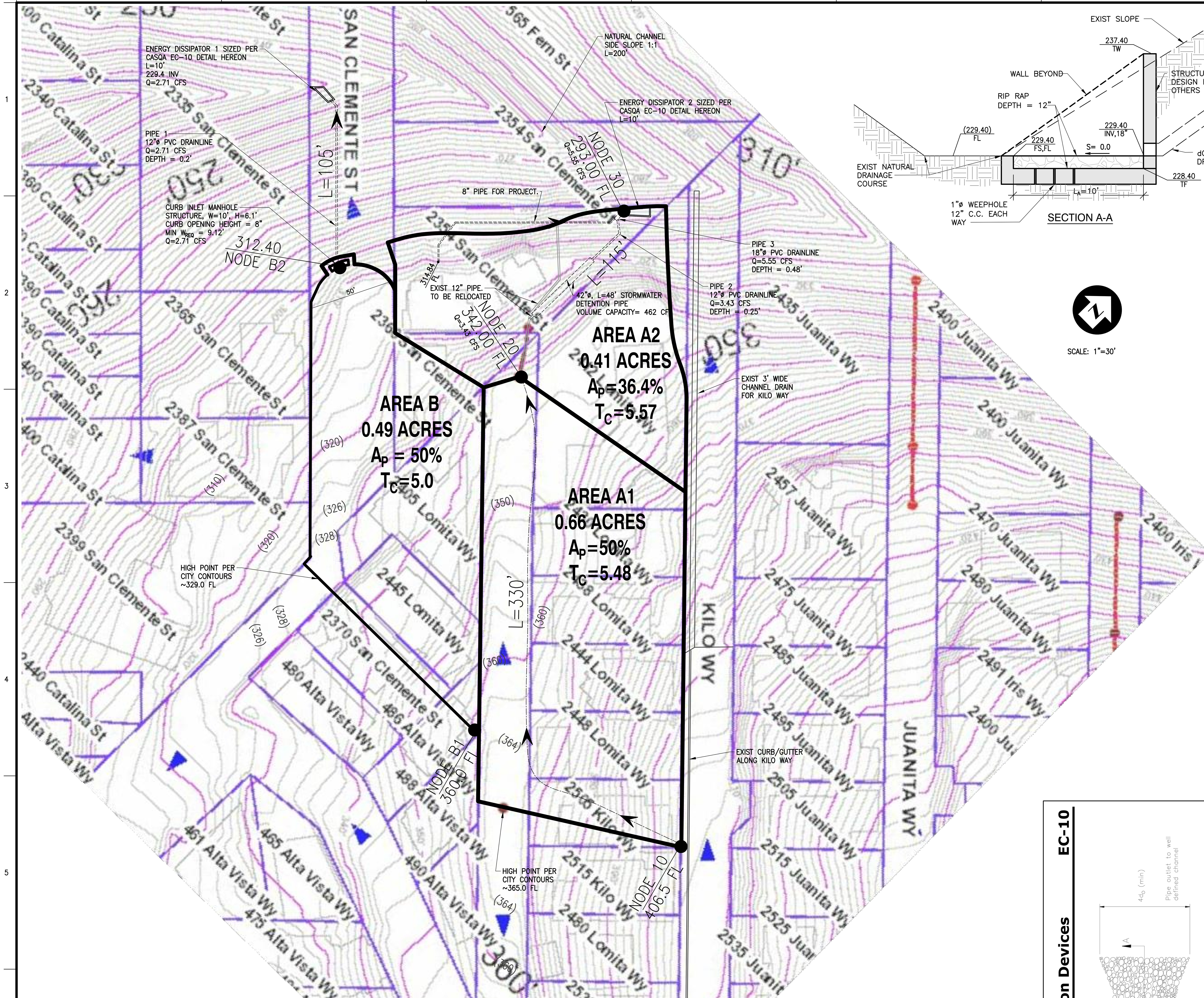
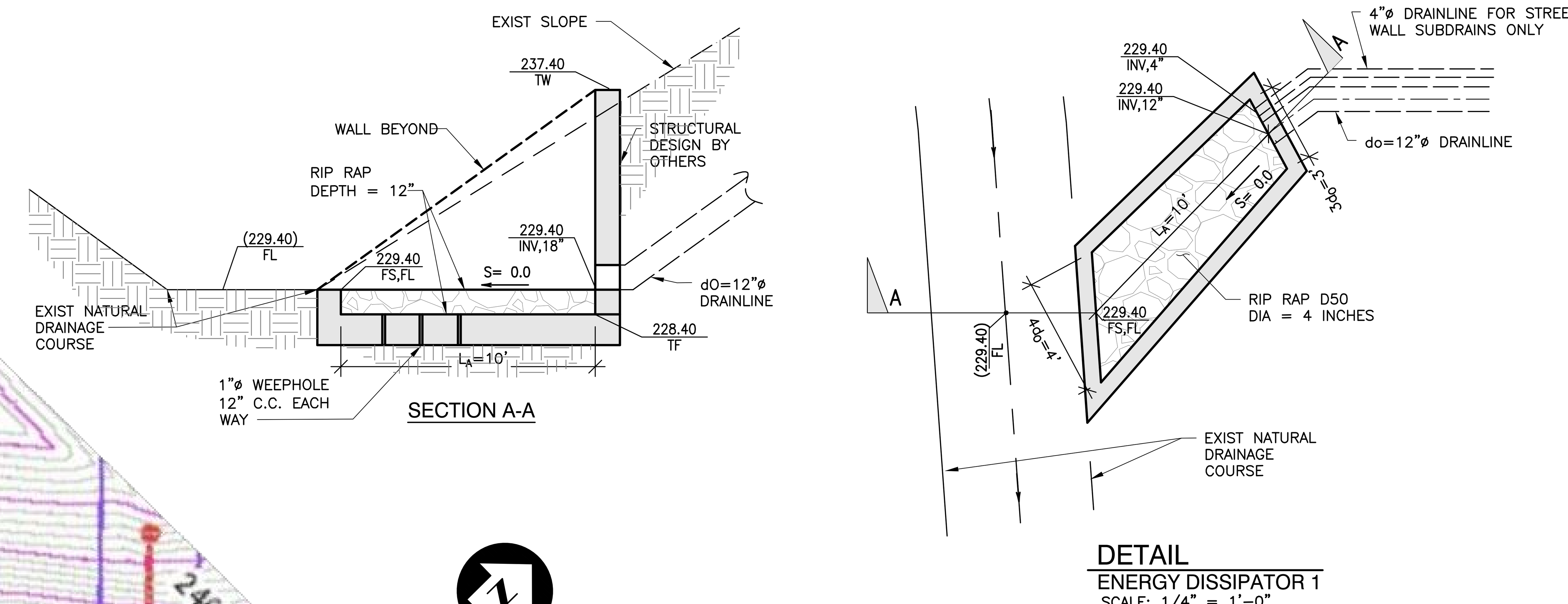
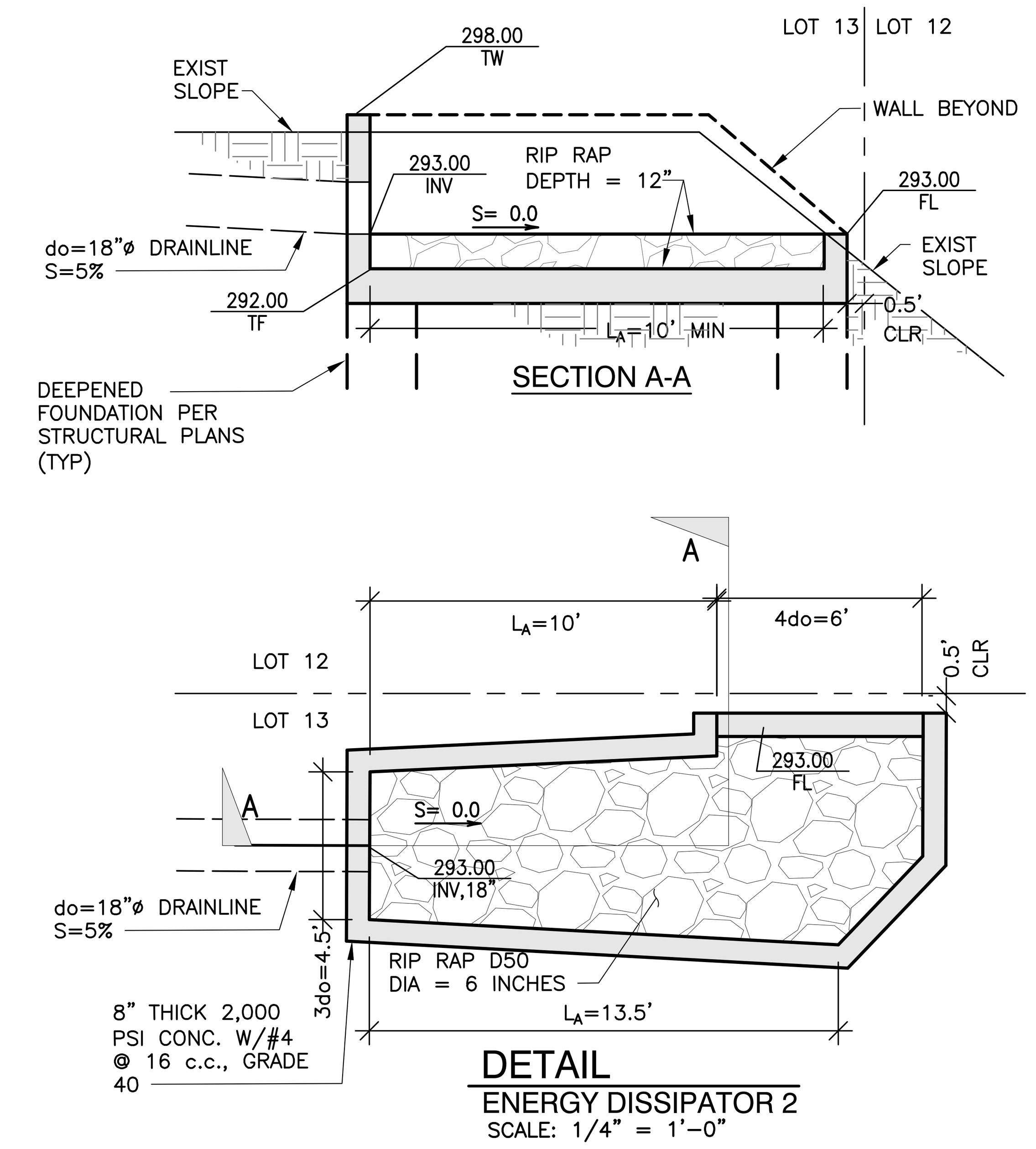
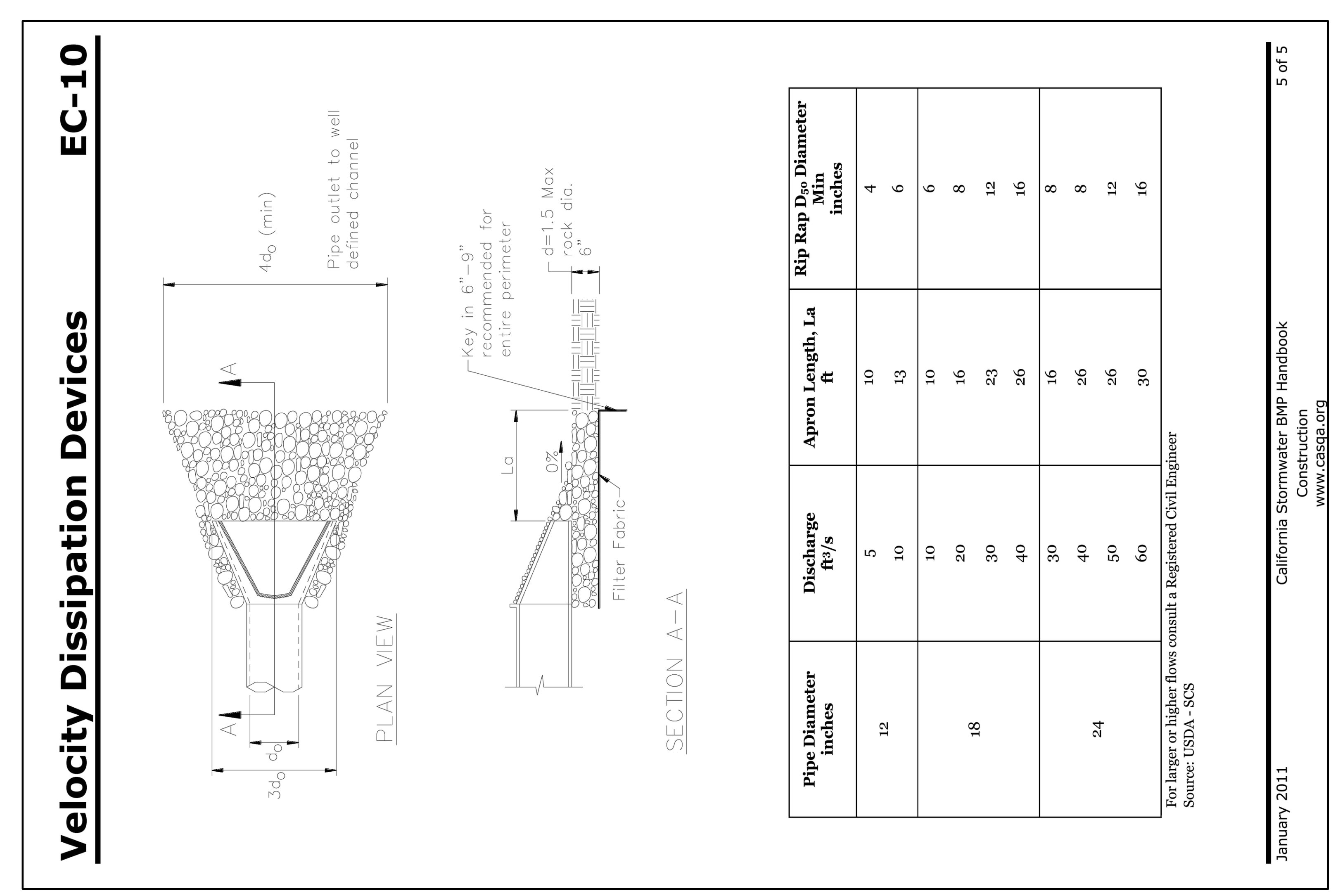






CONTOUR NOTES

CONTOURS SHOWN ARE PER CITY OF LAGUNA BEACH GIS WEBSITE.



Velocity Dissipation Devices

EC-10

Pipe Diameter inches	Discharge ft³/s	Apron Length, La ft	Rip Rap D50 Diameter Min inches
12	5	10	4
	10	13	6
18	10	10	6
	20	16	8
	30	23	12
	40	26	16
24	30	16	8
	40	26	8
	50	26	12
	60	30	16

For larger or higher flows consult a Registered Civil Engineer
Source: USDA - SCS

January 2011

California Stormwater BMP Handbook
Construction
www.cabmphandbooks.com

5 of 5

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San Clemente, CA 92672
949 492 8586
www.toalengineering.com

REGISTERED PROFESSIONAL ENGINEER
CALEB RIOS
No. 57587
CIVIL
STATE OF CALIFORNIA

CALEB RIOS
R.C.E. 57587
DATE:

PREPARED FOR:

KEVIN AARONSON

REVISIONS

BY	DATE	APVD.	DATE

AARONSON RESIDENCE

PROPOSED DRAINAGE MAP
SAN CLEMENTE & LOMITA WAY

LOTS 11-15, BLOCK 6, LOMA TRACT
2354 SAN CLEMENTE, LAGUNA BEACH CA

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SURVEY DATE: 10/01/18	V. SCALE: N/A
DRN.: O.R.	DWG. NO.
CHD.: C.R.	H2
APPD.: C.R.	
JOB NO. 18156	SHEET 1 OF 1

PLANS PREPARED BY:
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STORMWATER QUALITY

CALEB RIOS
R.C.E. 57587
DATE:

PREPARED FOR:
KEVIN AARONSON

REVISIONS	BY	DATE	APVD.	DATE

AARONSON RESIDENCE
PRE-DEVELOPMENT IMPERVIOUS AREA EXHIBIT
LOTS 11-15, BLOCK 6, LOMA TRACT
2354 SAN CLEMENTE, LAGUNA BEACH CA

DATE: 3/9/21
SURVEY DATE: 10/01/18
DRN.: O.R.
CHKD.: C.R.
APPD.: C.R.
JOB NO. 18156
H. SCALE: 1"=8'
V. SCALE: N/A
DWG. NO. H3
SHEET 1 OF 1

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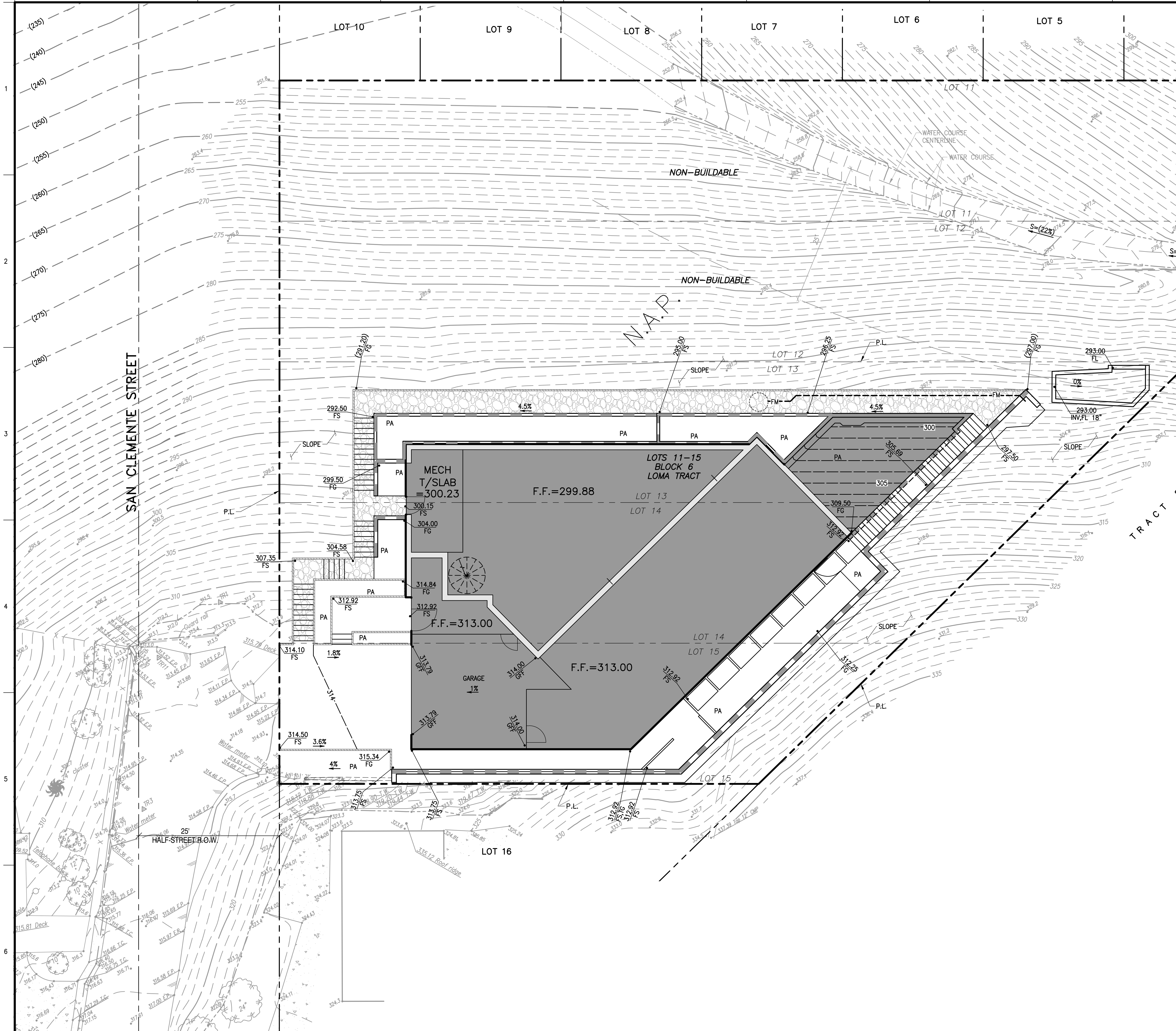

PERVIOUS LEGEND

	PERVIOUS DECOMPOSED GRANITE
PA	PLANTER AREA
SLOPE	SLOPE AREA

IMPERVIOUS LEGEND

	PROPOSED CONCRETE PAVING/WALLS 1,072 SF (0.024 AC)
	PROPOSED BUILDING STRUCTURE LIMITS 4,007 SF (0.092 AC)

IMP TOTAL = 5,079 SF (0.116 AC)

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REGISTERED PROFESSIONAL ENGINEER CALEB RIOS No. 57587 CIVIL STATE OF CALIFORNIA

CALEB RIOS
R.C.E. 57587
DATE:

PREPARED FOR:
KEVIN AARONSON

DATE	APVD.	DATE	BY	REVISIONS

AARONSON RESIDENCE
POST-DEVELOPMENT IMPERVIOUS AREA EXHIBIT
LOTS 11-15, BLOCK 6, LOMA TRACT
2354 SAN CLEMENTE, LAGUNA BEACH CA

DATE: 3/9/21	H. SCALE: 1"=8'
SURVEY DATE: 10/01/18	V. SCALE: N/A
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CHD.: C.R.	
APPD.: C.R.	
JOB NO. 18156	SHEET 1 OF 1

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Appendix E
Water Quality Management Plan

WATER QUALITY MANAGEMENT PLAN

Project Name:

2354 SAN CLEMENTE STREET, LAGUNA BEACH, CA

Prepared for:

Kevin Aaronson

2354 San Clemente Street
Laguna Beach, CA 92651
Tel: (949) 279-1644

Prepared by:

TOAL ENGINEERING, INC.

139 Avenida Navarro
San Clemente, CA 92672
(949) 492-8586

Engineer: Caleb Rios

Registration No. 57587

Email: Crios@toalengineering.com

Engineer's Seal

Prepared on:

Date prepared: Dec 27, 2018

Date of revisions:

Date of Final revision:

Job Number**: 18156**

Project Owner's Certification			
Permit/Application No.	N/A	Grading Permit No.	N/A
Tract/Parcel Map No.	Lots 11-15, Blk 6, Loma Tract	Building Permit No.	TBD
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract)			APN: 656-122-04 +05

This Water Quality Management Plan (WQMP) has been prepared for Kevin Aaronson by Toal Engineering, Inc. The WQMP is intended to comply with the requirements of the local NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the San Diego Region (South Orange County). Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

Owner:			
Title	Kevin Aaronson		
Company	N/A		
Address	2354 San Clemente Street, Laguna Beach, CA		
Email			
Telephone #	(949) 279-1644		
Signature	DocuSigned by: 4/14/2020 F3F6AED2AD2C4A5...	Date	

Contents

Page No.

Section 1 Discretionary Permit(s) and Water Quality Conditions

Project Infomation			
Permit/Application No.	N/A	Site Address or Tract/Parcel Map No.	Lots 11-15, Blk 6, Loma Tract
Additional Information/ Comments:	N/A		
Water Quality Conditions			
Water Quality Conditions from prior approvals or applicable watershed-based plans	Prior to the issuance of any grading or building permit, the applicant shall submit to the City a Water Quality Management Plan (WQMP) for review and approval that (Mitigation Measure 8-5): a. Fulfills all the requirements of the City's Standard Urban Stormwater Mitigation Plan (SUSMP, also known as the City's WQMP is Exhibit 7.V of the City's Local Implementation Plan); b. Addresses Site Design BMPs such as minimizing impervious areas, maximizing permeability, minimizing directly connected impervious areas, creating reduced or "Zero discharge" areas, and conserving natural areas; c. Incorporates the applicable Routine Source Control and Treatment Control BMPs as defined in the City's Standard Stormwater Manuals and the SUSMP; d. Generally, describes the long-term operation and maintenance requirements for the structural BMPs; e. Identifies the entity that will be responsible for long-term operation and maintenance of the structural BMPs; and, f. Describes the mechanism for funding the long-term operation and maintenance of the structural BMPs.		

Section 2 Project Description

2.1 General Description

Description of Proposed Project				
Site Location	Address: 2354 San Clemente Street, Laguna Beach, CA Location: The site is situated in a developed Residential area in the Laguna Coastal Stream Watershed, Located in the San Diego Region. See Figure 1. Legal: Lots 11-15, Block 6, Loma Tract			
Project Area (ft^2): 6,468	Number of Dwelling Units: 1		SIC Code: 1521	
Narrative Project Description:	The project consists of the construction of a new single family residence with appurtenant hardscape, walls, driveway and landscape areas on the project. The project size is 6,468 sf (0.148 ac) with a rear descending slope which will remain untouched in its natural state.			
Project Area	Pervious		Impervious	
	Area (acres)	Percentage	Area (acres)	Percentage
Pre-Project Conditions	**0.088**	**59%**	**0.060**	**41%**
Post-Project Conditions	**0.032**	**22%**	**0.116**	**78%**

Figure 1. Project Location Map

2.2 Post Development Drainage Characteristics

The site drainage system is designed to treat and partially retain runoff via enclosed planter boxes (Bioretention with underdrain) prior to discharge in order to eliminate direct discharge into the Pacific Ocean. Drain inlets will be provided in site landscape areas to collect excess runoff and not allow surface water to accumulate and result in standing water/ponding situations. Drain lines will convey the collected runoff into enclosed planter boxes for treatment and storage prior to discharge.

Drainage from paved areas shall be directed to flow away from the building foundation and into turf or landscape areas, where possible prior to collection by the proposed area drain system.

The proposed planter boxes will remove sediment and pollutants through volume reduction before the runoff is discharged to the natural drainage course at the northerly end of the site. In large storm events runoff will overflow and bypass the enclosed planter boxes and flow to the drainage course that outlets directly to Glenneyre Street and into the City Drainage System. All project runoff will be discharged directly to the natural drainage course (via an energy dissipator at the bottom of the slope) at the northerly end of the site. The lower portion of the aforementioned drainage course is concrete lined up to Glenneyre Street. Details of the drainage system are shown on the Site Plan and Drainage Plan in Section 4.

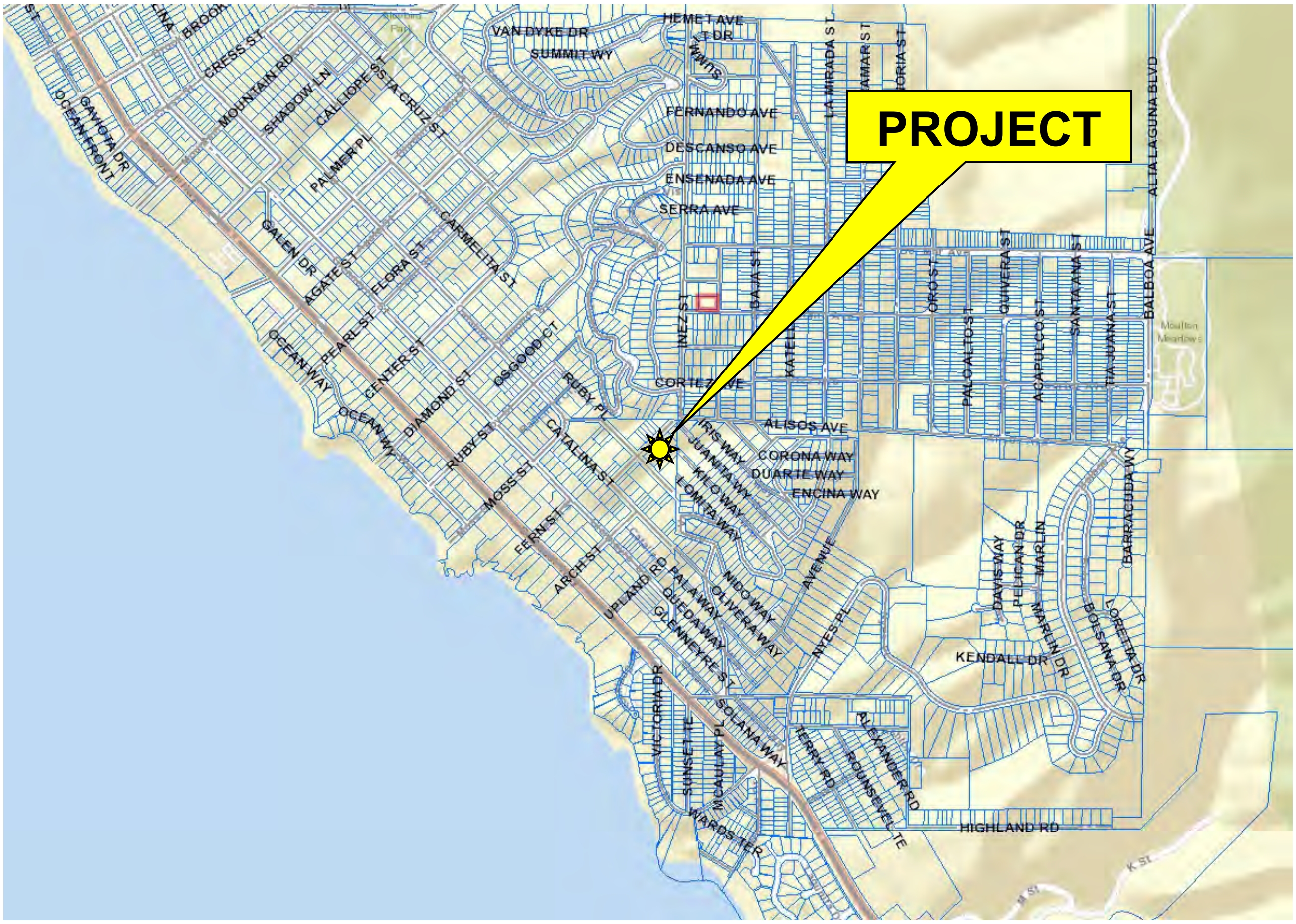


Figure 1

2.3 Property Ownership/Management

Kevin Aaronson
2354 San Clemente Street
Laguna Beach, CA 92651

Section 3 Site & Watershed Characterization

3.1 Site Conditions

3.1.1 Existing Site Conditions

Existing condition:
As shown in Figure 1 (Section 2.1), The project site is situated in a developed residential area and is located at the Northwesterly terminus of San Clemente Street. The site generally slopes from south to north and is bordered to the southwest by San Clemente Street, to the southeast by a similar residential development, to the northwest by a steep descending slope and to the east by an ascending slope. There is an east-west-trending natural swale at the bottom of the slope along northerly end of the site.

Topography:
The subject project is on a sloping site with a total area of 6,468 s.f. (0.148 acres). The maximum elevation change between property lines is roughly 82 feet, with the project sitting at an elevation between 292 to 314 feet above sea level. The site slopes away from San Clemente Street toward the rear yard with an average slope of 1.5:1 (H:V). A field shot survey was prepared by this office on 10/01/2018 and was used in preparation of plans and reports for this project.

Existing Drainage Patterns:
No drain inlets were discovered during the field shot survey. The site currently appears to sheet flow away from the building and towards the steep slope at the northerly end of the site where it enters an offsite natural drainage course. This natural drainage course descends and discharges directly to Glenneyre Street and into the City Storm drain system prior to entering the Pacific Ocean.

Environmentally Sensitive Features:
N/A - There are no environmentally sensitive features or areas within or near the site.

Existing Infrastructure:
The runoff will be conveyed (via an energy dissipator at the bottom of the slope) to the existing natural drainage course at the northerly end of the site. This natural drainage course descends and discharges to Glenneyre Street and into the City Storm drain system prior to entering Ocean. The lower portion of the swale is concrete lined up to Glenneyre Street. Public sewer, water, and dry utility facilities are located within San Clemente street.

Existing Land Uses				
Land Use Description	Total Area (acres)	Impervious Area (acres)	Pervious Area (acres)	Imperviousness (%)
Project Area	**0.148**	**0.060**	**0.088**	**41%**

Total	**0.148**	**0.060**	**0.088**	**41%**

3.1.2 Infiltration-Related Characteristics

A geotechnical report is not yet available for the project and will be incorporated into this report before WQMP approval.

Per Exhibit map XVI-2a in the TGD and the Orange County Hydrology Manual, the project is primarily comprised of HSG- C type soils. Surficial infiltration is possible, however it is not feasible due to the steep slope.

3.1.2.1 Hydrogeologic Conditions

Groundwater conditions will be added upon receipt of the project Soils Report.

3.1.2.2 Soil and Geologic Infiltration Characteristics

Site soils underlainment will be added upon receipt of the project Soils Report.

The site **is primarily comprised of HSG-C** type soils per Exhibit map XVI-2a in the TGD and the Orange County Hydrology Manual. Type C type soils are moderate for on-site infiltration. Infiltration is not feasible within 50' of the slope edge, nor within 8 feet of the building foundations, which represents the entire project area.

3.1.2.3 Geotechnical Conditions

Geotechnical conditions will be added upon receipt of the project Soils Report.

3.1.2.4 Summary of Infiltration Opportunities and Constraints of Existing Site

Although on-site areas comprised of Type C soils may support incidental infiltration, the steep slopes, shallow bedrock, and potential geotechnical hazards exclude the use of infiltration BMPs for this project.

3.2 Proposed Site Development Activities

3.2.1 Overview of Site Development Activities

The post-development drainage plan will eliminate direct discharge to the face of slope or Pacific Ocean by discharging directly to the natural drainage course (via an energy dissipator at the bottom of the slope) at the southerly end of the site. This natural drainage course descends and discharges directly to Glenneyre Street and into the City Storm drain system prior to entering the Pacific Ocean. Prior to discharge, the proposed drainage runoff will gravity flow to a bioretention area (Planter Box). Where possible, runoff is directed towards landscaped areas before being collected by the drain inlets. The Pacific Ocean is a known Environmentally Sensitive Area(ESA) and no runoff will be discharged directly into the water.

Details of the drainage system are shown on the Grading Plan prepared by Toal Engineering, Inc.

See Site Plan and Drainage Plan in Section 4.

3.2.2 Project Attributes Influencing Stormwater Management

Potential pollutant-generating activities:
The significant pollutant-generating activities anticipated for this residential development are Landscaping/Gardening, Pet care, Trash, and Automotive use. See Section 4.4 for applicable Site Design and Source Control BMPs.

Building Use:
The project is a single-family residential development; building use is residential.

Proposed landscaping:
On-slope areas within the project limits will be planted with native, drought-tolerant plant species, and will be temporarily irrigated to establish vegetation before disconnecting the irrigation system. Vegetation on the sloped areas beyond the project limits will remain untouched.

Drainage Patterns:
The post-development drainage pattern is intended to match the existing drainage pattern with the exception of not allowing the post-development drainage to outlet onto or over the slope. The post development drainage will be collected and treated by planter boxes that have been sized per the South Orange County Hydrology Module SOHM software that maintain runoff flow rates and durations to no more than 10% of the 2-year flowrate up to the 10 year flowrate. Please see SOHM reports in Attachment C. These planter boxes outlet directly to the bottom of the slope to reduce slope erosion. See the WQMP Site Plan and Drainage Plan in Section 4.1.

Proposed Slopes:
The on-site slopes outside of the project area will remain untouched. There are no proposed sloped areas within the project limts.

Environmentally Sensitive Features:
N/A - As noted in Section 3.1.1, there are no such areas within or near the site.

Proposed Land Uses				
Land Use Description	Total Area (acres)	Impervious Area (acres)	Pervious Area (acres)	Imperviousness (%)
Residential Project	**0.148**	**0.116**	**0.032**	**78%**
Total	**0.148**	**0.116**	**0.032**	**78%**

3.2.3 Effects on Infiltration and Harvest and Use Feasibility

As discussed in Section 3.1.2.4, there is no opportunity for on-site infiltration due to steep slopes and potential geotechnical hazards. Harvest and Use was considered for this project, but was also deemed infeasible due to lack of demand for irrigation water. The bulk of the pervious area within the project limits consist of planter areas that will be planted with native, drought-tolerant species and then temporarily irrigated until the vegetation is established; once established, the temporary irrigation will be turned off and disconnected.

3.3 Receiving Waterbodies

The project is located within the Laguna Coastal Streams Watershed. Storm runoff from the proposed development outlets into Glenneyre street for collection by the City storm drain system, which then conveys the runoff to the Pacific Ocean.

The Orange County Coast along with the Laguna Coastal Streams is 303(d) listed by the State Water Resources Board for the following impairments.

3.4 Stormwater Pollutants or Conditions of Concern

Pollutants or Conditions of Concern				
Pollutant	Expected from Proposed Land Uses/Activities (Yes or No)	Receiving Waterbody Impaired (Yes or No)	Priority Pollutant from WQIP or other Water Quality Condition? (Yes or No)	**Pollutant of Concern (Primary, Other, or No)**
Suspended-Solids	Yes	No	No	Other
Nutrients	Yes	No	No	Other
Heavy Metals	No	No	No	No
Bacteria/Virus/Pathogens	Yes	Yes	**Yes**	**Primary**
Pesticides	Yes	No	No	Other
Oil and Grease	Yes	No	No	Other
Toxic Organic Compounds	No	No	No	No
Trash and Debris	Yes	No	No	Other
Dry Weather Runoff	Yes	No	No	Other

3.5 Hydrologic Conditions of Concern

All PDPs must ensure that post-project runoff flow rates and durations for the PDF shall not exceed pre-development, naturally occuring, runoff flow rates and durations by more than 10% of the time, from 10% of the 2-year runoff event up to the 10-year runoff event.Does a hydrologic condition of concern exist for this project?

– An HCOC does not exist for this receiving water because:

☐ Project discharges directly to a protected conveyance (bed and bank are concrete lined the entire way from the point(s) of discharge to a receiving lake, reservoir, embayment, or the Ocean

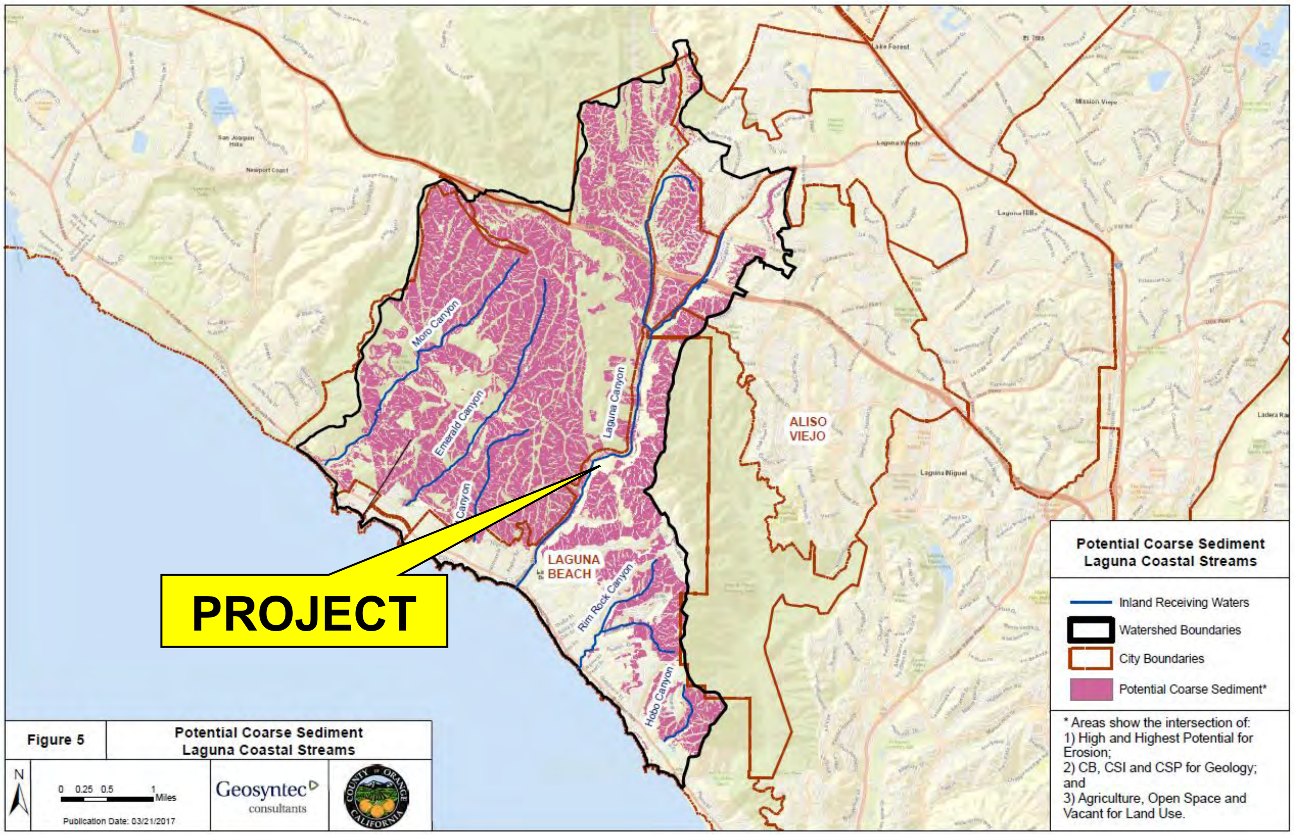
☐ Project discharges directly to storm drains which discharge directly to a reservoir, lake, embayment, ocean or protected conveyance (as described above)

☐ The project discharges to an area identified in the WMAA as exempt from hydromodification concerns

☒ Yes – An HCOC does exist for this receiving water because none of the above are applicable. Hydromofication control criteria applies because the project discharges to a natural drainage course and the project is not within the Hydromodification Exempt Areas per the TGD Appendix N.7 Hydromodification Susceptibility Maps by Jurisdiction. The natural swale descends and discharges directly to Glenneyre Street and into the City Storm drain system prior to entering the Pacific Ocean. The lower portion of the swale is concrete lined up to Glenneyre Street.

3.6 Critical Course Sediment Yield Areas

Per Figure 5 in Appendix N.8 of the TGD, the project is not located within a Potential critical coarse sediment area.



Section 4 Site Plan and Drainage Plan

4.1 Drainage Management Area Delineation

The project area includes two (2) DMAs as shown on the WQMP Site Plan on the following page, summarized as follows:

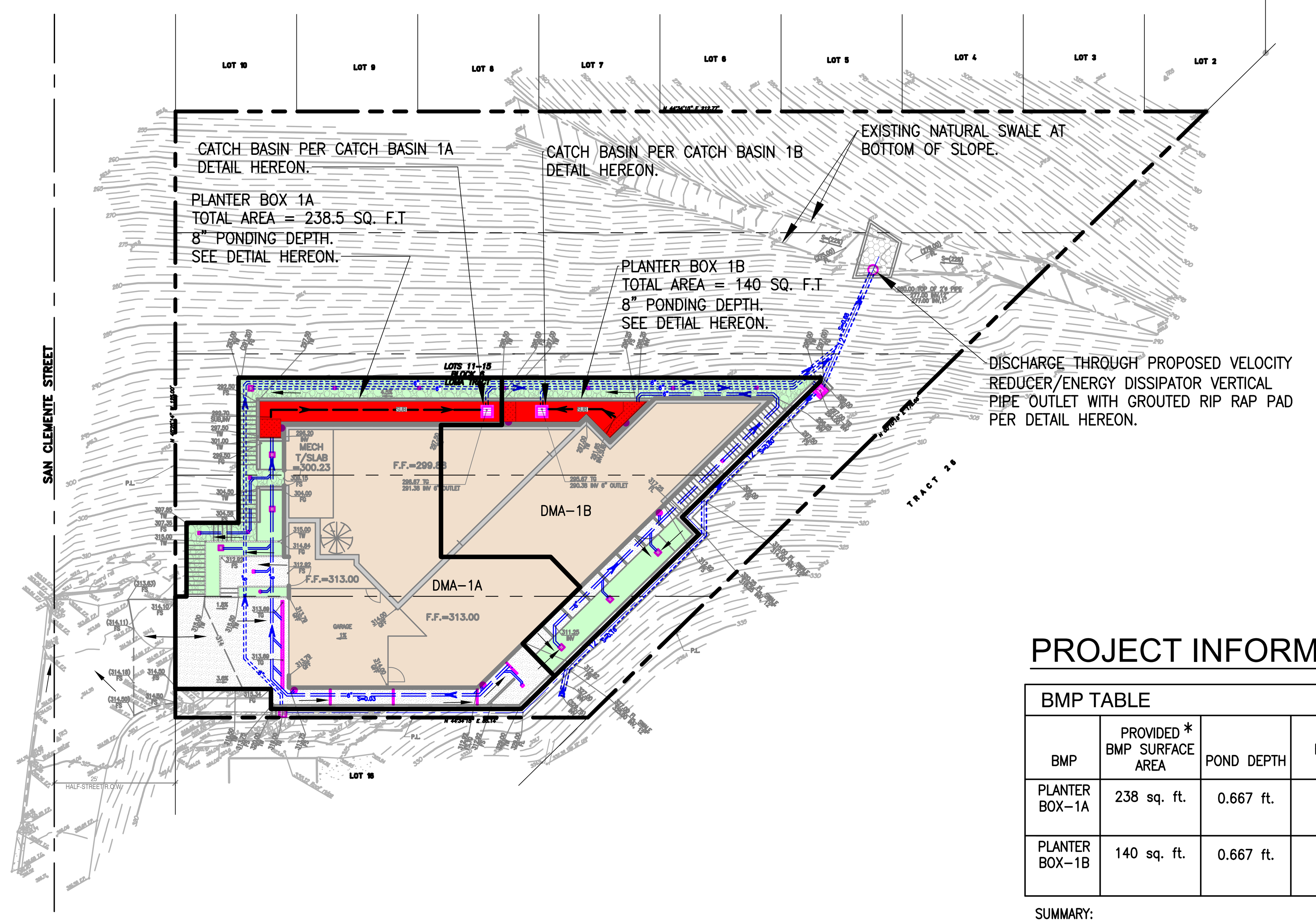
DMA-1A includes the driveway, portion of the residential building, and hardscape improvements. The runoff volume from DMA-1A is collected and conveyed to bioretention planter box 1A with underdrain unit for treatment prior to off-site discharge.

DMA-1B includes a portion of the residential building and hardscape improvements. The runoff volume from DMA-1B is collected and conveyed to bioretention planter box 1B with underdrain unit for treatment prior to off-site discharge.

GIS Coordinates of Planter Box 1A 33.526526, -117.764424

GIS Coordinates of Planter Box 1B 33.526574, -117.7644316

See DMA summary table in section 4.3.4



SCALE: 1"=20'

WQMP LEGEND

- ENCLOSED PLANTER BOX
- PROPOSED BUILDING
- PROPOSED CONCRETE PAVING
- PROPOSED ONSITE LANDSCAPE / PERVIOUS AREA
- PROPOSED INFLOW DRAIN LINE
- PROPOSED OUTFLOW DRAIN LINE
- PROPOSED DOWNSPOUT
- FLOW DIRECTION IN DRAIN LINES
- PROPOSED DRAIN INLETS
- DRAINAGE BOUNDARY
- RUNOFF FLOW DIRECTION

STRUCTURAL BMP
USE EFFICIENT IRRIGATION SYSTEMS, WATER CONSERVATION, SMART CONTROLLERS

NOT FOR CONSTRUCTION

PROJECT INFORMATION:

BMP TABLE

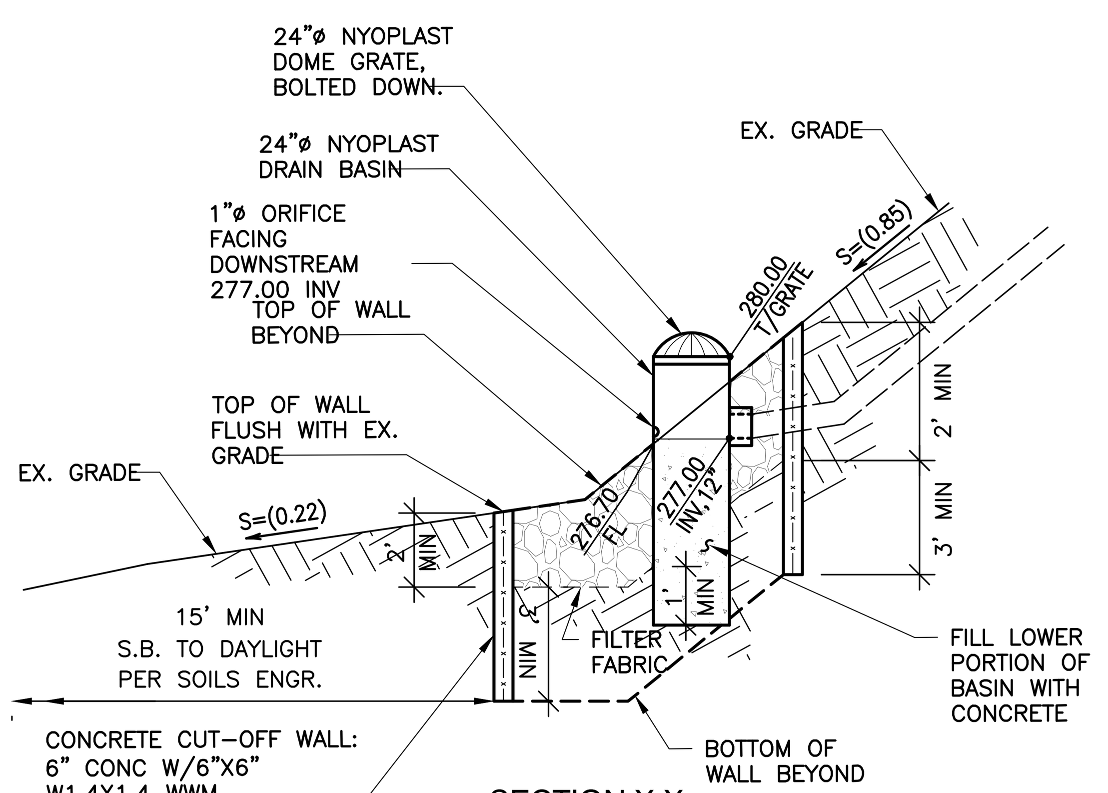
BMP	PROVIDED * BMP SURFACE AREA	POND DEPTH	PROVIDED ** BMP STORAGE VOLUME	DMA	DMA AREA	BIO-FILTRATION *** MIN REQUIRED STORAGE VOLUME	HYDROMOD **** MIN REQUIRED STORAGE VOLUME
PLANTER BOX-1A	238 sq. ft.	0.667 ft.	397 cu. ft.	DMA-1A	4,058 sq. ft. (0.093 ac)	148.4 cu. ft.	397 cu. ft.
PLANTER BOX-1B	140 sq. ft.	0.667 ft.	233 cu. ft.	DMA-1B	2,410 sq. ft. (0.055 ac)	87.4 cu. ft.	233 cu. ft.

SUMMARY:
* MINIMUM REQUIRED PLANTER AREA PER SOHM (ATTACHMENT C)
** STORAGE VOLUME = PONDING + PORE SPACE
*** MINIMUM REQUIRED STORAGE VOLUME PER WORKSHEET 8 IN ATTACHMENT E
**** MINIMUM REQUIRED STORAGE VOLUME PER SOHM (ATTACHMENT C) = PONDING + PORE SPACE

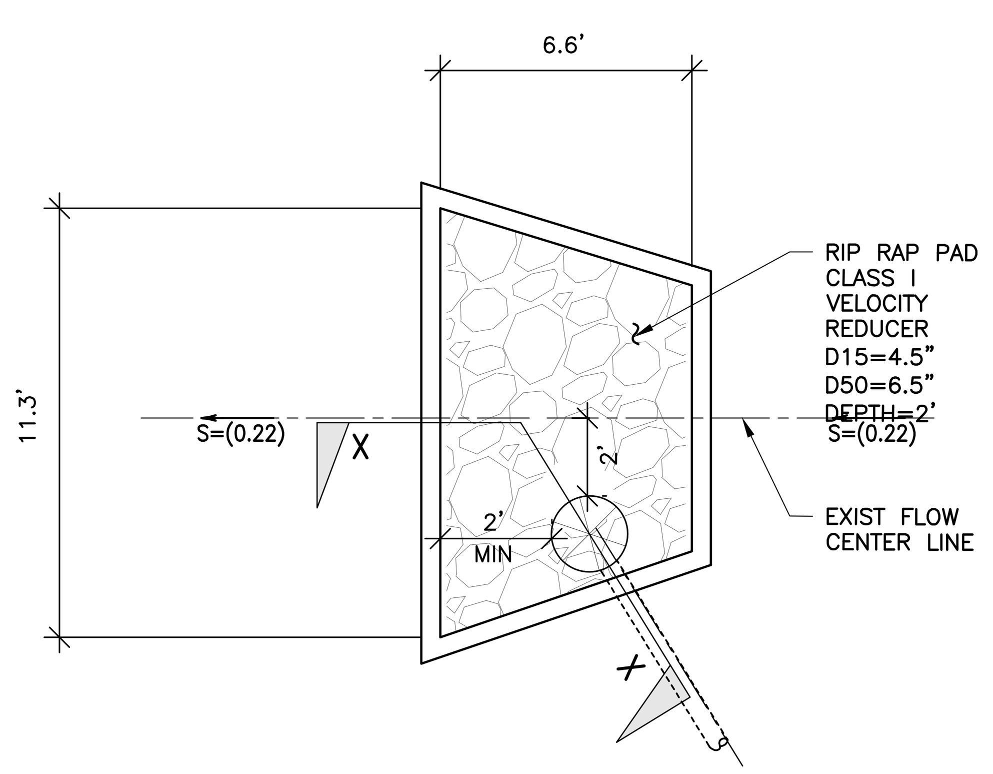
APPROXIMATE GIS COORDINATES FOR BMP'S

PLANTER BOX 1A: 33.526526, -117.764424

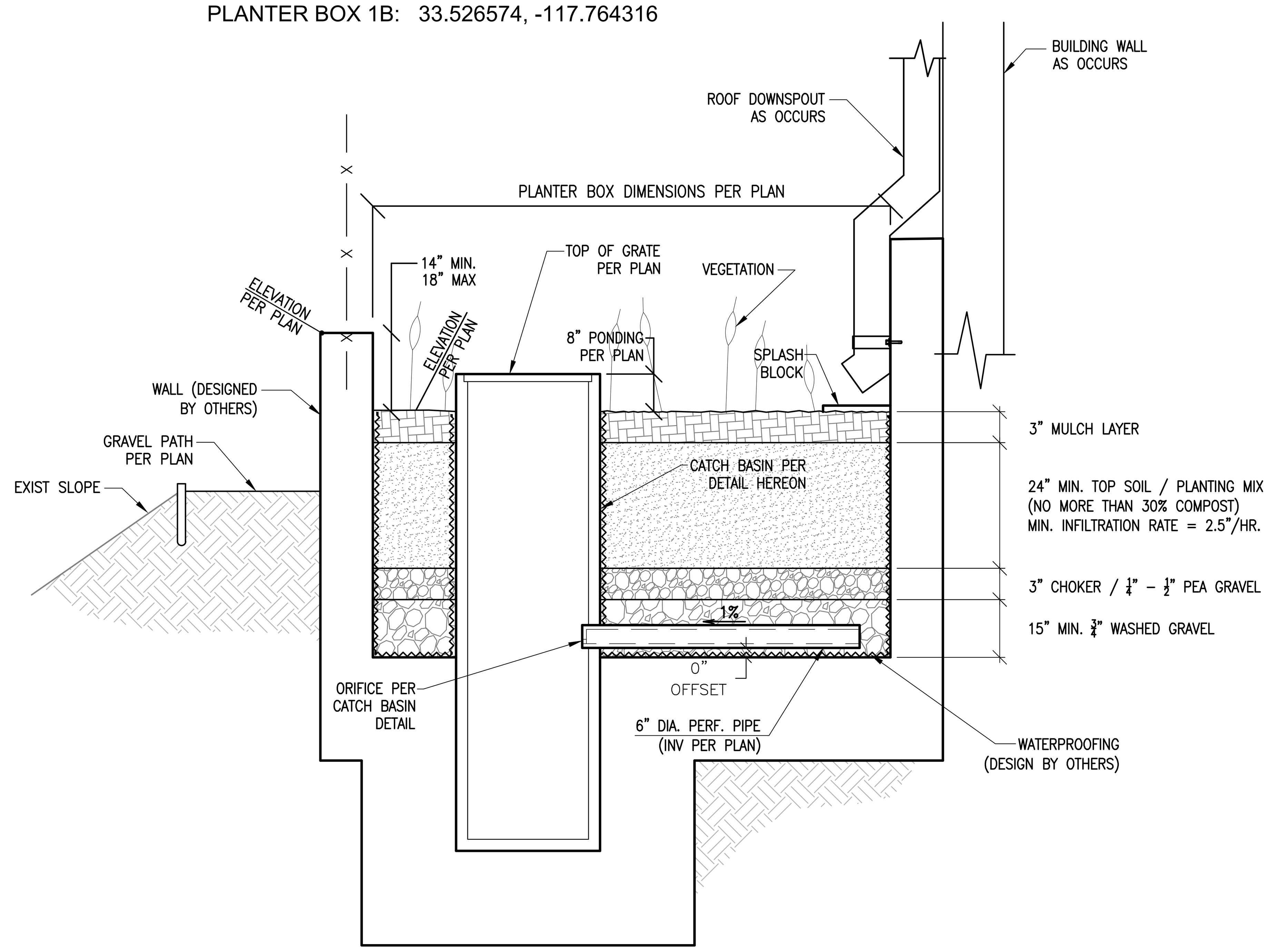
PLANTER BOX 1B: 33.526574, -117.764316



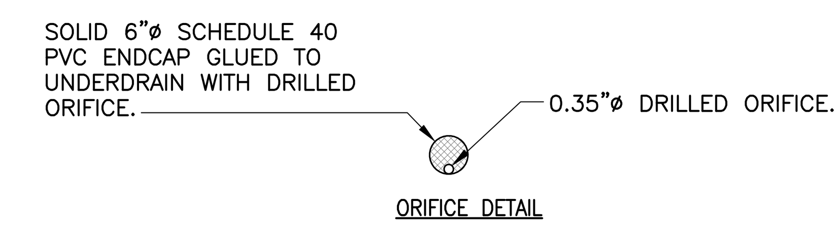
SECTION X-X

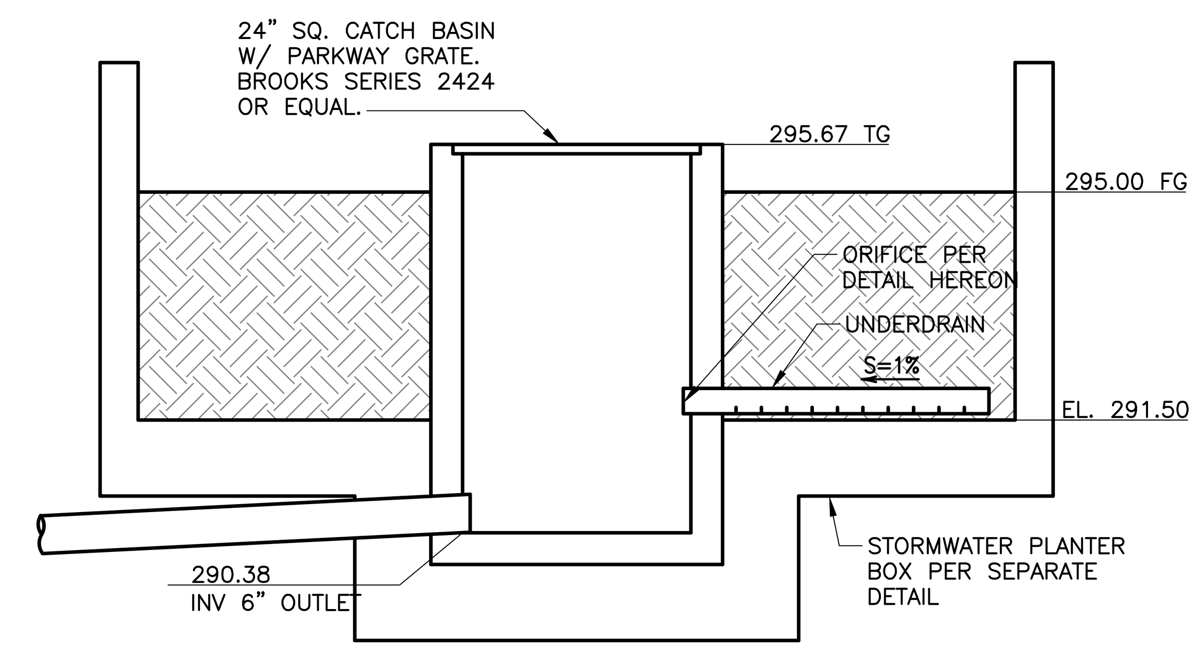


DETAIL
VERTICAL PIPE OUTLET WITH RIP RAP PAD
SCALE: 1/4" = 1'-0"

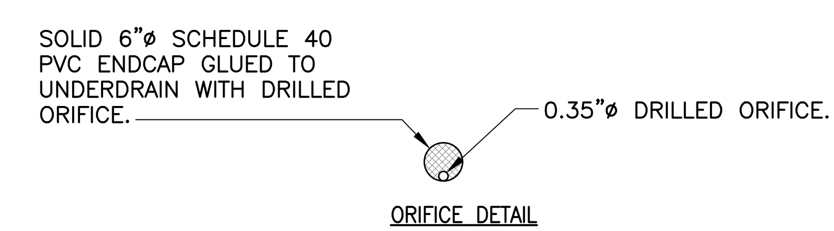


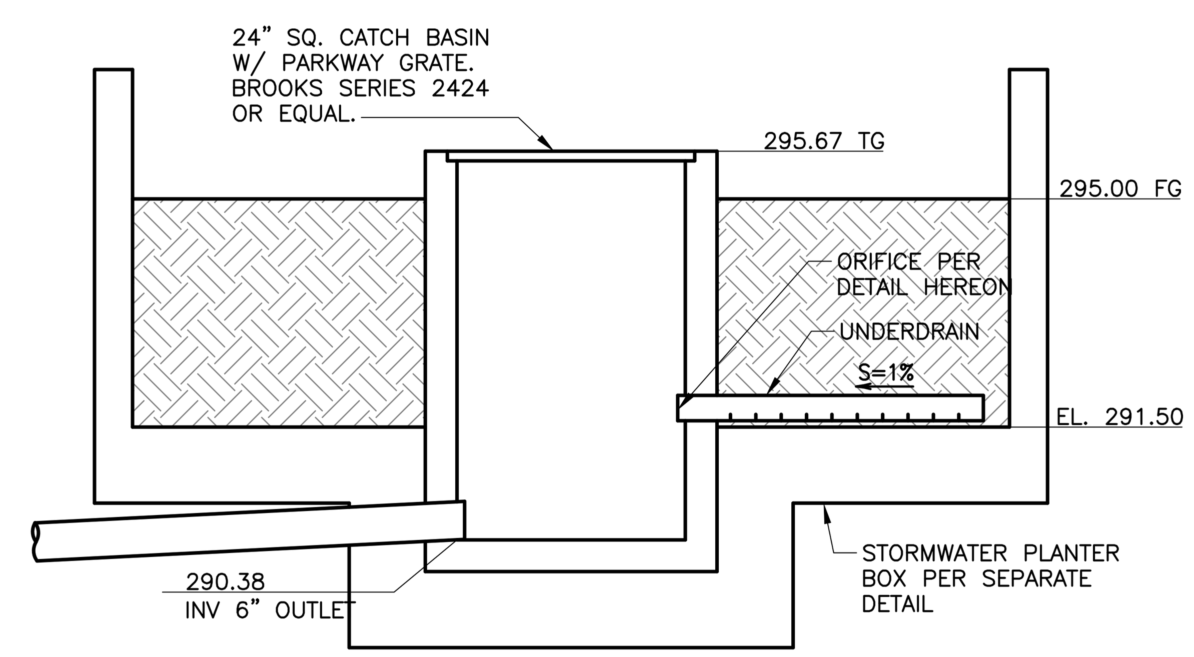
DETAIL PLANTER BOX
BIO-1: BIO-RETENTION PLANTER
NOT TO SCALE





DETAIL
1B FLOW CONTROL / DETENTION CATCH BASIN
NOT TO SCALE





DETAIL
1B FLOW CONTROL / DETENTION CATCH BASIN
NOT TO SCALE

PLANS PREPARED BY:
TOAL ENGINEERING, INC.
CIVIL ENGINEERING
LAND SURVEYING
STORMWATER QUALITY
139 Avenida Navarro
San Clemente, CA 92672
949 492 8586
www.toalengineering.com

REGISTERED PROFESSIONAL ENGINEER CALEB RIOS No. 57587 CIVIL STATE OF CALIFORNIA

CALEB RIOS
R.C.E. 57587
DATE:

PREPARED FOR:
KEVIN AARONSON

DATE	APVD.	DATE	BY	REVISIONS

AARONSON RESIDENCE
WATER QUALITY MANAGEMENT PLAN (WQMP) SITE PLAN
LOTS 11-15, BLOCK 6, LOMA TRACT
2354 SAN CLEMENTE, LAGUNA BEACH CA

DATE: 12/27/18	H. SCALE: 1"=8'
SURVEY DATE: 10/01/18	V. SCALE: N/A
DRN.: O.R.	DWG. NO. 1
CHD.: C.R.	
APPD.: C.R.	
JOB NO. 18156	SHEET 1 OF 1

12/27/2018 3:01:44 PM N:\181xx\18156\Reports\WQMP\18156-WQMP-SITE-PLAN.dwg

4.2 Overall Site Design BMPs

Minimize Impervious Area:
Driveway and walkways designed to minimum widths. Utilized multi-floor building to minimize building footprint.

Maximize Natural Infiltration Capacity:
N/A due to the steep topography and geotechnical hazards related to infiltration for the project site.

Preserve Existing Drainage Patterns and Time of Concentration:
The ultimate point of discharge is the same for the pre- and post-development conditions. Time of concentration is reduced by the project as a necessary consequence of proper drainage design on the steep slopes. Site discharge is limited to pre-development rates per SOHM requirements.

Disconnect Impervious Areas:
Pervious areas are distributed throughout the project. Hardscape areas are designed to drain to landscape areas where practicable; however, priority is given in the drainage design to protect foundations and other structures from the effects of runoff, including maintenance considerations.

Protect Existing Vegetation and Sensitive Areas:
Existing vegetation on sloped areas beyond the project limits shall remain untouched.

Revegetate Disturbed Areas:
There are no proposed sloped areas on the project. Any disturbed slope area shall be revegetated with native, drought-tolerant plant species in accordance with the project landscape plan. Vegetation shall comply with the City's Water Efficient Landscape Ordinance 9.55.020 (drought tolerant species with low water use).

Soil Stockpiling and Site Generated Organics:
Soils harvested during remedial grading shall be checked by the geotechnical engineer of record and designated for on-site use to the maximum extent feasible for revegetation purposes.

Firescaping:
Proposed landscape plant palette shall incorporate plants appropriate for the zone(s) around the development in an effort to mitigate fire risk to the maximum extent practicable.

Water Efficient Landscaping:
Plant materials on the disturbed slope areas shall consist of drought-tolerant species with limited irrigation requirements. Irrigation will be used only temporarily on the slopes to establish vegetation immediately after planting.

Slopes and Channel Buffers:

For planting, see Water Efficient Landscaping above. Additionally, drainage devices are proposed around the development area to capture storm runoff and avoid water flowing over slopes.

4.3 DMA Characteristics and Site Design BMPs

4.3.1 DMA-1A

Location:
DMA-1A includes the driveway, and portion of the residential building and hardscape improvements.

Area:
DMA-1A measures 4,058 sq. ft. (0.093 ac) with an impervious area of 78.5 percent.

Topographic Features and Drainage Pattern:
Runoff within DMA-1A is collected by a series of roof gutters and drain inlets, and conveyed via underground drain pipes to bioretention planter box 1A. Treated runoff is then discharged directly to the natural Drainage course at the bottom of the rear slope that discharges to Glenneyre Street.

BMP Locations/Placement:
The LID Bioretention planter box BMP is located along the northwesterly side of the project; this location was selected to avoid conflicts with footings, residential area and slope.

Land Uses and Pollutant-Generating Activities:
Residential development. See Table in Section 3.4 for expected project pollutants for this type of development.

Site Design BMPs:
HSCs were considered for this DMA, but were not implemented due to infiltration infeasibility, topography constraints related to the hillside and slopes, and architectural design considerations related to the roof.

Infiltration Feasibility:
See Worksheet 1 for the entire project in Attachment G. As shown thereon, and discussed earlier in Sections 3.1.2.4 and 3.2.3., infiltration is not feasible for this project.

Harvested Stormwater Demand and Feasibility:
As discussed earlier in Section 3.2.3, Harvest and Use is not feasible for this project. On-site pervious areas do not generate sufficient irrigation demand, as these areas are to be planted with native, drought tolerant species and will not be irrigated after vegetation has been initially established. A LID BMP that can fully address the runoff from this DMA was selected instead.

4.3.2 DMA-1B

Location:
DMA-1B includes portions of the residential building and hardscape improvements.

Area:
DMA-1B measures 2,410 sq. ft. (0.055 ac) with an impervious area of 78.2 percent.

Topographic Features and Drainage Pattern:
Runoff within DMA-1B is collected by a series of roof gutters and drain inlets, and conveyed via underground drain pipes to bioretention planter box 1B. Treated runoff is then discharged directly to the natural Drainage course at the bottom of the rear slope that discharges to Glenneyre Street.

BMP Locations/Placement:
The LID Bioretention planter box BMP is located along the northwesterly side of the project; this location was selected to avoid conflicts with footings, residential area and slope.

Land Uses and Pollutant-Generating Activities:
Residential development. See Table in Section 3.4 for expected project pollutants for this type of development.

Site Design BMPs:
HSCs were considered for this DMA, but were not implemented due to infiltration infeasibility, topography constraints related to the hillside and slopes, and architectural design considerations related to the roof.

Infiltration Feasibility:
See Worksheet 1 for the entire project in Attachment G. As shown thereon, and discussed earlier in Sections 3.1.2.4 and 3.2.3., infiltration is not feasible for this project.

Harvested Stormwater Demand and Feasibility:
As discussed earlier in Section 3.2.3, Harvest and Use is not feasible for this project. On-site pervious areas do not generate sufficient irrigation demand, as these areas are to be planted with native, drought tolerant species and will not be irrigated after vegetation has been initially established. A LID BMP that can fully address the runoff from this DMA was selected instead.

4.3.3 DMA Summary

Drainage Management Areas				
DMA (Number/Description)	Total Area (acres)	Imperviousness (%)	Infiltration Feasibility Category (Full, Partial, or No Infiltration)	Hydrologic Source Controls Used
DMA-1A: On-site Buildings, driveway, and hardscapes	0.093	78.5	No Infiltration	None
DMA-1B: On-site Buildings, and hardscapes	0.055	78.2	No infiltration	None

4.4 Source Control BMPs

Non-Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**Reason Source Control is Not Applicable**
		Included	**Not Applicable**	
N1	Education for Property Owners, Tenants and Occupants	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No hazardous materials onsite.
N6	Local Industrial Permit Compliance	☐	☒	Not an industrial project.
N7	Spill Contingency Plan	☐	☒	No bulk storage of chemicals.
N8	Underground Storage Tank Compliance	☐	☒	No underground storage tanks.
N9	Hazardous Materials Disclosure Compliance	☐	☒	No bulk storage of hazardous materials on-site.
N10	Uniform Fire Code Implementation	☐	☒	No bulk storage of hazardous materials on-site.
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	N/A – residential development.
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☐	☒	N/A – single-family residential
N16	Retail Gasoline Outlets	☐	☒	Not a retail gasoline outlet.

N1 - Education for Property Owners, Tenants, and Occupants

Property owner(s) shall read and be familiar with this WQMP. The owner and occupants shall take an active role in promoting water quality (i.e. proper disposal of trash/waste, avoiding non-stormwater discharges, etc.). For more information, visit: http://ocwatersheds.com/publiced

N2 – Activity Restrictions

Outdoor activities are anticipated to be limited at this residential site, but the following items shall be taken into consideration:

- Avoid hosing down driveways and walkways; sweep the surfaces and properly dispose of collected debris, as needed.
- Wash water from any cleaning activities shall be contained and not directed to the storm drain.

N3 - Common Area Landscape Management

Property landscape management will be done under the supervision of the Owner. Plant material shall be selected with consideration taken for minimizing water and fertilizer requirements. Maintenance personnel shall be instructed to minimize irrigation, maintain the irrigation system in proper working condition, and keep inlet grates clear of debris. Maintenance shall be consistent with provisions of the Conservation Resolution and County Management Guidelines, EPA Preventing Pollution through Efficient Water Use, and Proper Use of Fertilizer and Pesticides.

N4-BMP Maintenance

See Inspection and Maintenance Responsibility & Frequency Plan in Attachment B.

N11 - Litter Control

Litter within the boundaries of the subject property will be cleaned up by the owner or contracted maintenance company under the supervision of the property owner. Collected debris shall be placed in the appropriate waste container for off-site disposal or recycling.

N12 – Employee Training

All contracted landscape and maintenance personnel shall read and be familiar with this WQMP. A copy should be made available at time of hire, and subsequently accessible for the duration of the service contract. Discussions between property owner and maintenance personnel, regarding onsite water quality expectations, shall take place on an annual basis. See also link in N1 above.

N14 - Catch Basin Inspection

Drain inlets, catch basins, surface gutters, and outlets shall be inspected and cleaned prior to the rainy season (October 1st) each year.

Structural Source Control BMPs				
Identifier	Name	Check One		Reason Source Control is Not Applicable
		Included	Not Applicable	
S1	Provide storm drain system stenciling and signage	☐	☒	Private residence
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	No significant outdoor material storage areas.
S3	Design and construct trash and waste storage areas to reduce pollution introduction	☒	☐	
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	
S5	Protect slopes and channels and provide energy dissipation	☐	☒	Drainage devices provided upstream of proposed improvements. No project runoff is discharged onto slopes.
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☐	
S6	Dock areas	☐	☒	No dock areas.
S7	Maintenance bays	☐	☒	No maintenance bays.
S8	Vehicle wash areas	☐	☒	No vehicle wash areas.
S9	Outdoor processing areas	☐	☒	No outdoor processing areas.
S10	Equipment wash areas	☐	☒	No equipment wash areas.
S11	Fueling areas	☐	☒	No fueling areas.
S12	Hillside landscaping	☒	☐	
S13	Wash water control for food preparation areas	☐	☒	Single-family residence.
S14	Community car wash racks	☐	☒	Not a commercial car wash.

S3

The trash area is located at the Southwest corner of the residence, adjacent to the parking garage entrance. The ground around the trash area shall be kept clear of loose debris, and the lids to all containers shall remain closed when not in use.

S4

The irrigation system is to be designed and constructed to facilitate irrigation and avoid over-watering. The use of an automated timer system will control valve run times, and low precipitation heads will minimize the amount of water entering the landscape areas. The system shall be equipped with a moisture detection system and/or rain shut-off trigger(s) to avoid unnecessary irrigation. The use of drought-tolerant plant materials, and the grouping of different species with similar watering requirements, will help to reduce the amount of irrigation needed to maintain healthy vegetation on-site. The property owner shall refer to the "Water Quality Guidelines for Landscaping and Gardening" (see Educational Materials attachments) for additional information.

S12

The sloped areas within the limits of this project shall be revegetated with native, drought-tolerant plant material. Temporary irrigation will be used until the vegetation on the slope has been established, at which point the irrigation system will be turned off.

Section 5 Low Impact Development BMPs

5.1 LID BMPs in DMA-1A

Infiltration is not feasible for this project due to: 1) the close proximity of on-site slopes steeper than 15%; 2) the geotechnical hazards created by any proposed infiltration.

Harvest and Use is not feasible for this project due to insufficient irrigation demand from the conservation landscaping proposed throughout the development. The majority of the available landscape area will be planted with native, drought tolerant species and will not be irrigated. The total non-irrigated on-site landscape area = 750 sf (0.017 c). The irrigated on-site landscape area = 138 sf (0.003 ac). This irrigated area creates a negligible amount of daily demand as shown in the calculation below. A Harvest and Reuse Cistern for 2.1 Gallons/day is not feasible.

Per TGD Section F.2.5.3

Modified EAWU Daily Average Irrigation Demand in Laguna Beach= 680 gpd / Irrigated Acre x 0.003 Acre

EAWU = 2.1 Gallons/Day

This DMA will utilize a LID BMP with no infiltration. BMP selection is subject to space constraints resulting from the proposed residential buildings, the driveway, and the various site walls throughout which require footings, ect for design.

5.1.1 Hydrologic Source Controls for DMA-1A

Impervious area dispersion is a site design consideration for the drainage layout, however, priority is given to proper collection and conveyance of storm water away from buildings and structures. Use of this HSC BMP within DMA-1A does not qualify for a reduction toward control of the DCV, thus Worksheet 4 is not provided herewith.

5.1.2 Structural LID BMP for DMA-1A

BMP Type:
DMA-1A is categorized as “bioretention with underdrain.” The selected LID BMP for this DMA is a Bio retention (bio infiltration with underdrain) BMP BIO-6. (see ATTACHMENT E for BIO-6 fact sheet)

BMP Sizing:
Sizing of “bioretention with underdrain” BMPs utilizes Worksheet 8 (see Attachment E).

BMP Design:

$DCV = C \times d \times A$

$C = (0.75 \times imp + 0.15)$ where: $imp = 0.785$

$d = 0.75\ inches$

$A = 0.093\ ac.$

$DCV = 0.74 \text{ x } 0.75 \text{ x } 0.093 \text{ x } 43{,}560 \text{ x } \left(1\ in. - 12\ ft.\right)$ → **DCV =187 c.f. "See Worksheet 8 for calculation"**

5.2 LID BMPs in DMA-1B

Infiltration is not feasible for this project due to: 1) the close proximity of on-site slopes steeper than 15%; 2) the geotechnical hazards created by any proposed infiltration.

Harvest and Use is not feasible for this project due to insufficient irrigation demand from the conservation landscaping proposed throughout the development. The majority of the available landscape area will be planted with native, drought tolerant species and will not be irrigated. The total non-irrigated on-site landscape area = 450 sf (0.010 c). The irrigated on-site landscape area = 76 sf (0.002 ac). This irrigated area creates a negligible amount of daily demand as shown in the calculation below. A Harvest and Reuse Cistern for 1.4 Gallons/day is not feasible.

Per TGD Section F.2.5.3

Modified EAWU Daily Average Irrigation Demand in Laguna Beach= 680 gpd / Irrigated Acre x 0.002 Acre

EAWU = 1.4 Gallons/Day

This DMA will utilize an LID BMP with no infiltration. BMP selection is subject to space constraints resulting from the proposed residential buildings, the driveway, and the various site walls throughout which require footings, ect for design.

5.2.1 Hydrologic Source Controls for DMA-1B

Impervious area dispersion is a site design consideration for the drainage layout, however, priority is given to proper collection and conveyance of storm water away from buildings and structures. Use of this HSC BMP within DMA-1A does not qualify for a reduction toward control of the DCV, thus Worksheet 4 is not provided herewith.

5.2.2 Structural LID BMP for DMA-1B

BMP Type:

DMA-1B is categorized as "bioretention with underdrain." The selected LID BMP for this DMA is a Bio retention (bio infiltration with underdrain) BMP BIO-6. (see ATTACHMENT E for BIO-6 fact sheet)

BMP Sizing:

Sizing of "bioretention with underdrain" BMPs utilizes Worksheet 8 (see Attachment E).

BMP Design:

$DCV = C \times d \times A$

$C = (0.75 \times imp + 0.15)$ where: $imp = 0.782$

$d = 0.75\ inches$

$A = 0.055\ ac.$

$DCV = 0.736 \text{ x } 0.75 \text{ x } 0.055 \text{ x } 43{,}560 \text{ x } \left(1\ in. - 12\ ft.\right)$ → **DCV =110.3 c.f. "See Worksheet 8 for calculation"**

5.3 Summary of LID BMPs

DMA	DMA-1A	DMA-1B
BMP Type	Bio retention planter box with underdrain	Bio retention planter box with underdrain
DCV	187 cu-ft	110.3 cu-ft
$A_{bmp\text{-}eff}$	89 sq-ft	52.5 sq-ft
$V_{media\text{-}retain}$	17.8 cu-ft	10.5 cu-ft
$V_{biofilter\text{-}storage\text{-}req}$	126.9 cu-ft	74.8 cu-ft
$V_{biofilter\text{-}storage}$	148.4 cu-f	87.4 cu-ft
Sizing Criteria Met	YES	YES

Section 6 Hydromodification BMPs

Hydromodification Control BMPs	
BMP Name	**BMP Description**
BIO-6 Bioretention Planter boxes with underdrain	Bioretention with underdrains (Flow through planter boxes). This BMP functions as a soil and plant-based filtration device and also as a stormwater retention device.

Per the SOHM software the required planter box sizes required to meet the hydromodification requirements are:

DMA-1A

Minimum planter box surface area required= 238 s.f.

Planter box surface area provided = 238 s.f. .... OK

Minimum Ponding Depth required= 8 inches = Ponding Depth provided .... OK

DMA-1B

Minimum planter box surface area required: 140 s.f.

Planter box surface area provided: 140 s.f. .... OK

Ponding Depth required: 8 inches = Ponding Depth provided ..... OK

(Please see Attachment C for the full SOHM report that contains all the hydromodification calculations and details)

Section 7 Educational Materials Index

Educational Materials			
Residential Material (http://www.ocwatersheds.com)	**Check If Applicable**	**Business Material (http://www.ocwatersheds.com)**	**Check If Applicable**
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☐
Homeowners Guide for Sustainable Water Use	☒	Proper Maintenance Practices for Your Business	☐
Household Tips	☒	Compliance BMPs for Mobile Businesses	☐
Proper Disposal of Household Hazardous Waste	☒	**Other Material**	**Check If Attached**
Recycle at Your Local Used Oil Collection Center (North County)	☐		
Recycle at Your Local Used Oil Collection Center (Central County)	☐	Tips for Pool Maintenance	☒
Recycle at Your Local Used Oil Collection Center (South County)	☒		☐
Tips for Maintaining a Septic Tank System	☐		☐
Responsible Pest Control	☒		☐
Sewer Spill	☐		☐
Tips for the Home Improvement Projects	☐		☐
Tips for Horse Care	☐		☐
Tips for Landscaping and Gardening	☒		☐
Tips for Pet Care	☐		☐
Tips for Projects Using Paint	☐		☐

ATTACHMENT A
Educational Materials

For More Information

California Environmental Protection Agency
www.calepa.ca.gov
- **Air Resources Board**
  www.arb.ca.gov
- **Department of Pesticide Regulation**
  www.cdpr.ca.gov
- **Department of Toxic Substances Control**
  www.dtsc.ca.gov
- **Integrated Waste Management Board**
  www.ciwmb.ca.gov
- **Office of Environmental Health Hazard Assessment**
  www.oehha.ca.gov
- **State Water Resources Control Board**
  www.waterboards.ca.gov

Earth 911 - Community-Specific Environmental Information 1-800-cleanup or visit www.1800cleanup.org

Health Care Agency's Ocean and Bay Water Closure and Posting Hotline
(714) 433-6400 or visit www.ocbeachinfo.com

Integrated Waste Management Dept. of Orange County (714) 834-6752 or visit www.oclandfills.com for information on household hazardous waste collection centers, recycling centers and solid waste collection

O.C. Agriculture Commissioner
(714) 447-7100 or visit www.ocagcomm.com

Stormwater Best Management Practice Handbook
Visit www.cabmphandbooks.com

UC Master Gardener Hotline
(714) 708-1646 or visit www.uccemg.com

The Orange County Stormwater Program has created and moderates an electronic mailing list to facilitate communications, take questions and exchange ideas among its users about issues and topics related to stormwater and urban runoff and the implementation of program elements. To join the list, please send an email to ocstormwaterinfo-join@list.ocwatersheds.com

Orange County Stormwater Program

Aliso Viejo	(949)	425-2535
Anaheim Public Works Operations	(714)	765-6860
Brea Engineering	(714)	990-7666
Buena Park Public Works	(714)	562-3655
Costa Mesa Public Services	(714)	754-5323
Cypress Public Works	(714)	229-6740
Dana Point Public Works	(949)	248-3584
Fountain Valley Public Works	(714)	593-4441
Fullerton Engineering Dept.	(714)	738-6853
Garden Grove Public Works	(714)	741-5956
Huntington Beach Public Works	(714)	536-5431
Irvine Public Works	(949)	724-6315
La Habra Public Services	(562)	905-9792
La Palma Public Works	(714)	690-3310
Laguna Beach Water Quality	(949)	497-0378
Laguna Hills Public Services	(949)	707-2650
Laguna Niguel Public Works	(949)	362-4337
Laguna Woods Public Works	(949)	639-0500
Lake Forest Public Works	(949)	461-3480
Los Alamitos Community Dev.	(562)	431-3538
Mission Viejo Public Works	(949)	470-3056
Newport Beach, Code & Water Quality Enforcement	(949)	644-3215
Orange Public Works	(714)	532-6480
Placentia Public Works	(714)	993-8245
Rancho Santa Margarita	**(949)**	**635-1800**
San Clemente Environmental Programs	**(949)**	**361-6143**
San Juan Capistrano Engineering	**(949)**	**234-4413**
Santa Ana Public Works	**(714)**	**647-3380**
Seal Beach Engineering	**(562) 431-2527 x317**	
Stanton Public Works	**(714) 379-9222 x204**	
Tustin Public Works/Engineering	**(714)**	**573-3150**
Villa Park Engineering	**(714)**	**998-1500**
Westminster Public Works/Engineering	**(714) 898-3311 x446**	
Yorba Linda Engineering	**(714)**	**961-7138**
Orange County Stormwater Program	**(877)**	**897-7455**

Orange County 24-Hour Water Pollution Problem Reporting Hotline
1-877-89-SPILL (1-877-897-7455)

On-line Water Pollution Problem Reporting Form
www.ocwatersheds.com

Printed on Recycled Paper

The Ocean Begins at Your Front Door

Even if you live miles from the Pacific Ocean, you may be unknowingly polluting it.

Did You Know?

- Most people believe that the largest source of water pollution in urban areas comes from specific sources such as factories and sewage treatment plants. In fact, the largest source of water pollution comes from city streets, neighborhoods, construction sites and parking lots. This type of pollution is sometimes called "non-point source" pollution.
- There are two types of non-point source pollution: stormwater and urban runoff pollution.
- Stormwater runoff results from rainfall. When rainstorms cause large volumes of water to rinse the urban landscape, picking up pollutants along the way.
- Urban runoff can happen any time of the year when excessive water use from irrigation, vehicle washing and other sources carries trash, lawn clippings and other urban pollutants into storm drains.

Where Does It Go?

- **Anything we use outside homes, vehicles and businesses – like motor oil, paint, pesticides, fertilizers and cleaners – can be blown or washed into storm drains.**
- **A little water from a garden hose or rain can also send materials into storm drains.**
- **Storm drains are separate from our sanitary sewer systems; unlike water in sanitary sewers (from sinks or toilets), water in storm drains is not treated before entering our waterways.**

Sources of Non-Point Source Pollution

- Automotive leaks and spills.
- Improper disposal of used oil and other engine fluids.
- Metals found in vehicle exhaust, weathered paint, rust, metal plating and tires.
- Pesticides and fertilizers from lawns, gardens and farms.
- Improper disposal of cleaners, paint and paint removers.
- Soil erosion and dust debris from landscape and construction activities.
- Litter, lawn clippings, animal waste, and other organic matter.
- Oil stains on parking lots and paved surfaces.

Dumping one quart of motor oil into a storm drain can contaminate 250,000 gallons of water.

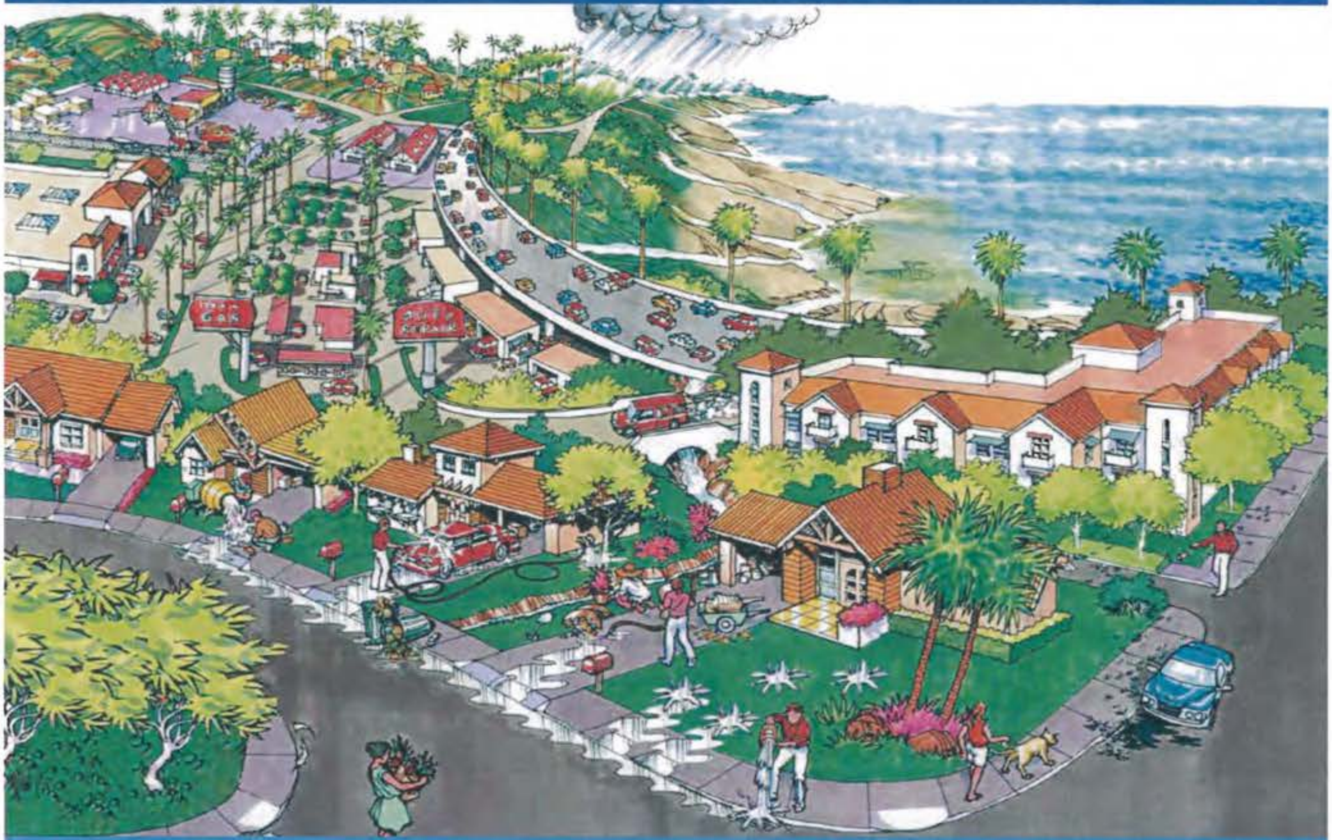
The Effect on the Ocean

Non-point source pollution can have a serious impact on water quality in Orange County. Pollutants from the storm drain system can harm marine life as well as coastal and wetland habitats. They can also degrade recreation areas such as beaches, harbors and bays.

Stormwater quality management programs have been developed throughout Orange County to educate and encourage the public to protect water quality, monitor runoff in the storm drain system, investigate illegal dumping and maintain storm drains.

Support from Orange County residents and businesses is needed to improve water quality and reduce urban runoff pollution. Proper use and disposal of materials will help stop pollution before it reaches the storm drain and the ocean.

The Ocean Begins at Your Front Door



Never allow pollutants to enter the street, gutter or storm drain!

Follow these simple steps to help reduce water pollution:

Household Activities

- Do not rinse spills with water. Use dry cleanup methods such as applying cat litter or another absorbent material, sweep and dispose of in the trash. Take items such as used or excess batteries, oven cleaners, automotive fluids, painting products and cathode ray tubes, like TVs and computer monitors, to a Household Hazardous Waste Collection Center (HHWCC).
- For a HHWCC near you call (714) 834-6752 or visit www.oclandfils.com.
- Do not hose down your driveway, sidewalk or patio to the street, gutter or storm drain. Sweep up debris and dispose of it in the trash.

Automotive

- Take your vehicle to a commercial car wash whenever possible. If you wash your vehicle at home, choose soaps, cleaners, or detergents labeled non-toxic, phosphate- free or biodegradable. Vegetable and citrus-based products are typically safest for the environment.
- Do not allow washwater from vehicle washing to drain into the street, gutter or storm drain. Excess washwater should be disposed of in the sanitary sewer (through a sink or toilet) or onto an absorbent surface like your lawn.
- Monitor your vehicles for leaks and place a pan under leaks. Keep your vehicles well maintained to stop and prevent leaks.
- Never pour oil or antifreeze in the street, gutter or storm drain. Recycle these substances at a service station, a waste oil collection center or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.1800cleanup.org.

Pool Maintenance

- Pool and spa water must be dechlorinated and free of excess acid, alkali or color to be allowed in the street, gutter or storm drain.
- When it is not raining, drain dechlorinated pool and spa water directly into the sanitary sewer.
- Some cities may have ordinances that do not allow pool water to be disposed of in the storm drain. Check with your city.

Landscape and Gardening

- Do not over-water. Water your lawn and garden by hand to control the amount of water you use or set irrigation systems to reflect seasonal water needs. If water flows off your yard onto your driveway or sidewalk, your system is over-watering. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of waste by composting, hauling it to a permitted landfill, or as green waste through your city's recycling program.
- Follow directions on pesticides and fertilizer, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Take unwanted pesticides to a HHWCC to be recycled. For locations and hours of HHWCC, call (714) 834-6752 or visit www.oclandfills.com.

Trash

- Place trash and litter that cannot be recycled in securely covered trash cans.
- Whenever possible, buy recycled products.
- Remember: Reduce, Reuse, Recycle.

Pet Care

- Always pick up after your pet. Flush waste down the toilet or dispose of it in the trash. Pet waste, if left outdoors, can wash into the street, gutter or storm drain.
- If possible, bathe your pets indoors. If you must bathe your pet outside, wash it on your lawn or another absorbent/permeable surface to keep the washwater from entering the street, gutter or storm drain.
- Follow directions for use of pet care products and dispose of any unused products at a HHWCC.

Common Pollutants

Home Maintenance
- Detergents, cleaners and solvents
- Oil and latex paint
- Swimming pool chemicals
- Outdoor trash and litter

Lawn and Garden
- Pet and animal waste
- Pesticides
- Clippings, leaves and soil
- Fertilizer

Automobile
- Oil and grease
- Radiator fluids and antifreeze
- Cleaning chemicals
- Brake pad dust

Do your part to prevent water pollution in our creeks, rivers, bays and ocean.

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, not properly disposing of household hazardous waste can lead to water pollution. Batteries, electronics, paint, oil, gardening chemicals, cleaners and other hazardous materials cannot be thrown in the trash. They also must never be poured or thrown into yards, sidewalks, driveways, gutters or streets. Rain or other water could wash the materials into the storm drain and eventually into our waterways and the ocean. In addition, hazardous waste must not be poured in the sanitary sewers (sinks and toilets).

NEVER DISPOSE OF HOUSEHOLD HAZARDOUS WASTE IN THE TRASH, STREET, GUTTER, STORM DRAIN OR SEWER.

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

To Report Illegal Dumping of Household Hazardous Waste call 1-800-69-TOXIC

To report a spill,
call the
Orange County 24-Hour Water Pollution Problem Reporting Hotline
1-877-89-SPILL (1-877-897-7455).

For emergencies, dial 911.

RECYCLE USED OIL

Printed on Recycled Paper

Help Prevent Ocean Pollution:

Proper Disposal of Household Hazardous Waste

The Ocean Begins at Your Front Door

PROJECT POLLUTION PREVENTION

ORANGE COUNTY

Pollution Prevention

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "household hazardous waste" or "HHW." HHW can be found throughout your home, including the bathroom, kitchen, laundry room and garage.

WHEN POSSIBLE, USE NON-HAZARDOUS OR LESS-HAZARDOUS PRODUCTS.

Disposal of HHW down the drain, on the ground, into storm drains, or in the trash is illegal and unsafe.

Proper disposal of HHW is actually easy. Simply drop them off at a Household Hazardous Waste Collection Center (HHWCC) for free disposal and recycling. Many materials including anti-freeze, latex-based paint, motor oil and batteries can be recycled. Some centers have a "Stop & Swap" program that lets you take partially used home, garden, and automobile products free of charge. There are four HHWCCs in Orange County:

Anheim:..................1071 N. Blue Gum St
Huntington Beach:.........17121 Nichols St
Irvine:............................6411 Oak Canyon
San Juan Capistrano:... 32250 La Pata Ave

Centers are open Tuesday-Saturday, 9 a.m.-3 p.m. Centers are closed on rainy days and major holidays. For more information, call **(714) 834-6752** or visit **www.oclandfills.com.**

Common household hazardous wastes

- Batteries
- Paint and paint products
- Adhesives
- Drain openers
- Household cleaning products
- Wood and metal cleaners and polishes
- Pesticides
- Fungicides/wood preservatives
- Automotive products (antifreeze, motor oil, fluids)
- Grease and rust solvents
- Fluorescent lamps
- Mercury (thermometers & thermostats)
- All forms of electronic waste including computers and microwaves
- Pool & spa chemicals
- Cleaners
- Medications
- Propane (camping & BBQ)
- Mercury-containing lamps
- Television & monitors (CRTs, flatscreens)

Tips for household hazardous waste

- Never dispose of HHW in the trash, street, gutter, storm drain or sewer.
- Keep these materials in closed, labeled containers and store materials indoors or under a cover.
- When possible, use non-hazardous products.
- Reuse products whenever possible or share with family and friends.
- Purchase only as much of a product as you'll need. Empty containers may be disposed of in the trash.
- HHW can be harmful to humans, pets and the environment. Report emergencies to 911.

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Fertilizers, pesticides and other chemicals that are left on yards or driveways can be blown or washed into storm drains that flow to the ocean. Overwatering lawns can also send materials into storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never pour gardening products into the ocean, so don't let them enter the storm drains. Follow these easy tips to help prevent water pollution.

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

UCCE Master Gardener Hotline:
(714) 708-1646

To report a spill,
call the
Orange County 24-Hour
Water Pollution Problem
Reporting Hotline
1-877-89-SPILL (1-877-897-7455).

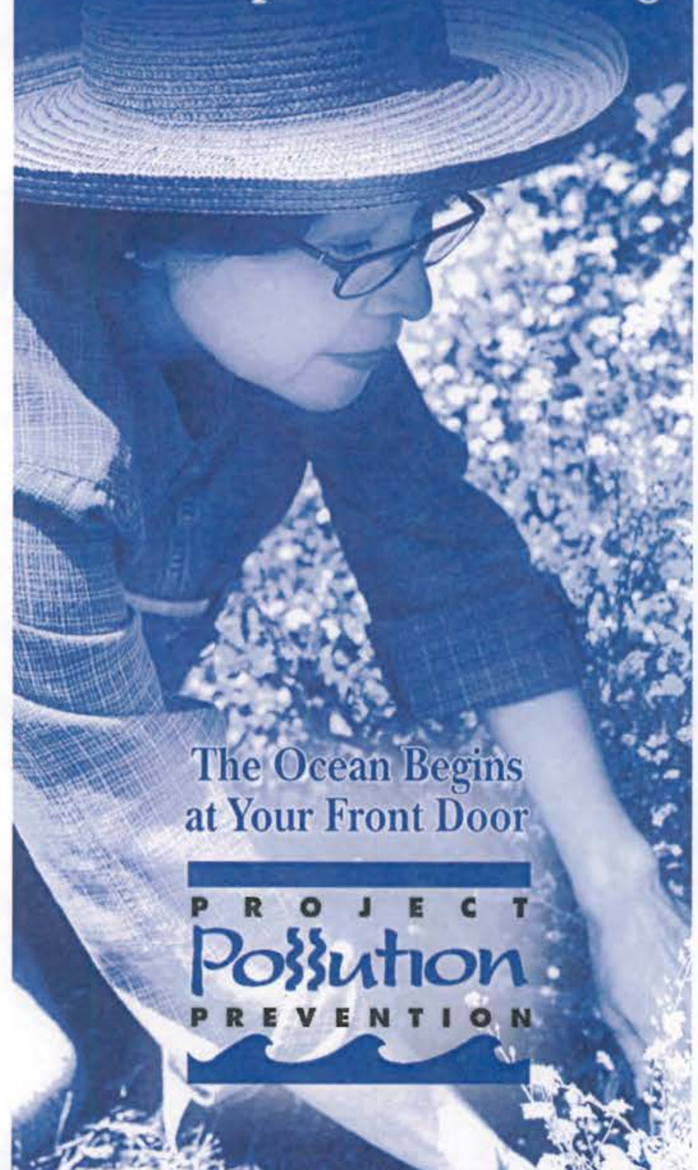
For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while landscaping or gardening. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

Printed on Recycled Paper

Help Prevent Ocean Pollution:

Tips for Landscape & Gardening



Tips for Landscape & Gardening

Never allow gardening products or polluted water to enter the street, gutter or storm drain.

General Landscaping Tips

- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.

- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.

- Plant native vegetation to reduce the amount of water, fertilizers, and pesticide applied to the landscape.

- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.

Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro spray systems. Periodically inspect and fix leaks and misdirected sprinklers.

- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.

- Use slow-release fertilizers to minimize leaching, and use organic fertilizers.

- Read labels and use only as directed. Do not over-apply pesticides or fertilizers. Apply to spots as needed, rather than blanketing an entire area.

- Store pesticides, fertilizers and other chemicals in a dry covered area to prevent exposure that may result in the deterioration of containers and packaging.

- Rinse empty pesticide containers and re-use rinse water as you would use the product. Do not dump rinse water down storm drains. Dispose of empty containers in the trash.

- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting. For more information, visit **www.ipm.ucdavis.edu**.

- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.

- Take unwanted pesticides to a Household Hazardous Waste Collection Center to be recycled. Locations are provided below.

Household Hazardous Waste Collection Centers

Anaheim:	1071 N. Blue Gum St.
Huntington Beach:	17121 Nichols St.
Irvine:	6411 Oak Canyon
San Juan Capistrano:	32250 La Pata Ave.

For more information, call (714) 834-6752 or visit www.oclandfills.com

Clean beaches and healthy creeks, rivers, bays, and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Swimming pools and spas are common in Orange County, but they must be maintained properly to guarantee that chemicals aren't allowed to enter the street, where they can flow into the storm drains and then into the waterways. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never dump pool chemicals into the ocean, so don't let it enter the storm drains. Follow these easy tips to help prevent water pollution.

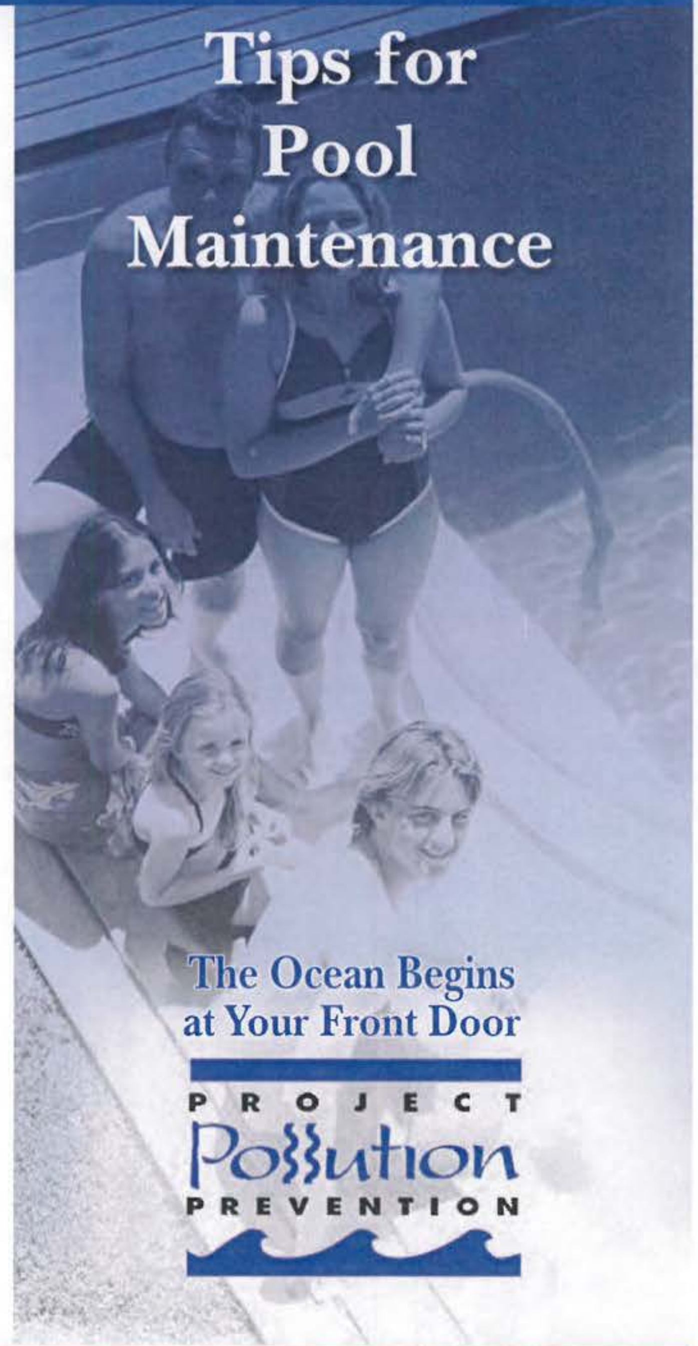
For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

To report a spill,
call the
**Orange County 24-Hour
Water Pollution Reporting Hotline
1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while maintaining your pool. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

Help Prevent Ocean Pollution:



Tips for Pool Maintenance

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Tips for Pool Maintenance

Many pools are plumbed to allow the pool to drain directly to the sanitary sewer. If yours is not, follow these instructions for disposing of pool and spa water.

Acceptable and Preferred Method of Disposal

When you cannot dispose of pool water in the sanitary sewer, the release of dechlorinated swimming pool water is allowed if all of these tips are followed:

- The residual chlorine does not exceed 0.1 mg/l (parts per million).
- The pH is between 6.5 and 8.5.
- The water is free of any unusual coloration, dirt or algae.
- There is no discharge of filter media.
- There is no discharge of acid cleaning wastes.
- Some cities may have ordinances that do not allow pool water to be disposed into a storm drain. Check with your city.

How to Know if You're Following the Standards

You can find out how much chlorine is in your water by using a pool testing kit. Excess chlorine can be removed by discontinuing the use of chlorine for a few days prior to discharge or by purchasing dechlorinating chemicals from a local pool supply company. Always make sure to follow the instructions that come with any products you use.

Doing Your Part

By complying with these guidelines, you will make a significant contribution toward keeping pollutants out of Orange County's creeks, streams, rivers, bays and the ocean. This helps to protect organisms that are sensitive to pool chemicals, and helps to maintain the health of our environment.

PROJECT Pollution PREVENTION

Do your part to prevent water pollution in our creeks, rivers, bays and ocean.

Clean beaches and healthy creeks, rivers, bays, and ocean are important to Orange County. However, many common household activities can lead to water pollution if you're not careful.

REMEMBER THE WATER IN YOUR STORM DRAIN IS NOT TREATED BEFORE IT ENTERS OUR WATERWAYS

Litter, oil, chemicals and other substances that are left on your yard or driveway can be blown or washed into storm drains that flow to the ocean. Over-watering your lawn and washing your car can also flush materials into the storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated.

You would never pour soap, fertilizers or oil into the ocean, so don't let them enter streets, gutters or storm drains. Follow the easy tips in this brochure to help prevent water pollution.

For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com**

To report a spill, call the **Orange County 24-Hour Water Pollution Problem Reporting Hotline 1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while performing everyday household activities. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

GENUINE RECYCLED PAPER

50% PRE-CONSUMER AND 15% POST-CONSUMER

RECYCLE USED OIL

The Ocean Begins at Your Front Door

PROJECT POLLUTION PREVENTION

Pollution Prevention

Household Activities

- **Do not rinse spills with water!** Sweep outdoor spills and dispose of in the trash. For wet spills like oil, apply cat litter or another absorbent material, then sweep and bring to a household hazardous waste collection center (HHWCC).
- Securely cover trash cans.
- Take household hazardous waste to a household hazardous waste collection center.
- Store household hazardous waste in closed, labeled containers inside or under a cover.
- Do not hose down your driveway, sidewalk or patio. Sweep up debris and dispose of in trash.
- Always pick up after your pet. Flush waste down the toilet or dispose of in the trash.
- Bathe pets indoors or have them professionally groomed.

Household Hazardous Wastes include:

- ▲ **Batteries**
- ▲ **Paint thinners, paint strippers and removers**
- ▲ **Adhesives**
- ▲ **Drain openers**
- ▲ **Oven cleaners**
- ▲ **Wood and metal cleaners and polishes**
- ▲ **Herbicides and pesticides**
- ▲ **Fungicides/wood preservatives**
- ▲ **Automotive fluids and products**
- ▲ **Grease and rust solvents**
- ▲ **Thermometers and other products containing mercury**
- ▲ **Fluorescent lamps**
- ▲ **Cathode ray tubes, e.g. TVs, computer monitors**
- ▲ **Pool and spa chemicals**

Gardening Activities

- Follow directions on pesticides and fertilizers, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Water your lawn and garden by hand to control the amount of water you use. Set irrigation systems to reflect seasonal water needs. If water flows off your yard and onto your driveway or sidewalk, your system is over-watering.
- Mulch clippings or leave them on the lawn. If necessary, dispose in a green waste container.
- Cultivate your garden often to control weeds.

Washing and Maintaining Your Car

- Take your car to a commercial car wash whenever possible.
- Choose soaps, cleaners, or detergents labeled “non-toxic,” “phosphate free” or “biodegradable.” Vegetable and citrus-based products are typically safest for the environment, **but even these should not be allowed into the storm drain.**
- Shake floor mats into a trash can or vacuum to clean.
- Do not use acid-based wheel cleaners and “hose off” engine degreasers at home. They can be used at a commercial facility, which can properly process the washwater.
- **Do not dump washwater onto your driveway, sidewalk, street, gutter or storm drain.** Excess washwater should be disposed of in the sanitary sewers (through a sink, or toilet) or onto an absorbent surface like your lawn.
- Use a nozzle to turn off water when not actively washing down automobile.
- Monitor vehicles for leaks and place pans under leaks. Keep your car well maintained to stop and prevent leaks.
- Use cat litter or other absorbents and sweep to remove any materials deposited by vehicles. Contain sweepings and dispose of at a HHWCC.
- Perform automobile repair and maintenance under a covered area and use drip pans or plastic sheeting to keep spills and waste material from reaching storm drains.
- **Never pour oil or antifreeze in the street, gutter or storm drains.** Recycle these substances at a service station, HHWCC, or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.ciwmb.ca.gov/UsedOil.

For locations and hours of Household Hazardous Waste Collection Centers in Anaheim, Huntington Beach, Irvine and San Juan Capistrano, call (714)834-6752 or visit www.oclandfills.com.

Did you know that just one quart of oil can pollute 250,000 gallons of water?

A clean ocean and healthy creeks, rivers, bays and beaches are important to Orange County. However, not properly disposing of used oil can lead to water pollution. If you pour or drain oil onto driveways, sidewalks or streets, it can be washed into the storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering the ocean. Help prevent water pollution by taking your used oil to a used oil collection center.

Included in this brochure is a list of locations that will accept up to five gallons of used motor oil at no cost. Many also accept used oil filters. Please contact the facility before delivering your used oil. This listing of companies is for your reference and does not constitute a recommendation or endorsement of the company.

Please note that used oil filters may not be disposed of with regular household trash. They must be taken to a household hazardous waste collection or recycling center in Anaheim, Huntington Beach, Irvine or San Juan Capistrano. For information about these centers, visit www.oclandfills.com.

Please do not mix your oil with other substances!

For more information, please call the Orange County Stormwater Program at 1-877-89-SPILL (1-877-897-7455) **or visit www.watersheds.com.**

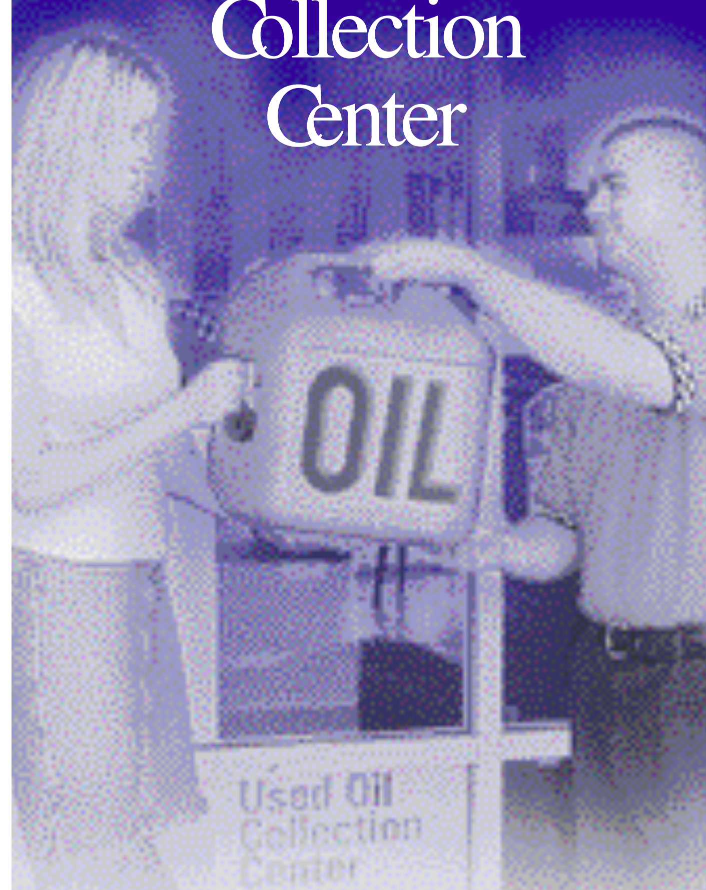
For information about the proper disposal of household hazardous waste, call the Household Waste Hotline at (714) 834-6752 or visit www.oclandfills.com.

RECYCLE USED OIL

For additional information about the nearest oil recycling center, call the Used Oil Program at 1-800-CLEANUP or visit www.cleanup.org.

Help Prevent Ocean Pollution:

Recycle at Your Local Used Oil Collection Center



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

SOUTH COUNTY

Used Oil Collection Centers

ALISO VIEJO

Big O Tires
27812 Aliso Creek Rd, Suite E-100
(949) 362-4225

Econo Lube N' Tune
22932 Glenwood Dr.
(949) 643-9667

Jiffy Lube
27832 Aliso Creek Road
(949) 362-0005

Pep Boys
26881 Aliso Creek Road
(949) 362-9254

DANA POINT

Dana Point Fuel Dock
34661 Puerto Pl. (949) 496-6113

EZ Lube Inc.
34242 Doheny Park Rd.
(949) 477-1223

FOOTHILL RANCH

USA Express Tire & Service
26492 Town Center Dr.
(714) 826-1001

LAGUNA BEACH

USA Express Tire & Service Inc.
350 Broadway (949) 494-7111

LAKE FOREST

Big O Tires
20742 Lake Forest Dr.
(949) 443-4155

EZ Lube
26731 Rancho Parkway
(949) 465-9912

Firestone Store
24421 Rockfield Blvd.
(949) 581-2660

Jiffy Lube
20781 Lake Forest Dr.
(949) 583-0470

Kragen Auto Parts
24601 Raymond Way
(949) 829-8292

Pep Boys
22671 Lake Forest Dr.
(949) 855-9593

Ryan's Foothill Ranch Transmission
20622 Pascal Way (949) 770-6888

USA Express Tire & Service
24561 Trabuco Rd (949) 454-8001

LAGUNA NIGUEL

Econo Lube N Tune
27912 Forbes Rd. (949) 364-5833

Laguna Niguel Auto Center
26042 Cape Dr. #12
(949) 582-2191

LAGUNA HILLS

David J Phillips Buick
24888 Alicia Pkwy.
(949) 831-0434

EZ Lube
24281 Moulton Pkwy.
(949) 830-9840

EZ Lube
26921 Moulton Pkwy.
(949) 751-3436

Kragen Auto Parts
26562 Moulton Ave.
(949) 831-0434

Firestone Store
24196 Laguna Hills Mall
(949) 581-4700

MISSION VIEJO

AAA Complete Auto Care & Tire
27913 Center Street
(949) 347-8200

Autobahn West
25800 Jeronimo Rd. Suite 401
(949) 770-2312

Auto Zone
22942 Los Alisos (949) 830-8181

Econo Lube & Tune
25902 El Paseo (949) 582-5483

Jiffy Lube
27240 La Paz Rd. (949) 455-0470

Kragen Auto Parts
24510 Alicia Pkwy. (949) 951-9175

Mission Viejo Chevron
27742 Crown Vly. Pkwy.
(949) 364-0137

Oilmax 10 Minute Lube
25800 Jeronimo Rd. #300
(949) 859-9271

Ramona Auto Service
27210 La Paz Rd. (949) 583-1233

RANCHO SANTA MARGARITA

Jiffy Lube
23401 Antonio Parkway
(949) 589-7447

SAN CLEMENTE

EZ Lube
525 Avenida Pico (949) 940-1850

Kragen Auto Parts
1113 S. El Camino Real
(949) 492-9850

Kragen Auto Parts
400 Camino de Estrella
(949) 240-9195

San Clemente Car Wash & Oil
1731 N. El Camino Real
(949) 847-4924

SAN JUAN CAPISTRANO

Saturn of San Juan Capistrano
33033 Camino Capistrano
(949) 248-5411

Texaco Xpress Lube
27201 Ortega Hwy.
(949) 489-8008

This information was provided by the County of Orange Integrated Waste Management Department and the California Integrated Waste Management Board (CIWMB).

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities such as pest control can lead to water pollution if you're not careful. Pesticide treatments must be planned and applied properly to ensure that pesticides do not enter the street, gutter or storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never dump pesticides into the ocean, so don't let it enter the storm drains. Pesticides can cause significant damage to our environment if used improperly. If you are thinking of using a pesticide to control a pest, there are some important things to consider.

For more information,
please call
University of California Cooperative Extension Master Gardeners at
(714) 708-1646
or visit these Web sites:
www.uccemg.org
www.ipm.ucdavis.edu

For instructions on collecting a specimen sample visit the Orange County Agriculture Commissioner's website at:
http://www.ocagcomm.com/ser_lab.asp

To report a spill, call the
Orange County 24-Hour Water Pollution Problem Reporting Hotline at 1-877-89-SPILL (1-877-897-7455).

For emergencies, dial 911.

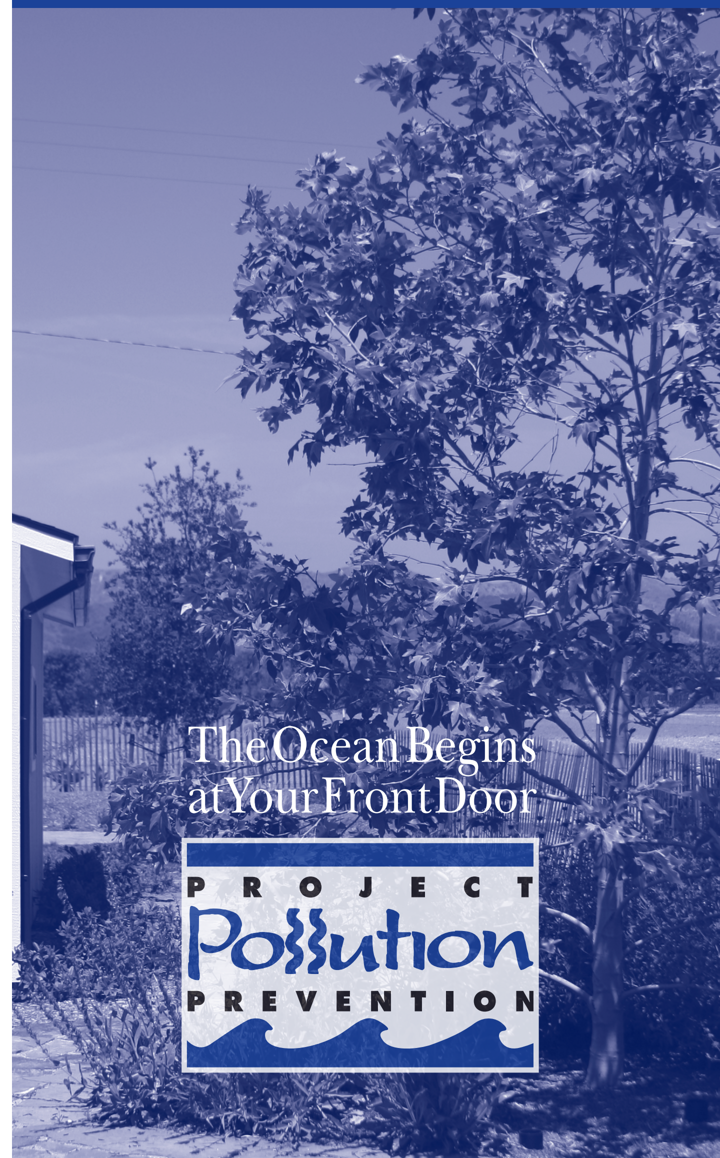
Information From:
Cheryl Wilen, Area IPM Advisor; Darren Haver, Watershed Management Advisor; Mary Louise Flint, IPM Education and Publication Director; Pamela M. Geisel, Environmental Horticulture Advisor; Carolyn L. Unruh, University of California Cooperative Extension staff writer. Photos courtesy of the UC Statewide IPM Program and Darren Haver.

Funding for this brochure has been provided in full or in part through an agreement with the State Water Resources Control Board (SWRCB) pursuant to the Costa-Machado Water Act of 2000 (Prop. 13).

Printed on Recycled Paper

Help Prevent Ocean Pollution:

Responsible Pest Control



Tips for Pest Control

Key Steps to Follow:

Step 1: **Correctly identify the pest (insect, weed, rodent, or disease) and verify that it is actually causing the problem.**

Three life stages of the common lady beetle, a beneficial insect.

This is important because beneficial insects are often mistaken for pests and sprayed with pesticides needlessly.

Consult with a Certified Nursery Professional at a local nursery or garden center or send a sample of the pest to the Orange County Agricultural Commissioner's Office.

Determine if the pest is still present – even though you see damage, the pest may have left.

Step 2: **Determine how many pests are present and causing damage.**

Small pest populations may be controlled more safely using non-pesticide techniques. These include removing food sources, washing off leaves with a strong stream of water, blocking entry into the home using caulking and replacing problem plants with ones less susceptible to pests.

Integrated Pest Management (IPM) usually combines several least toxic pest control methods for long-term prevention and management of pest problems without harming you, your family, or the environment.

Step 3: **If a pesticide must be used, choose the least toxic chemical.**

Obtain information on the least toxic pesticides that are effective at controlling the target pest from the UC Statewide Integrated Pest Management (IPM) Program's Web site at www.ipm.ucdavis.edu.

Seek out the assistance of a Certified Nursery Professional at a local nursery or garden center when selecting a pesticide. Purchase the smallest amount of pesticide available.

Apply the pesticide to the pest during its most vulnerable life stage. This information can be found on the pesticide label.

Step 4: **Wear appropriate protective clothing.**

Follow pesticide labels regarding specific types of protective equipment you should wear. Protective clothing should always be washed separately from other clothing.

Step 5: **Continuously monitor external conditions when applying pesticides such as weather, irrigation, and the presence of children and animals.**

Never apply pesticides when rain is predicted within the next 48 hours. Also, do not water after applying pesticides unless the directions say it is necessary.

Apply pesticides when the air is still; breezy conditions may cause the spray or dust to drift away from your targeted area.

In case of an emergency call 911 and/or the regional poison control number at (714) 634-5988 or (800) 544-4404 (CA only).

For general questions you may also visit www.calpoison.org.

Step 6: **In the event of accidental spills, sweep up or use an absorbent agent to remove any excess pesticides. Avoid the use of water.**

Be prepared. Have a broom, dust pan, or dry absorbent material, such as cat litter, newspapers or paper towels, ready to assist in cleaning up spills.

Contain and clean up the spill right away. Place contaminated materials in a doubled plastic bag. All materials used to clean up the spill should be properly disposed of according to your local Household Hazardous Waste Disposal site.

Step 7: **Properly store and dispose of unused pesticides.**

Purchase Ready-To-Use (RTU) products to avoid storing large concentrated quantities of pesticides.

Store unused chemicals in a locked cabinet.

Unused pesticide chemicals may be disposed of at a Household Hazardous Waste Collection Center.

Empty pesticide containers should be triple rinsed prior to disposing of them in the trash.

Household Hazardous Waste Collection Center
(714) 834-6752
www.oclandfills.com

The Pollution Solution

Several residential activities can result in water pollution. Among these activities are car washing and hosing off driveways and sidewalks. Both activities can waste water and result in excess runoff. Water conservation methods described in this pamphlet can prevent considerable amounts of runoff and conserve water. By taking your car to a commercial car wash and by sweeping driveways and sidewalks, you can further prevent the transport of pollutants to Orange County waterways. Here are some of the common pollutants for which you can be part of the solution:

1 Pesticides and Fertilizer

- **Pollution:** The same pesticides that are designed to be toxic to pests can have an equally lethal impact on our marine life. The same fertilizer that promotes plant growth in lawns and gardens can also create nuisance algae blooms, which remove oxygen from the water and clog waterways when it decomposes.

- **Solution:** Never use pesticides or fertilizer within 48 hours of an anticipated rainstorm. Use only as much as is directed on the label and keep it off driveways and sidewalks.

2 Dirt and Sediment

- **Pollution:** Dirt or sediment can impede the flow of the stormwater and negatively impact stream habitat as it travels through waterways and deposits downstream. Pollutants can attach to sediment, which can then be transported through our waterways.
- **Solution:** Protect dirt stockpiles by covering them with tarps or secure plastic sheets to prevent wind or rain from allowing dirt or sediment to enter the storm drain system.

3 Metals

- **Pollution:** Metals and other toxins present in car wash water can harm important plankton, which forms the base of the aquatic food chain.
- **Solution:** Take your car to a commercial car wash where the wash water is captured and treated at a local wastewater treatment plant.

DID YOU KNOW?

Did you know that most of the pollution found in our waterways is not from a single source, but from a "non-point" source meaning the accumulation of pollution from residents and businesses throughout the community

4 Pet Waste

- **Pollution:** Pet waste carries bacteria through our watersheds and eventually will be washed out to the ocean. This can pose a health risk to swimmers and surfers.
- **Solution:** Pick up after your pets!

5 Trash and Debris

- **Pollution:** Trash and debris can enter waterways by wind, littering and careless maintenance of trash receptacles. Street sweeping collects some of this trash; however, much of what isn't captured ends up in our storm drain system where it flows untreated out to the ocean.

- **Solution:** Don't litter and make sure trash containers are properly covered. It is far more expensive to clean up the litter and trash that ends up in our waterways than it is to prevent it in the first place. Come out to one of Orange County's many locations for Coastal and Inner-Coastal Cleanup Day, which is held in September.

6 Motor Oil / Vehicle Fluids

- **Pollution:** Oil and petroleum products from our vehicles are toxic to people, wildlife and plants.
- **Solution:** Fix any leaks from your vehicle and keep the maintenance up on your car. Use absorbent material such as cat litter on oil spills, then sweep it up and dispose of it in the trash. Recycle used motor oil at a local Household Hazardous Waste Collection Center.

A TEAM EFFORT

The Orange County Stormwater Program has teamed with the Municipal Water District of Orange County (MWDOC) and the University of California Cooperative Extension Program (UCCE) to develop this pamphlet.

Low Impact Development (LID) and sustainable water use prevents water pollution and conserves water for drinking and reuse. Reducing your water use and the amount of water flowing from your home protects the environment and saves you money.

Thank you for making water protection a priority!

For more information, please visit www.ocwatersheds.com/publiced/

www.mwdoc.com

www.uccemg.com

To report a spill, call the Orange County 24-Hour Water Pollution Prevention Reporting Hotline at 1-877-89-SPILL \ (1-877-897-7455)

Special Thanks to
The City of Los Angeles Stormwater Program for the use of its artwork

The Metropolitan Water District of Southern California for the use of the California-Friendly Plant and Native Habitat photos

PROJECT Pollution PREVENTION | UCCE University of California | MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

Homeowners Guide for Sustainable Water Use

Low Impact Development, Water Conservation & Pollution Prevention

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION | UCCE University of California | MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

RUNOFF, RAINWATER AND REUSE

Where Does Water Runoff Go?

Stormwater, or water from rainfall events, and runoff from outdoor water use such as sprinklers and hoses flows from homes directly into catch basins and the storm drain system. After entering the storm drain, the water flows untreated into streams, rivers, bays and ultimately the Pacific Ocean. Runoff can come from lawns, gardens, driveways, sidewalks and roofs. As it flows over hard, impervious surfaces, it picks up pollutants. Some pollutants carried by the water runoff include trash, pet waste, pesticides, fertilizer, motor oil and more.

Water Conservation

Pollution not only impairs the water quality for habitat and recreation, it can also reduce the water available for reuse. Runoff allowed to soak into the ground is cleaned as it percolates through the soil, replenishing depleted groundwater supplies. Groundwater provides at least 50% of the total water for drinking and other indoor household activities in north and central Orange County. When land is covered with roads, parking lots, homes, etc., there is less land to take in the water and more hard surfaces over which the water can flow.

In Orange County, 60-70% of water used by residents and businesses goes to irrigation and other outdoor uses. Reusing rainwater to irrigate our lawn not only reduces the impact of water pollution from runoff, but it also is a great way to conserve our precious water resources and replenish our groundwater basin.

What is Low Impact Development (LID)?

Low Impact Development (LID) is a method of development that seeks to maintain the natural hydrologic character of an area. LID provides a more sustainable and pollution-preventative approach to water management.

New water quality regulations require implementation of LID in larger new developments and encourage implementation of LID and other sustainable practices in existing residential areas. Implementing modifications to your lawn or garden can reduce pollution in our environment, conserve water and reduce your water bill.

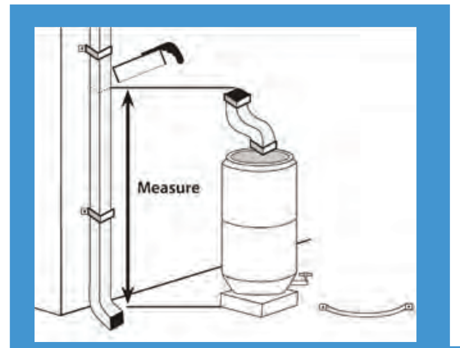
Permeable pavement allows water runoff to infiltrate through the soil and prevents most pollutants from reaching the storm drain system.

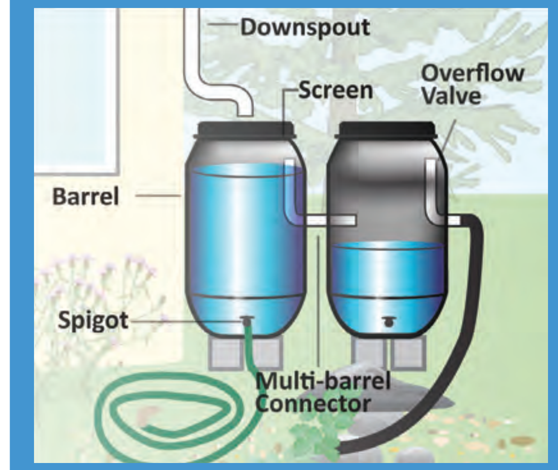
OPTIONS FOR RAINWATER HARVESTING AND REUSE

Rainwater harvesting is a great way to save money, prevent pollution and reduce potable water use. To harvest your rainwater, simply redirect the runoff from roofs and downspouts to rain barrels. Rain gardens are another option; these reduce runoff as well as encourage infiltration.

Downspout Disconnection/Redirection

Disconnecting downspouts from pipes running to the gutter prevents runoff from transporting pollutants to the storm drain. Once disconnected, downspouts can be redirected to rain gardens or other vegetated areas, or be connected to a rain barrel.





Rain Barrels

Rain barrels capture rainwater flow from roofs for reuse in landscape irrigation. Capacity of rain barrels needed for your home will depend on the amount of roof area and rainfall received. When purchasing your rain barrel, make sure it includes a screen, a spigot to siphon water for use, an overflow tube to allow for excess water to run out and a connector if you wish to connect multiple barrels to add capacity of water storage.

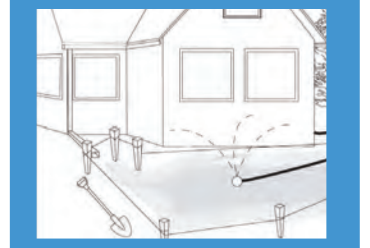
Mosquito growth prevention is very important when installing a rain barrel. The best way to prevent mosquito breeding is to eliminate entry points by ensuring all openings are sealed tightly. If these methods are unsuccessful, products are available to kill mosquito larvae, but that are harmless to animals and humans. Regular application of these products is essential. Please visit the Orange County Vector Control website for more information at www.ocvcd.org/mosquitoes3.php.

Rain Gardens

Rain gardens allow runoff to be directed from your roof downspout into a landscaped area. Vegetation and rocks in the garden will slow the flow of water to allow for infiltration into the soil. Plants and soil particles will absorb pollutants from the roof runoff. By utilizing a native plant palate, rain gardens can be maintained all year with minimal additional irrigation. These plants are adapted to the semi-arid climate of Southern California, require less water and can reduce your water bill.

Before modifying your yard to install a rain garden, please consult your local building and/or planning departments to ensure your garden plan follows pertinent building codes and ordinances. Besides codes and ordinances, some home owner associations also have guidelines for yard modifications. If your property is in hill areas or includes engineered slopes, please seek professional advice before proceeding with changes.

For information on how to disconnect a downspout or to install and maintain a rain barrel or rain garden at your home, please see the Los Angeles Rainwater Harvesting Program, A Homeowner's "How-To" Guide, November 2009 at www.larainwaterharvesting.org/



OTHER WATER CONSERVATION AND POLLUTION PREVENTION TECHNIQUES

Native Vegetation and Maintenance

"California Friendly" plants or native vegetation can significantly reduce water use. These plants often require far less fertilizers and pesticides, which are two significant pollutants found in Orange County waterways. Replacing water "thirsty" plants and grass types with water efficient natives is a great way to save water and reduce the need for potentially harmful pesticides and fertilizer.

Please see the California Friendly Garden Guide produced by the Metropolitan Water District of Southern California and associated Southern California Water Agencies for a catalog of California friendly plants and other garden resources at www.bewaterwise.com/Gardensoft.

Weed Free Yards

Weeds are water thieves. They often reproduce quickly and rob your yard of both water and nutrients. Weed your yard by hand if possible. If you use herbicides to control the weeds, use only the amount recommended on the label and never use it if rain is forecast within the next 48 hours.

Soil Amendments

Soil amendments such as green waste (e.g. grass clippings, compost, etc.) can be a significant source of nutrients and can help keep the soil near the roots of plants moist. However, they can cause algal booms if they get into our waterways, which reduces the amount of oxygen in the water and impacts most aquatic organisms. It is important to apply soil amendments more than 48 hours prior to predicted rainfall.

IRRIGATE EFFICIENTLY

Water runoff from sprinklers left on too long will carry pollutants into our waterways.

Smart Irrigation Controllers

Smart Irrigation Controllers have internal clocks as well as sensors that will turn off the sprinklers in response to environmental changes. If it is raining, too windy or too cold, the smart irrigation control sprinklers will automatically shut off.

Check with your local water agency for available rebates on irrigation controllers and smart timers.

- Aim your sprinklers at your lawn, not the sidewalk – By simply adjusting the direction of your sprinklers you can save water, prevent water pollution from runoff, keep your lawn healthy and save money.
- **Set a timer for your sprinklers** – lawns absorb the water they need to stay healthy within a few minutes of turning on the sprinklers. Time your sprinklers; when water begins running off your lawn, you can turn them off. Your timer can be set to water your lawn for this duration every time.
- **Water at Sunrise** – Watering early in the morning will reduce water loss due to evaporation. Additionally, winds tend to die down in the early morning so the water will get to the lawn as intended.
- **Water by hand** – Instead of using sprinklers, consider watering your yard by hand. Hand-watering ensures that all plants get the proper amount of water and you will prevent any water runoff, which wastes water and carries pollutants into our waterways.
- **Fix leaks** - Nationwide, households waste one trillion gallons of water a year to leaks – that is enough water to serve the entire state of Texas for a year. If your garden hose is leaking, replace the nylon or rubber hose washer and ensure a tight connection. Fix broken sprinklers immediately.

ATTACHMENT B Operation & Maintenance Plan

Operations and Maintenance (O&M) Plan

Water Quality Management Plan
for
AARONSON RESIDENCE
2354 San Clemente Street
Laguna Beach, California 92651
APN 656-122-04+05

LOTS 11-15, BLK 6, LOMA TRACT

Overall Responsible Party/Owner:
KEVIN AARONSON
2354 San Clemente Street
Laguna Beach, California 92651

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Non-Structural Source Control BMPs			
Yes	**N1. Education for Property Owners, Tenants and Occupants** Practical information materials will be provided to the first residents/occupants/tenants on general housekeeping practices that contribute to the protection of stormwater quality. These materials will be initially developed and provided to first residents/occupants/tenants by the developer.	Owner shall keep up to date with BMP requirements, and be responsible for educating maintenance personnel; As required.	*Owner*
No	**N2. Activity Restrictions**		
Yes	**N3. Common Area Landscape Management** Identify on-going landscape maintenance requirements that are consistent with those in the County Water Conservation Resolution (or city equivalent) that include fertilizer and/or pesticide usage consistent with Management Guidelines for Use of Fertilizers (DAMP Section 5.5). Statements regarding the specific applicable guidelines must be included in the project WQMP.	Keep garden areas clean, planted, and weed free. Weekly.	*Owner or contracted maintenance personnel*
Yes	**N4. BMP Maintenance** The project WQMP shall identify responsibility for implementation of each non-structural BMP and scheduled cleaning and/or maintenance of all structural BMP facilities.	Visual Inspection, perform more thorough inspection if ponding water sits for more than 48 hours. Twice yearly and immediately following each storm event.	*Owner or contracted maintenance personnel*
No	**N5. Title 22 CCR Compliance**		
No	**N6. Local Water Quality Permit Compliance**		
No	**N7. Spill Contingency Plan**		
No	**N8. Underground Storage Tank Compliance**		
No	**N9. Hazardous Materials Disclosure Compliance**		
No	**N10. Uniform Fire Code Implementation**		

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N11. Common Area Litter Control** The owner may contract with their landscape maintenance firms to provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations by tenants/homeowners or businesses and reporting the violations to the owner/POA for investigation.	Keep site clean of litter. Weekly.	*Owner or contracted maintenance personnel*
No	**N12. Employee Training**		
No	**N13. Housekeeping of Loading Docks**		
Yes	**N14. Common Area Catch Basin Inspection** The owner is required to have at least 80 percent of drainage facilities inspected, cleaned and maintained on an annual basis with 100 percent of the facilities included in a two year period. Cleaning should take place in the late summer/early fall prior to the start of the rainy season. Drainage facilities include catch basins (storm drain inlets), detention basins, retention basins, sediment basins, open drainage channels and lift stations. Records should be kept to document the annual maintenance.	Inspect drain inlets and catch basins. Keep inlet covers clean. Weekly.	*Owner or contracted maintenance personnel*
No	**N15. Street Sweeping Private Streets and Parking Lots**		
Structural Source Control BMPs			
Yes	**S1. Provide Storm Drain System Stenciling and Signage** Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language and/or graphical icons, which discourage illegal dumping.	Ensure that all catch basins are stencilled "No Dumping – Drains To Ocean."	*Owner or contracted maintenance personnel*
No	**S2. Design Outdoor Hazardous Material Storage Areas to Reduce Pollutant Introduction**		

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**S3. Design Trash Enclosures to Reduce Pollutant Introduction** Design trash storage areas to reduce pollutant introduction. All trash container areas shall be paved with an impervious surface, designed not to allow run-on, screened or walled to prevent off-site transport of trash, and be provided with a roof or awning to prevent direct precipitation.	Keep trash storage areas clean and orderly. Weekly.	*Owner or contracted maintenance personnel*
Yes	**S4. Use Efficient Irrigation Systems and Landscape Design** Projects shall design the timing and application methods of irrigation water to minimize the runoff of excessive irrigation water into the municipal storm drain system. Additionally, permittee shall: Employ rain shutoff devices, design irrigation systems to each landscape areas specific requirements, use flow reducers, group plants with similar water requirements together.	Ensure that sprinklers are working properly and minimize unnecessary irrigation. Weekly.	*Owner or contracted maintenance personnel*
Yes	**S5. Protect Slopes and Channels**	Ensure that drainage system is in proper working order to prevent stormwater from flowing over the top of slopes. Monthly	*Owner or contracted maintenance personnel*
No	**S6. Loading Dock Areas**		
No	**S7. Maintenance Bays and Docks**		
No	**S8. Vehicle Wash Areas**		
No	**S9. Outdoor Processing Areas**		
No	**S10. Equipment Wash Areas**		
No	**S11. Fueling Areas**		
No	**S12. Site Design and Landscape Planning**		
No	**S13. Wash Water Controls for Food Preparation Areas**		
No	**S14. Community Car Wash Racks**		

BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Low Impact Development BMPs		
Enclosed Planter Box (Biotreatment). BIO-1 • Media (gravel, soil mixtures, etc.) replacement • Confirm that the planter box is infiltrating water by checking the ground surface 48 hours after major storm events. • Add 1" – 2" of Mulch	• Every 5 – 10 years • On-going, during the rainy season; and, periodically during the summer months • Annually	*Owner via maintenance contractors*

Required Permits

This section must list any permits required for the implementation, operation, and maintenance of the BMPs. Possible examples are:

- Permits for connection to sanitary sewer
- Permits from California Department of Fish and Game
- Encroachment permits

If no permits are required, a statement to that effect should be made.

Forms to Record BMP Implementation, Maintenance, and Inspection

The form that will be used to record implementation, maintenance, and inspection of BMPs is attached.

Recordkeeping

All operations and maintenance (O&M) records must be maintained and available to the city upon request. Records must be maintained for at least the last five (5) consecutive years.

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: ____________________

Name of Person Performing Activity (Printed): ____________________

Signature: ____________________

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

ATTACHMENT C
SOHM Reports

SOHM

PROJECT REPORT

General Model Information

Project Name:	DMA-1
Site Name:	Aaronson
Site Address:	2354 San Clemente Street
City:	Laguna Beach
Report Date:	12/27/2018
Gage:	Laguna Beach
Data Start:	10/01/1949
Data End:	09/30/2006
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2018/11/27

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data
Predeveloped Land Use

DMA-1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,Scrub,VSteep(>15%)	0.148
Pervious Total	0.148
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.148

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

DMA-1A

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,Urban,Flat(0-5%)	0.02
Pervious Total	0.02
Impervious Land Use	acre
Impervious,Flat(0-5)	0.073
Impervious Total	0.073
Basin Total	0.093

Element Flows To:

Surface	Interflow	Groundwater
PLANT BOX Surface1A	PLANT BOX Surface1A	

DMA-1B

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,Urban,Flat(0-5%)	0.012
Pervious Total	0.012
Impervious Land Use	acre
Impervious,Flat(0-5)	0.043
Impervious Total	0.043
Basin Total	0.055

Element Flows To:

Surface	Interflow	Groundwater
PLANT BOX Surface1B	PLANT BOX Surface1B	

Routing Elements
Predeveloped Routing

Mitigated Routing

PLANT BOX 1A

Bottom Length:	53.00 ft.
Bottom Width:	4.50 ft.
Material thickness of first layer:	2
Material type for first layer:	Amended 2.5 in/hr
Material thickness of second layer:	1.5
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	0.45
Offset (in.):	0
Flow Through Underdrain (ac-ft.):	3.525
Total Outflow (ac-ft.):	3.902
Percent Through Underdrain:	90.34

Discharge Structure
Riser Height: 0.667 ft.
Riser Diameter: 8 in.
Element Flows To:
Outlet 1 Outlet 2

Flow Through Planter Box Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.0055	0.0000	0.0000	0.0000
0.0513	0.0055	0.0001	0.0000	0.0000
0.1026	0.0055	0.0002	0.0000	0.0000
0.1539	0.0055	0.0003	0.0000	0.0000
0.2051	0.0055	0.0004	0.0000	0.0000
0.2564	0.0055	0.0005	0.0000	0.0000
0.3077	0.0055	0.0007	0.0000	0.0000
0.3590	0.0055	0.0008	0.0000	0.0000
0.4103	0.0055	0.0009	0.0000	0.0000
0.4616	0.0055	0.0010	0.0000	0.0000
0.5129	0.0055	0.0011	0.0000	0.0000
0.5641	0.0055	0.0012	0.0000	0.0000
0.6154	0.0055	0.0013	0.0000	0.0000
0.6667	0.0055	0.0014	0.0000	0.0000
0.7180	0.0055	0.0015	0.0000	0.0000
0.7693	0.0055	0.0016	0.0000	0.0000
0.8206	0.0055	0.0018	0.0000	0.0000
0.8719	0.0055	0.0019	0.0000	0.0000
0.9231	0.0055	0.0020	0.0000	0.0000
0.9744	0.0055	0.0021	0.0000	0.0000
1.0257	0.0055	0.0022	0.0000	0.0000
1.0770	0.0055	0.0023	0.0000	0.0000
1.1283	0.0055	0.0024	0.0000	0.0000
1.1796	0.0055	0.0025	0.0000	0.0000
1.2309	0.0055	0.0026	0.0000	0.0000
1.2821	0.0055	0.0027	0.0000	0.0000
1.3334	0.0055	0.0028	0.0000	0.0000
1.3847	0.0055	0.0030	0.0000	0.0000
1.4360	0.0055	0.0031	0.0000	0.0000

1.4873	0.0055	0.0032	0.0000	0.0000
1.5386	0.0055	0.0033	0.0000	0.0000
1.5899	0.0055	0.0034	0.0000	0.0000
1.6411	0.0055	0.0035	0.0000	0.0000
1.6924	0.0055	0.0036	0.0000	0.0000
1.7437	0.0055	0.0037	0.0000	0.0000
1.7950	0.0055	0.0038	0.0000	0.0000
1.8463	0.0055	0.0039	0.0000	0.0000
1.8976	0.0055	0.0041	0.0000	0.0000
1.9489	0.0055	0.0042	0.0000	0.0000
2.0001	0.0055	0.0043	0.0000	0.0000
2.0514	0.0055	0.0044	0.0000	0.0000
2.1027	0.0055	0.0045	0.0000	0.0000
2.1540	0.0055	0.0046	0.0000	0.0000
2.2053	0.0055	0.0047	0.0000	0.0000
2.2566	0.0055	0.0049	0.0000	0.0000
2.3079	0.0055	0.0050	0.0000	0.0000
2.3591	0.0055	0.0051	0.0000	0.0000
2.4104	0.0055	0.0052	0.0000	0.0000
2.4617	0.0055	0.0053	0.0000	0.0000
2.5130	0.0055	0.0054	0.0000	0.0000
2.5643	0.0055	0.0056	0.0000	0.0000
2.6156	0.0055	0.0057	0.0000	0.0000
2.6669	0.0055	0.0058	0.0000	0.0000
2.7181	0.0055	0.0059	0.0000	0.0000
2.7694	0.0055	0.0060	0.0000	0.0000
2.8207	0.0055	0.0061	0.0000	0.0000
2.8720	0.0055	0.0063	0.0000	0.0000
2.9233	0.0055	0.0064	0.0000	0.0000
2.9746	0.0055	0.0065	0.0000	0.0000
3.0259	0.0055	0.0066	0.0000	0.0000
3.0771	0.0055	0.0067	0.0000	0.0000
3.1284	0.0055	0.0068	0.0000	0.0000
3.1797	0.0055	0.0070	0.0000	0.0000
3.2310	0.0055	0.0071	0.0000	0.0000
3.2823	0.0055	0.0072	0.0000	0.0000
3.3336	0.0055	0.0073	0.0000	0.0000
3.3849	0.0055	0.0074	0.0000	0.0000
3.4361	0.0055	0.0075	0.0000	0.0000
3.4874	0.0055	0.0077	0.0000	0.0000
3.5000	0.0055	0.0077	0.0000	0.0000

Flow Through Planter Box Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**To Amended(cfs)**	**Infilt(cfs)**
3.5000	0.0055	0.0077	0.0000	0.0068	0.0000
3.5513	0.0055	0.0080	0.0000	0.0068	0.0000
3.6026	0.0055	0.0082	0.0000	0.0068	0.0000
3.6539	0.0055	0.0085	0.0000	0.0068	0.0000
3.7051	0.0055	0.0088	0.0000	0.0068	0.0000
3.7564	0.0055	0.0091	0.0000	0.0068	0.0000
3.8077	0.0055	0.0094	0.0000	0.0068	0.0000
3.8590	0.0055	0.0097	0.0000	0.0068	0.0000
3.9103	0.0055	0.0099	0.0000	0.0068	0.0000
3.9616	0.0055	0.0102	0.0000	0.0068	0.0000
4.0129	0.0055	0.0105	0.0000	0.0068	0.0000
4.0641	0.0055	0.0108	0.0003	0.0068	0.0000
4.1154	0.0055	0.0111	0.0010	0.0068	0.0000
4.1667	0.0055	0.0113	0.0011	0.0068	0.0000

4.2180	0.0055	0.0116	0.0012	0.0068	0.0000
4.2693	0.0055	0.0119	0.0013	0.0068	0.0000
4.3206	0.0055	0.0122	0.0013	0.0068	0.0000
4.3719	0.0055	0.0125	0.0016	0.0068	0.0000
4.4231	0.0055	0.0127	0.0018	0.0068	0.0000
4.4744	0.0055	0.0130	0.0018	0.0068	0.0000
4.5257	0.0055	0.0133	0.0020	0.0068	0.0000
4.5770	0.0055	0.0136	0.0022	0.0068	0.0000
4.6283	0.0055	0.0139	0.0024	0.0068	0.0000
4.6670	0.0055	0.0141	0.0024	0.0068	0.0000

PLANT BOX Surface1A

Element Flows To:

Outlet 1	Outlet 2
	PLANT BOX 1A

PLANT BOX 1B

Bottom Length:	31.11 ft.
Bottom Width:	4.50 ft.
Material thickness of first layer:	2
Material type for first layer:	Amended 2.5 in/hr
Material thickness of second layer:	1.5
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	0.35
Offset (in.):	0
Flow Through Underdrain (ac-ft.):	2.081
Total Outflow (ac-ft.):	2.296
Percent Through Underdrain:	90.62

Discharge Structure
Riser Height: 0.667 ft.
Riser Diameter: 8 in.
Element Flows To:
Outlet 1 Outlet 2

Flow Through Planter Box Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0032	0.0000	0.0000	0.0000
0.0513	0.0032	0.0001	0.0000	0.0000
0.1026	0.0032	0.0001	0.0000	0.0000
0.1539	0.0032	0.0002	0.0000	0.0000
0.2051	0.0032	0.0003	0.0000	0.0000
0.2564	0.0032	0.0003	0.0000	0.0000
0.3077	0.0032	0.0004	0.0000	0.0000
0.3590	0.0032	0.0004	0.0000	0.0000
0.4103	0.0032	0.0005	0.0000	0.0000
0.4616	0.0032	0.0006	0.0000	0.0000
0.5129	0.0032	0.0006	0.0000	0.0000
0.5641	0.0032	0.0007	0.0000	0.0000
0.6154	0.0032	0.0008	0.0000	0.0000
0.6667	0.0032	0.0008	0.0000	0.0000
0.7180	0.0032	0.0009	0.0000	0.0000
0.7693	0.0032	0.0010	0.0000	0.0000
0.8206	0.0032	0.0010	0.0000	0.0000
0.8719	0.0032	0.0011	0.0000	0.0000
0.9231	0.0032	0.0012	0.0000	0.0000
0.9744	0.0032	0.0012	0.0000	0.0000
1.0257	0.0032	0.0013	0.0000	0.0000
1.0770	0.0032	0.0013	0.0000	0.0000
1.1283	0.0032	0.0014	0.0000	0.0000
1.1796	0.0032	0.0015	0.0000	0.0000
1.2309	0.0032	0.0015	0.0000	0.0000
1.2821	0.0032	0.0016	0.0000	0.0000
1.3334	0.0032	0.0017	0.0000	0.0000
1.3847	0.0032	0.0017	0.0000	0.0000
1.4360	0.0032	0.0018	0.0000	0.0000
1.4873	0.0032	0.0019	0.0000	0.0000
1.5386	0.0032	0.0019	0.0000	0.0000

1.5899	0.0032	0.0020	0.0000	0.0000
1.6411	0.0032	0.0021	0.0000	0.0000
1.6924	0.0032	0.0021	0.0000	0.0000
1.7437	0.0032	0.0022	0.0000	0.0000
1.7950	0.0032	0.0022	0.0000	0.0000
1.8463	0.0032	0.0023	0.0000	0.0000
1.8976	0.0032	0.0024	0.0000	0.0000
1.9489	0.0032	0.0024	0.0000	0.0000
2.0001	0.0032	0.0025	0.0000	0.0000
2.0514	0.0032	0.0026	0.0000	0.0000
2.1027	0.0032	0.0026	0.0000	0.0000
2.1540	0.0032	0.0027	0.0000	0.0000
2.2053	0.0032	0.0028	0.0000	0.0000
2.2566	0.0032	0.0029	0.0000	0.0000
2.3079	0.0032	0.0029	0.0000	0.0000
2.3591	0.0032	0.0030	0.0000	0.0000
2.4104	0.0032	0.0031	0.0000	0.0000
2.4617	0.0032	0.0031	0.0000	0.0000
2.5130	0.0032	0.0032	0.0000	0.0000
2.5643	0.0032	0.0033	0.0000	0.0000
2.6156	0.0032	0.0033	0.0000	0.0000
2.6669	0.0032	0.0034	0.0000	0.0000
2.7181	0.0032	0.0035	0.0000	0.0000
2.7694	0.0032	0.0035	0.0000	0.0000
2.8207	0.0032	0.0036	0.0000	0.0000
2.8720	0.0032	0.0037	0.0000	0.0000
2.9233	0.0032	0.0037	0.0000	0.0000
2.9746	0.0032	0.0038	0.0000	0.0000
3.0259	0.0032	0.0039	0.0000	0.0000
3.0771	0.0032	0.0039	0.0000	0.0000
3.1284	0.0032	0.0040	0.0000	0.0000
3.1797	0.0032	0.0041	0.0000	0.0000
3.2310	0.0032	0.0042	0.0000	0.0000
3.2823	0.0032	0.0042	0.0000	0.0000
3.3336	0.0032	0.0043	0.0000	0.0000
3.3849	0.0032	0.0044	0.0000	0.0000
3.4361	0.0032	0.0044	0.0000	0.0000
3.4874	0.0032	0.0045	0.0000	0.0000
3.5000	0.0032	0.0045	0.0000	0.0000

Flow Through Planter Box Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.5000	0.0032	0.0045	0.0000	0.0041	0.0000
3.5513	0.0032	0.0047	0.0000	0.0041	0.0000
3.6026	0.0032	0.0048	0.0000	0.0041	0.0000
3.6539	0.0032	0.0050	0.0000	0.0041	0.0000
3.7051	0.0032	0.0052	0.0000	0.0041	0.0000
3.7564	0.0032	0.0053	0.0000	0.0041	0.0000
3.8077	0.0032	0.0055	0.0000	0.0041	0.0000
3.8590	0.0032	0.0057	0.0000	0.0041	0.0000
3.9103	0.0032	0.0058	0.0000	0.0041	0.0000
3.9616	0.0032	0.0060	0.0000	0.0041	0.0000
4.0129	0.0032	0.0062	0.0000	0.0041	0.0000
4.0641	0.0032	0.0063	0.0002	0.0041	0.0000
4.1154	0.0032	0.0065	0.0006	0.0041	0.0000
4.1667	0.0032	0.0067	0.0006	0.0041	0.0000
4.2180	0.0032	0.0068	0.0007	0.0041	0.0000
4.2693	0.0032	0.0070	0.0008	0.0041	0.0000

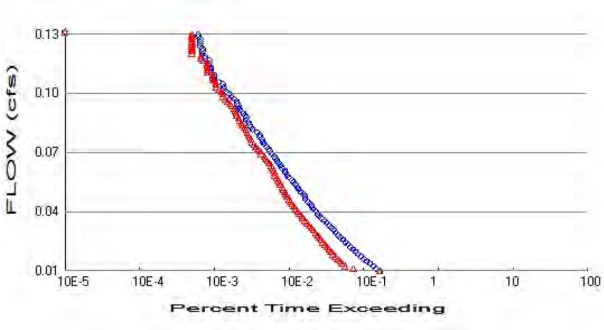
4.3206	0.0032	0.0071	0.0008	0.0041	0.0000
4.3719	0.0032	0.0073	0.0010	0.0041	0.0000
4.4231	0.0032	0.0075	0.0010	0.0041	0.0000
4.4744	0.0032	0.0076	0.0011	0.0041	0.0000
4.5257	0.0032	0.0078	0.0011	0.0041	0.0000
4.5770	0.0032	0.0080	0.0012	0.0041	0.0000
4.6283	0.0032	0.0081	0.0013	0.0041	0.0000
4.6670	0.0032	0.0083	0.0015	0.0041	0.0000

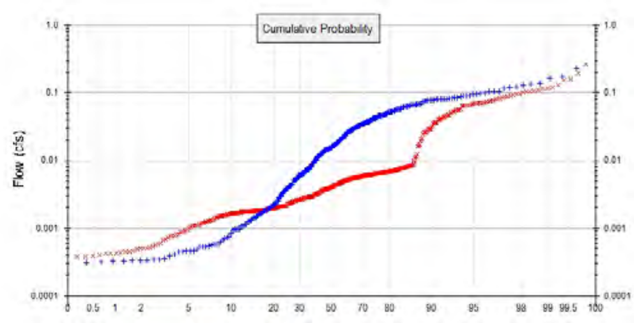
PLANT BOX Surface1B

Element Flows To:

Outlet 1	Outlet 2
	PLANT BOX 1B

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.148
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.032
Total Impervious Area: 0.116

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.079819
5 year	0.102733
10 year	0.129077
25 year	0.16741

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.071649
5 year	0.105324
10 year	0.118384
25 year	0.165433

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0080	3284	3264	99	Pass
0.0092	2962	1448	48	Pass
0.0104	2690	1120	41	Pass
0.0117	2436	1029	42	Pass
0.0129	2204	965	43	Pass
0.0141	2021	894	44	Pass
0.0153	1843	827	44	Pass
0.0165	1703	777	45	Pass
0.0178	1558	729	46	Pass
0.0190	1443	688	47	Pass
0.0202	1330	653	49	Pass
0.0214	1242	610	49	Pass
0.0227	1141	570	49	Pass
0.0239	1057	541	51	Pass
0.0251	976	513	52	Pass
0.0263	911	482	52	Pass
0.0276	843	452	53	Pass
0.0288	787	422	53	Pass
0.0300	735	398	54	Pass
0.0312	682	373	54	Pass
0.0324	641	347	54	Pass
0.0337	595	325	54	Pass
0.0349	546	307	56	Pass
0.0361	509	291	57	Pass
0.0373	482	274	56	Pass
0.0386	452	260	57	Pass
0.0398	429	242	56	Pass
0.0410	403	232	57	Pass
0.0422	379	219	57	Pass
0.0435	356	209	58	Pass
0.0447	337	200	59	Pass
0.0459	327	189	57	Pass
0.0471	310	183	59	Pass
0.0483	285	176	61	Pass
0.0496	271	171	63	Pass
0.0508	259	164	63	Pass
0.0520	245	153	62	Pass
0.0532	226	146	64	Pass
0.0545	218	143	65	Pass
0.0557	201	137	68	Pass
0.0569	190	129	67	Pass
0.0581	179	127	70	Pass
0.0594	176	125	71	Pass
0.0606	161	121	75	Pass
0.0618	155	116	74	Pass
0.0630	144	108	75	Pass
0.0642	138	103	74	Pass
0.0655	131	97	74	Pass
0.0667	126	93	73	Pass
0.0679	119	85	71	Pass
0.0691	111	82	73	Pass
0.0704	107	76	71	Pass
0.0716	100	71	71	Pass

0.0728	93	68	73	Pass
0.0740	89	65	73	Pass
0.0753	86	62	72	Pass
0.0765	81	59	72	Pass
0.0777	81	57	70	Pass
0.0789	74	55	74	Pass
0.0801	65	53	81	Pass
0.0814	62	51	82	Pass
0.0826	59	47	79	Pass
0.0838	58	46	79	Pass
0.0850	54	43	79	Pass
0.0863	53	42	79	Pass
0.0875	52	40	76	Pass
0.0887	49	39	79	Pass
0.0899	45	38	84	Pass
0.0912	43	37	86	Pass
0.0924	42	34	80	Pass
0.0936	41	32	78	Pass
0.0948	40	30	75	Pass
0.0961	37	28	75	Pass
0.0973	34	26	76	Pass
0.0985	32	26	81	Pass
0.0997	29	25	86	Pass
0.1009	27	23	85	Pass
0.1022	27	21	77	Pass
0.1034	26	21	80	Pass
0.1046	23	21	91	Pass
0.1058	20	19	95	Pass
0.1071	20	19	95	Pass
0.1083	20	19	95	Pass
0.1095	18	16	88	Pass
0.1107	18	16	88	Pass
0.1120	18	16	88	Pass
0.1132	17	16	94	Pass
0.1144	17	16	94	Pass
0.1156	17	14	82	Pass
0.1168	15	13	86	Pass
0.1181	15	13	86	Pass
0.1193	14	10	71	Pass
0.1205	14	10	71	Pass
0.1217	14	10	71	Pass
0.1230	13	10	76	Pass
0.1242	13	10	76	Pass
0.1254	13	10	76	Pass
0.1266	13	10	76	Pass
0.1279	12	10	83	Pass
0.1291	12	10	83	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

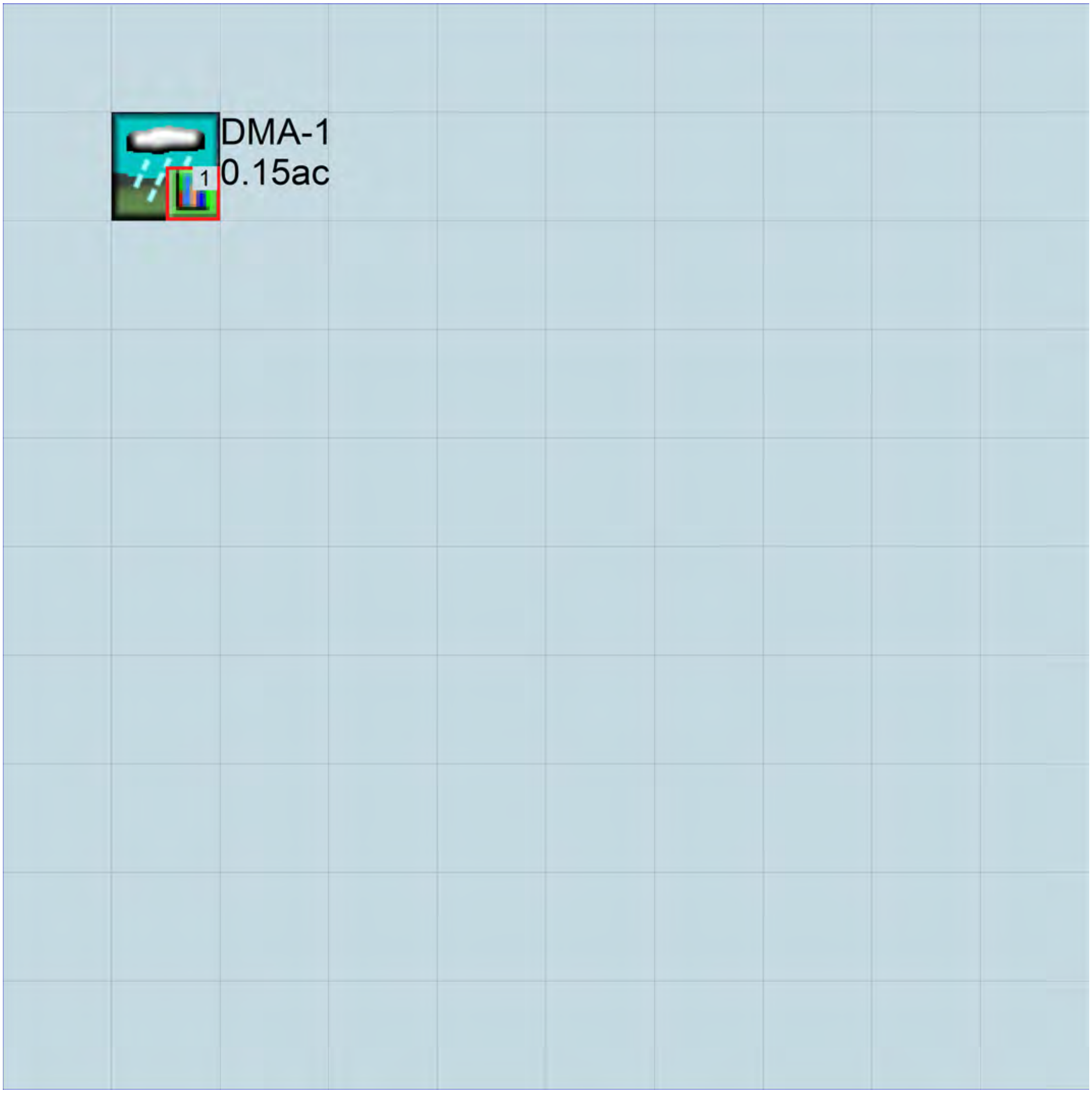
PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1949 10 01        END    2006 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM        26   DMA-1.wdm
MESSU      25   PreDMA-1.MES
           27   PreDMA-1.L61
           28   PreDMA-1.L62
           30   POCDMA-11.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      28
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1   PYR DIG2 FIL2 YRND
    1         DMA-1                      MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                            User  t-series Engl Metr ***
                                            in  out           ***
   28      C,Scrub,VSteep(>15%)    1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   28         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   28         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   28         0    0    0    1    0    0    0    0    1    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2        ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   28              0       3.9     0.015       250       0.2       0.8     0.955
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3        ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   28             40        35         3         2         0      0.03         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                               ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   28              0       0.3       0.3       0.4       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3        ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   28       0.5  0.5  0.5  0.6 0.65 0.65 0.65 0.65 0.65 0.65 0.55  0.5
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3        ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   28      0.13 0.13 0.13 0.13 0.13 0.13 0.13 0.13 0.13 0.13 0.13 0.13
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   28              0         0      0.03         0      0.78       0.3      0.01
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                      in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2        ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
DMA-1***
PERLND  28                       0.148     COPY   501     12
PERLND  28                       0.148     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                          in  out                            ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES
```

```
SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC      ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC      ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP      ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP      ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4       WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1949 10 01        END    2006 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   DMA-1.wdm
MESSU      25   MitDMA-1.MES
           27   MitDMA-1.L61
           28   MitDMA-1.L62
           30   POCDMA-11.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      57
      IMPLND       1
      RCHRES       1
      RCHRES       2
      RCHRES       3
      RCHRES       4
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        PLANT BOX  Surface1A        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   57      C,Urban,Flat(0-5%)      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   57         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   57         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   57         0    0    0    1    0    0    0    0    1    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   57              0       4.6     0.045       400      0.05       0.8     0.955
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   57             40        35         3         2         0      0.03         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                               ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   57              0       0.7      0.25         3       0.7         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   57       0.5  0.5  0.5  0.6 0.65 0.65 0.65 0.65 0.65 0.65 0.55  0.5
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   57      0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   57              0         0      0.07         0      0.92       0.3      0.01
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name-------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                       in  out          ***
    1     Impervious,Flat(0-5)    1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
```

```
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            100      0.05       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
DMA-1A***
PERLND  57                        0.02     RCHRES   1      2
PERLND  57                        0.02     RCHRES   1      3
IMPLND   1                       0.073     RCHRES   1      5
DMA-1B***
PERLND  57                       0.012     RCHRES   3      2
PERLND  57                       0.012     RCHRES   3      3
IMPLND   1                       0.043     RCHRES   3      5

******Routing******
PERLND  57                        0.02     COPY     1     12
IMPLND   1                       0.073     COPY     1     15
PERLND  57                        0.02     COPY     1     13
RCHRES   1                           1     RCHRES   2      8
PERLND  57                       0.012     COPY     1     12
IMPLND   1                       0.043     COPY     1     15
PERLND  57                       0.012     COPY     1     13
RCHRES   3                           1     RCHRES   4      8
RCHRES   2                           1     COPY   501     16
RCHRES   1                           1     COPY   501     17
RCHRES   4                           1     COPY   501     16
RCHRES   3                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                           in  out                           ***
    1     PLANT BOX  Surfa-012    3    1    1    1   28    0    1
    2     PLANT BOX 1A            1    1    1    1   28    0    1
```

```
    3     PLANT BOX  Surfa-015    3    1    1    1   28    0    1
    4     PLANT BOX 1B            1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
    3         1    0    0    0    0    0    0    0    0    0
    4         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR   *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
    3         4    0    0    0    0    0    0    0    0    0    1    9
    4         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                         ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each      FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit       possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
    1        0  1  0  0    4  5  6  0  0       0  0  0  0  0       2  2  2  2  2
    2        0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
    3        0  1  0  0    4  5  6  0  0       0  0  0  0  0       2  2  2  2  2
    4        0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50        ***
  <------><--------><--------><--------><--------><--------><-------->        ***
    1             1      0.01       0.0       0.0       0.0       0.0
    2             2      0.01       0.0       0.0       0.5       0.0
    3             3      0.01       0.0       0.0       0.0       0.0
    4             4      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                            ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1           0          4.0  5.0  6.0  0.0  0.0        0.0  0.0  0.0  0.0  0.0
    2           0          4.0  0.0  0.0  0.0  0.0        0.0  0.0  0.0  0.0  0.0
    3           0          4.0  5.0  6.0  0.0  0.0        0.0  0.0  0.0  0.0  0.0
    4           0          4.0  0.0  0.0  0.0  0.0        0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE       2
   70    4
     Depth       Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)    (acres) (acre-ft)    (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.005475  0.000000  0.000000
  0.051286  0.005475  0.000110  0.000000
  0.102571  0.005475  0.000219  0.000000
  0.153857  0.005475  0.000329  0.000000
  0.205143  0.005475  0.000438  0.000000
  0.256429  0.005475  0.000548  0.000000
  0.307714  0.005475  0.000657  0.000000
  0.359000  0.005475  0.000767  0.000000
  0.410286  0.005475  0.000876  0.000000
```

0.461571	0.005475	0.000986	0.000000
0.512857	0.005475	0.001095	0.000000
0.564143	0.005475	0.001205	0.000332
0.615429	0.005475	0.001314	0.000975
0.666714	0.005475	0.001424	0.001087
0.718000	0.005475	0.001533	0.001152
0.769286	0.005475	0.001643	0.001298
0.820571	0.005475	0.001752	0.001330
0.871857	0.005475	0.001862	0.001606
0.923143	0.005475	0.001971	0.001759
0.974429	0.005475	0.002081	0.001839
1.025714	0.005475	0.002190	0.002044
1.077000	0.005475	0.002300	0.002230
1.128286	0.005475	0.002409	0.002363
1.179571	0.005475	0.002519	0.002401
1.230857	0.005475	0.002628	0.002560
1.282143	0.005475	0.002738	0.002710
1.333429	0.005475	0.002847	0.002852
1.384714	0.005475	0.002957	0.002987
1.436000	0.005475	0.003066	0.003115
1.487286	0.005475	0.003176	0.003239
1.538571	0.005475	0.003285	0.003358
1.589857	0.005475	0.003395	0.003473
1.641143	0.005475	0.003504	0.003584
1.692429	0.005475	0.003614	0.003692
1.743714	0.005475	0.003723	0.003796
1.795000	0.005475	0.003833	0.003898
1.846286	0.005475	0.003942	0.003997
1.897571	0.005475	0.004052	0.004094
1.948857	0.005475	0.004161	0.004188
2.000143	0.005475	0.004278	0.004280
2.051429	0.005475	0.004395	0.004371
2.102714	0.005475	0.004511	0.004459
2.154000	0.005475	0.004628	0.004546
2.205286	0.005475	0.004744	0.004631
2.256571	0.005475	0.004861	0.004715
2.307857	0.005475	0.004977	0.004797
2.359143	0.005475	0.005094	0.004878
2.410429	0.005475	0.005210	0.004957
2.461714	0.005475	0.005327	0.005035
2.513000	0.005475	0.005443	0.005112
2.564286	0.005475	0.005560	0.005188
2.615571	0.005475	0.005676	0.005263
2.666857	0.005475	0.005793	0.005337
2.718143	0.005475	0.005909	0.005410
2.769429	0.005475	0.006026	0.005481
2.820714	0.005475	0.006142	0.005552
2.872000	0.005475	0.006259	0.005622
2.923286	0.005475	0.006376	0.005691
2.974571	0.005475	0.006492	0.005760
3.025857	0.005475	0.006609	0.005827
3.077143	0.005475	0.006725	0.005894
3.128429	0.005475	0.006842	0.005960
3.179714	0.005475	0.006958	0.006026
3.231000	0.005475	0.007075	0.006091
3.282286	0.005475	0.007191	0.006218
3.333571	0.005475	0.007308	0.006344
3.384857	0.005475	0.007424	0.006468
3.436143	0.005475	0.007541	0.006591
3.487429	0.005475	0.007657	0.006759
3.500000	0.005475	0.007826	0.006774

END FTABLE 2
FTABLE 1
24 6

Depth	Area	Volume	Outflow1	Outflow2	outflow 3	Velocity	Travel Time***
(ft)	(acres)	(acre-ft)	(cfs)	(cfs)	(cfs)	(ft/sec)	(Minutes)***
0.000000	0.005475	0.000000	0.000000	0.000000	0.000000		
0.051286	0.005475	0.000281	0.000000	0.006774	0.000000		

0.102571	0.005475	0.000562	0.000000	0.006774	0.000000
0.153857	0.005475	0.000842	0.000000	0.006774	0.000000
0.205143	0.005475	0.001123	0.000000	0.006774	0.000000
0.256429	0.005475	0.001404	0.000000	0.006774	0.000000
0.307714	0.005475	0.001685	0.000000	0.006774	0.000000
0.359000	0.005475	0.001966	0.000000	0.006774	0.000000
0.410286	0.005475	0.002246	0.000000	0.006774	0.000000
0.461571	0.005475	0.002527	0.000000	0.006774	0.000000
0.512857	0.005475	0.002808	0.000000	0.006774	0.000000
0.564143	0.005475	0.003089	0.000000	0.006774	0.000000
0.615429	0.005475	0.003370	0.000000	0.006774	0.000000
0.666714	0.005475	0.003650	0.000000	0.006774	0.000000
0.718000	0.005475	0.003931	0.081222	0.006774	0.000000
0.769286	0.005475	0.004212	0.226740	0.006774	0.000000
0.820571	0.005475	0.004493	0.397938	0.006774	0.000000
0.871857	0.005475	0.004774	0.562249	0.006774	0.000000
0.923143	0.005475	0.005054	0.690887	0.006774	0.000000
0.974429	0.005475	0.005335	0.771702	0.006774	0.000000
1.025714	0.005475	0.005616	0.838400	0.006774	0.000000
1.077000	0.005475	0.005897	0.896332	0.006774	0.000000
1.128286	0.005475	0.006178	0.950741	0.006774	0.000000
1.167000	0.005475	0.006390	1.002200	0.006774	0.000000

END FTABLE 1
FTABLE 4
70 4

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.003214	0.000000	0.000000		
0.051286	0.003214	0.000064	0.000000		
0.102571	0.003214	0.000129	0.000000		
0.153857	0.003214	0.000193	0.000000		
0.205143	0.003214	0.000257	0.000000		
0.256429	0.003214	0.000321	0.000000		
0.307714	0.003214	0.000386	0.000000		
0.359000	0.003214	0.000450	0.000000		
0.410286	0.003214	0.000514	0.000000		
0.461571	0.003214	0.000579	0.000000		
0.512857	0.003214	0.000643	0.000000		
0.564143	0.003214	0.000707	0.000201		
0.615429	0.003214	0.000771	0.000590		
0.666714	0.003214	0.000836	0.000638		
0.718000	0.003214	0.000900	0.000676		
0.769286	0.003214	0.000964	0.000762		
0.820571	0.003214	0.001029	0.000805		
0.871857	0.003214	0.001093	0.000971		
0.923143	0.003214	0.001157	0.001033		
0.974429	0.003214	0.001221	0.001097		
1.025714	0.003214	0.001286	0.001112		
1.077000	0.003214	0.001350	0.001237		
1.128286	0.003214	0.001414	0.001349		
1.179571	0.003214	0.001478	0.001453		
1.230857	0.003214	0.001543	0.001549		
1.282143	0.003214	0.001607	0.001639		
1.333429	0.003214	0.001671	0.001725		
1.384714	0.003214	0.001736	0.001807		
1.436000	0.003214	0.001800	0.001885		
1.487286	0.003214	0.001864	0.001959		
1.538571	0.003214	0.001928	0.002031		
1.589857	0.003214	0.001993	0.002101		
1.641143	0.003214	0.002057	0.002168		
1.692429	0.003214	0.002121	0.002233		
1.743714	0.003214	0.002186	0.002296		
1.795000	0.003214	0.002250	0.002358		
1.846286	0.003214	0.002314	0.002418		
1.897571	0.003214	0.002378	0.002476		
1.948857	0.003214	0.002443	0.002534		
2.000143	0.003214	0.002511	0.002589		
2.051429	0.003214	0.002579	0.002644		
2.102714	0.003214	0.002648	0.002698		
2.154000	0.003214	0.002716	0.002750		

```
  2.205286  0.003214  0.002785  0.002802
  2.256571  0.003214  0.002853  0.002852
  2.307857  0.003214  0.002922  0.002902
  2.359143  0.003214  0.002990  0.002951
  2.410429  0.003214  0.003058  0.002999
  2.461714  0.003214  0.003127  0.003046
  2.513000  0.003214  0.003195  0.003093
  2.564286  0.003214  0.003264  0.003139
  2.615571  0.003214  0.003332  0.003184
  2.666857  0.003214  0.003400  0.003228
  2.718143  0.003214  0.003469  0.003272
  2.769429  0.003214  0.003537  0.003316
  2.820714  0.003214  0.003606  0.003359
  2.872000  0.003214  0.003674  0.003401
  2.923286  0.003214  0.003742  0.003443
  2.974571  0.003214  0.003811  0.003484
  3.025857  0.003214  0.003879  0.003525
  3.077143  0.003214  0.003948  0.003566
  3.128429  0.003214  0.004016  0.003606
  3.179714  0.003214  0.004084  0.003645
  3.231000  0.003214  0.004153  0.003684
  3.282286  0.003214  0.004221  0.003762
  3.333571  0.003214  0.004290  0.003838
  3.384857  0.003214  0.004358  0.003913
  3.436143  0.003214  0.004426  0.003987
  3.487429  0.003214  0.004495  0.004089
  3.500000  0.003214  0.004596  0.004098
  END FTABLE  4
  FTABLE      3
   24    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.003214  0.000000  0.000000  0.000000  0.000000
  0.051286  0.003214  0.000165  0.000000  0.004098  0.000000
  0.102571  0.003214  0.000330  0.000000  0.004098  0.000000
  0.153857  0.003214  0.000494  0.000000  0.004098  0.000000
  0.205143  0.003214  0.000659  0.000000  0.004098  0.000000
  0.256429  0.003214  0.000824  0.000000  0.004098  0.000000
  0.307714  0.003214  0.000989  0.000000  0.004098  0.000000
  0.359000  0.003214  0.001154  0.000000  0.004098  0.000000
  0.410286  0.003214  0.001319  0.000000  0.004098  0.000000
  0.461571  0.003214  0.001483  0.000000  0.004098  0.000000
  0.512857  0.003214  0.001648  0.000000  0.004098  0.000000
  0.564143  0.003214  0.001813  0.000000  0.004098  0.000000
  0.615429  0.003214  0.001978  0.000000  0.004098  0.000000
  0.666714  0.003214  0.002143  0.000000  0.004098  0.000000
  0.718000  0.003214  0.002308  0.081222  0.004098  0.000000
  0.769286  0.003214  0.002472  0.226740  0.004098  0.000000
  0.820571  0.003214  0.002637  0.397938  0.004098  0.000000
  0.871857  0.003214  0.002802  0.562249  0.004098  0.000000
  0.923143  0.003214  0.002967  0.690887  0.004098  0.000000
  0.974429  0.003214  0.003132  0.771702  0.004098  0.000000
  1.025714  0.003214  0.003296  0.838400  0.004098  0.000000
  1.077000  0.003214  0.003461  0.896332  0.004098  0.000000
  1.128286  0.003214  0.003626  0.950741  0.004098  0.000000
  1.167000  0.003214  0.003751  1.002200  0.004098  0.000000
  END FTABLE  3
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM     22 IRRG     ENGL    0.7       SAME PERLND  57     EXTNL  SURLI
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
```

```
WDM       2 PREC      ENGL     1                RCHRES   3      EXTNL  PREC
WDM       1 EVAP      ENGL     0.5              RCHRES   1      EXTNL  POTEV
WDM       1 EVAP      ENGL     0.7              RCHRES   2      EXTNL  POTEV
WDM       1 EVAP      ENGL     0.5              RCHRES   3      EXTNL  POTEV
WDM       1 EVAP      ENGL     0.7              RCHRES   4      EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1         1     WDM   1000 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1         1     WDM   1001 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1         1     WDM   1002 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1         1     WDM   1003 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1      48.4     WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1      48.4     WDM    801 FLOW     ENGL      REPL
RCHRES   4 HYDR   RO     1 1         1     WDM   1004 FLOW     ENGL      REPL
RCHRES   4 HYDR   STAGE  1 1         1     WDM   1005 STAG     ENGL      REPL
RCHRES   3 HYDR   STAGE  1 1         1     WDM   1006 STAG     ENGL      REPL
RCHRES   3 HYDR   O      1 1         1     WDM   1007 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK        12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    12

  MASS-LINK        13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    13

  MASS-LINK        15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    15

  MASS-LINK        16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK    16

  MASS-LINK        17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK    17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

Legal Notice

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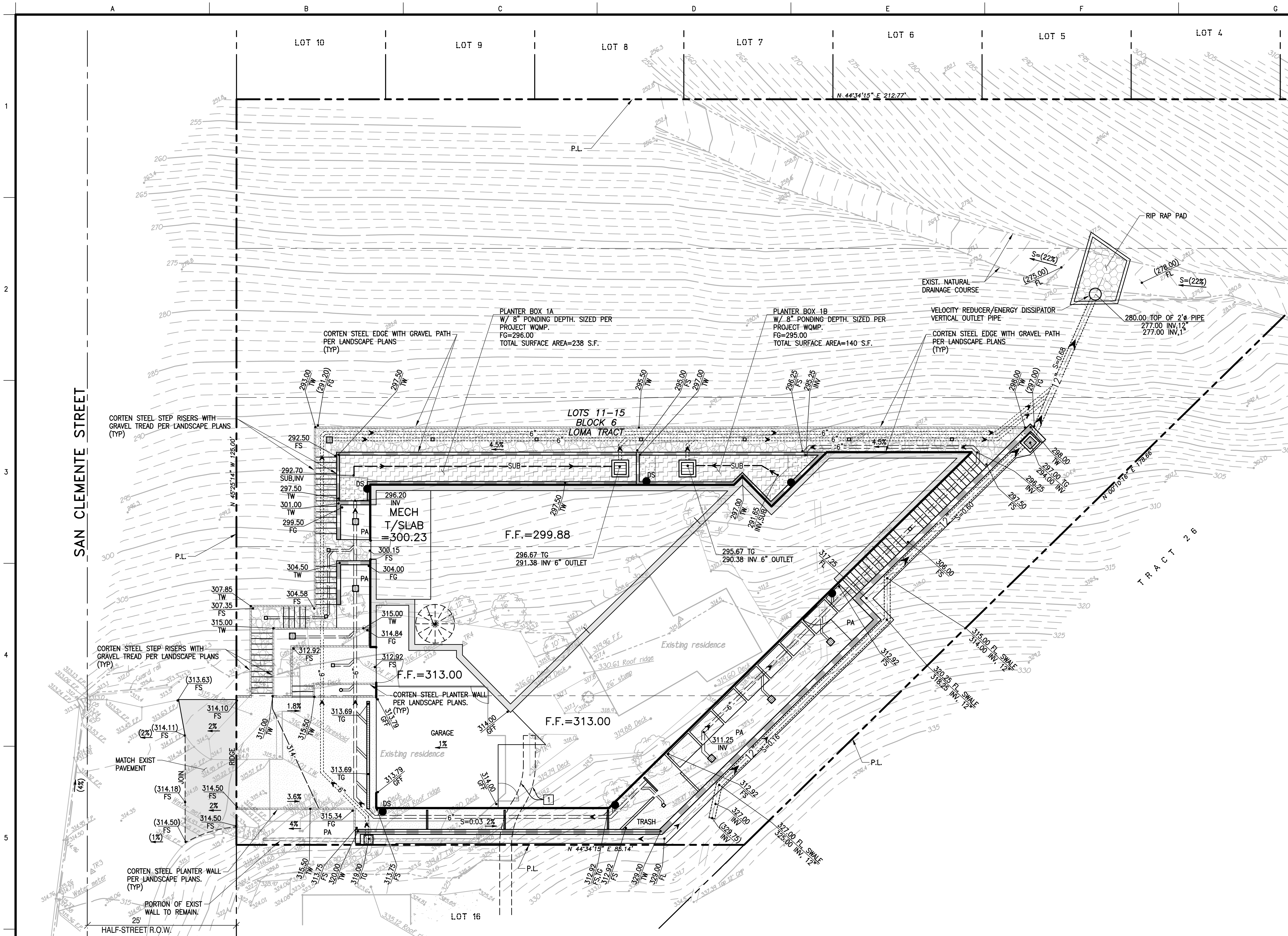
ATTACHMENT D
Grading Plan



LEGEND

100	EXISTING CONTOUR
—100—	PROPOSED CONTOUR
100.00	SPOT ELEVATION
	PROPOSED CONCRETE PAVING
	PROPOSED GRAVEL
	PROPOSED RIP RAP PAD
	PROPOSED BIORETENTION AREA
	PROPOSED SPLASH BLOCK
	EXIST WALL TO REMAIN
4"	PROPOSED STORM DRAIN LINE TO PLANTER BOX
4"	PROPOSED STORM DRAIN LINE TO DRAINAGE COURSE
	BEARING/RETAINING WALL
	EXISTING SCREEN WALL
	PROPOSED RETAINING WALL
	PROPOSED CORTEN STEEL EDGE
	PROPOSED GUARD RAILING
— SUB —	PROPOSED SUBDRAIN
PAD	PROPOSED PAD ELEVATION
FF	PROPOSED FINISHED FLOOR
FS	PROPOSED FINISHED SURFACE
FG	PROPOSED FINISHED GROUND
T/S	PROPOSED TOP OF SLAB
INV	INVERT OF PIPE
TG	TOP OF GRATE
P.L.	PROPERTY LINE
TW	TOP OF WALL
TF	TOP OF FOOTING
● DS	DOWNSPOUT

BENCHMARK NOTE:
OCSBM 3Z-29-71
ELEV=290.867
NAVD88 DATUM, 1991 ADJ.

EASEMENT NOTE:
ALL EASEMENTS SHOWN ON THIS TOPOGRAPHIC AND BOUNDARY SURVEY ARE PER A PRELIMINARY TITLE REPORT PREPARED BY CALIFORNIA TITLE COMPANY, ORDER NO. NB-1906169-12 DATED JUNE 18, 2018 UNLESS NOTED OTHERWISE.

1 ITEM 5 OF THE PRELIMINARY TITLE REPORT, A 2' WIDE EASEMENT FOR INGRESS AND EGRESS TO AND FROM A SEWER LINE AND INCIDENTAL PURPOSES RECORDED IN BOOK 13859, PAGE 2 O.R. THE LOCATION AS SHOWN ON THIS TOPOGRAPHIC SURVEY IS APPROXIMATE. THE ACTUAL LOCATION IS SUBJECT TO THE FIELD LOCATION OF THE SEWER LINE.

LOT LINE ADJUSTMENT NOTE:

1 ITEM 6 OF THE PRELIMINARY TITLE REPORT, AN APPLICATION FOR LOT LINE ADJUSTMENT LLA 10-2 RECORDED AUGUST 9, 2010 AS INSTRUMENT NO. 2010-404481 O.R. WAS RESCINDED BY RESOLUTION 15.085, RECORDED DECEMBER 4, 2015 AS INSTRUMENT NO. 2015-617907.

PLANS PREPARED BY:

TOAL ENGINEERING, INC.

CIVIL ENGINEERING
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STORMWATER QUALITY

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REGISTERED PROFESSIONAL ENGINEER
CALEB RIOS
No. 57587
CIVIL
STATE OF CALIFORNIA

CALEB RIOS
R.C.E. 57587
DATE:

PREPARED FOR:

KEVIN AARONSON

BY	DATE	APVD.	DATE

REVISIONS

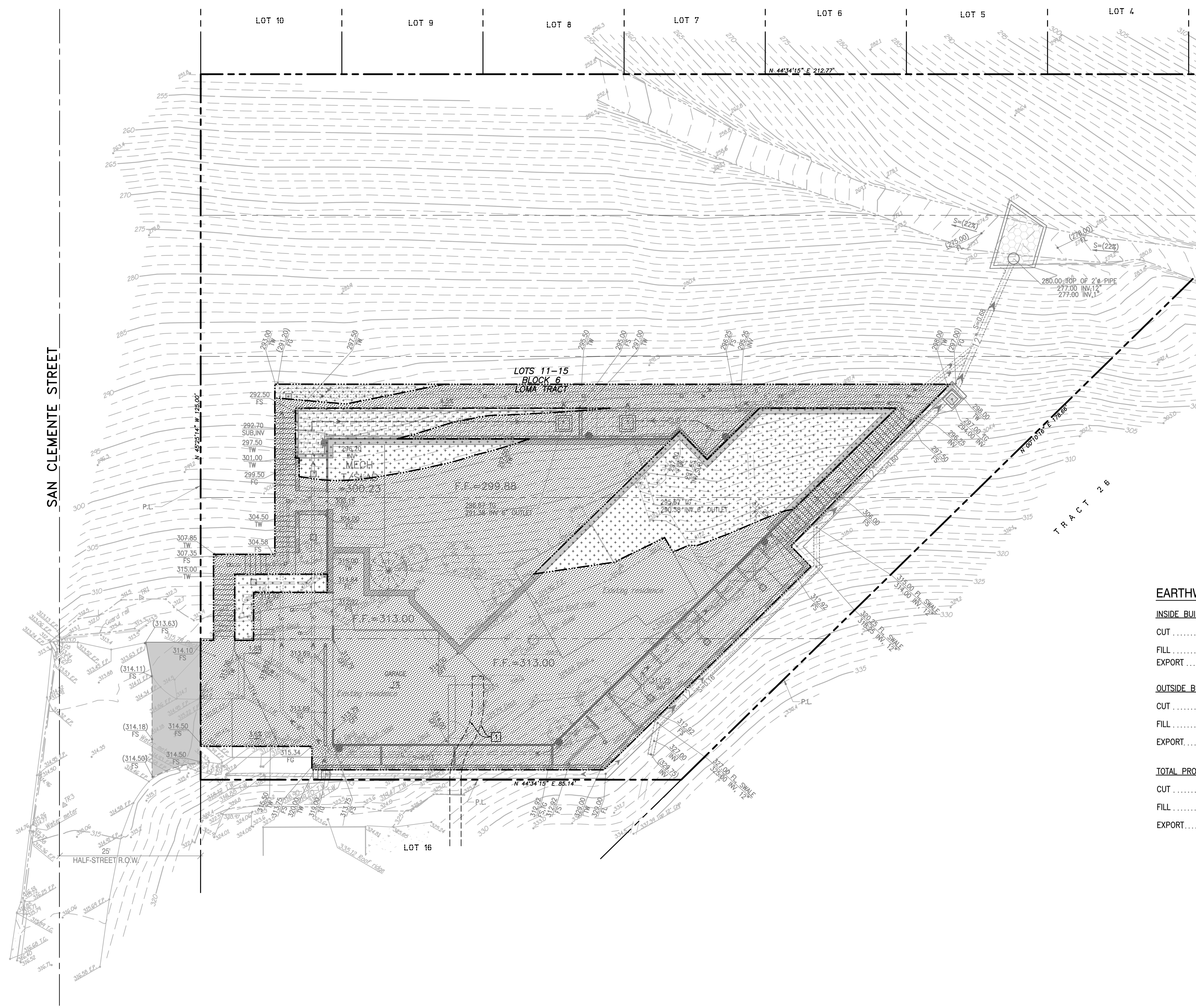
AARONSON RESIDENCE

PRELIMINARY GRADING PLAN

LOTS 11–15, BLOCK 6, LOMA TRACT
2354 SAN CLEMENTE, LAGUNA BEACH CA

DATE: 12/26/18	H. SCALE: 1"=8'	
SURVEY DATE: 10/01/18	V. SCALE: N/A	
DRN.: O.R.	DWG. NO.	
CHD.: C.R.	C–01	
APPD.: C.R.		
JOB NO. 18156	SHEET 1	OF 2

12/27/2018 3:07:54 PM N:\181xx\18156\Drawings\Civil\18156-prelimgp-01.dwg



EARTHWORK QUANTITIES:

INSIDE BUILDING FOOTPRINT:

CUT	601 CY
FILL	164 CY
EXPORT	437 CY

OUTSIDE BUILDING FOOTPRINT:

CUT	347 CY
FILL	24 CY
EXPORT	323 CY

TOTAL PROJECT

CUT	948 CY
FILL	188 CY
EXPORT	760 CY

LEGEND:

AREA OF CUT

AREA OF FILL

PLANS PREPARED BY:

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STORMWATER QUALITY

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STATE OF CALIFORNIA

CALEB RIOS
R.C.E. 57587
DATE:

PREPARED FOR:

KEVIN AARONSON

REVISIONS	BY	DATE	APVD.	DATE

AARONSON RESIDENCE

CUT FILL EXHIBIT

LOTS 11-15, BLOCK 6, LOMA TRACT
2354 SAN CLEMENTE, LAGUNA BEACH CA

DATE: 12/26/18	H. SCALE: 1"=8'
SURVEY DATE: 10/01/18	V. SCALE: N/A
DRN.: O.R.	DWG. NO.
CHD.: C.R.	C-02
APPD.: C.R.	
JOB NO. 18156	SHEET 2 OF 2

ATTACHMENT E
Worksheets, Fact sheets and Product information

Worksheet 1: Infiltration Feasibility Categorization

Categorization of Infiltration Feasibility Condition				*Page 1 of 5*
Part 1: Physical Limitations of Infiltration Based on the criteria for physical limitations of infiltration described in Section 4.2.2.2, what level of physical feasibility of infiltration is the maximum that the BMP location will support?				
1	**Physical Infiltration Feasibility Category**	**Mark applicable category**	**Next step**	
	Full Infiltration of the DCV		Continue to Part 2	
	Biotreatment with Partial Infiltration	X	Continue to Part 3	
	Biotreatment with No Infiltration		Select and Utilize Biotreatment without Infiltration	
Provide summary of basis: The project area is located within Type C soils. Type C soils may allow incidental infiltration.				

<table>
<tr><th colspan="2">Categorization of Infiltration Feasibility Condition</th><th colspan="2">Page 2 of 5</th></tr>
<tr><th colspan="2">Part 2: Risks Limiting Full Infiltration of the DCV –Would infiltration of the full DCV introduce risks of undesirable consequences that cannot reasonably be mitigated?</th><th>Yes</th><th>No</th></tr>
<tr><td>2</td><td>Would infiltration of the DCV pose significant risk for groundwater related concerns? Use criteria described in Section 4.2.2.3 and results from Worksheet 2 (Appendix C) to describe groundwater-related infiltration feasibility criteria.</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:

Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>3</td><td>Would infiltration of the full DCV pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level? Use criteria described in Section 4.2.2.4.</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:

Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>4</td><td>Would infiltration of the DCV cause an increase in groundwater flow or decrease in surface runoff over predevelopment conditions that would cause impairment to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters? Use criteria in Section 4.2.2.5</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:

Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
</table>

<table>
<tr><th colspan="2">Categorization of Infiltration Feasibility Condition</th><th colspan="2">Page 3 of 5</th></tr>
<tr><td colspan="2">Part 2 (continued): Risks Limiting Full Infiltration of the DCV –Would infiltration of the full DCV introduce risks of undesirable consequences that cannot reasonably be mitigated?</td><td>Yes</td><td>No</td></tr>
<tr><td>5</td><td>Is there substantial evidence that infiltration of the DCV would result in a significant increase in I&I to the sanitary sewer that cannot be sufficiently mitigated?</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:

Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>6</td><td>Would infiltration of the DCV violate downstream water rights?</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:

Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>Part 2 Result</td><td>If the answer to all questions 2-6 are “No”, then the DMA is categorized as “Full Infiltration” for the purposes of LID BMP type selection. Describe finding.

At the Preliminary/Conceptual WQMP phase, describe the additional design-phase testing required to confirm this determination and identify contingencies for final design.

At the Final Project WQMP phase, identify any required construction-phase testing and identify the design contingencies that should result based on construction-phase testing.

If the answer to any of questions 2-6 is “Yes” then the site cannot be categorized as “Full Infiltration”. Continue to Part 3: Partial Infiltration Feasibility</td><td colspan="2"></td></tr>
<tr><td colspan="2">Categorization of Infiltration Feasibility Condition</td><td colspan="2">Page 4 of 5</td></tr>
<tr><td colspan="2">Part 3: Partial Infiltration Feasibility Criteria –Would infiltration of any appreciable volume of stormwater result in risks of undesirable consequences that cannot reasonably be mitigated?</td><td>Yes</td><td>No</td></tr>
</table>

<table>
<tr><td>8</td><td>Would use of biotreatment BMPs with partial infiltration pose significant risk for groundwater related concerns? Refer to criteria in Section 4.2.2.3 and Worksheet 1 (Appendix C) for guidance on groundwater-related infiltration feasibility criteria.</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:

<u>Groundwater information will be included upon receipt of the Project Soils Report.</u></td></tr>
<tr><td>9</td><td>Would the use of biotreatment BMPs with partial infiltration pose elevated risks of geotechnical hazards that cannot be mitigated to an acceptable level? Refer to Section 4.2.2.4.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis:

<u>Infiltration cannot be located on-site in areas more than 50’ from slopes greater than 15%, nor can it be placed beyond 8’ from building foundations. See WQMP Site Plan in Section 4.1</u></td></tr>
<tr><td>10</td><td>Would the use of biotreatment BMPs with partial infiltration elevate risks or introduced conflicts related to groundwater balance, inflow and infiltration, or water rights? Refer to Section 4.2.2.5. Note: this is uncommon and must be supported by site-specific analysis if it is used as a basis to reject biotreatment with partial infiltration.</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:

<u>Groundwater information will be included upon receipt of the Project Soils Report. The quantity and quality of the stormwater from the site has not been diminished. A review of the Orange County Geomatics website and the Orange County Public Works Drainage Facilities Map does not reveal any potential downstream water right issues or violations.</u></td></tr>
<tr><td colspan="2">Categorization of Infiltration Feasibility Condition</td><td colspan="2">Page 5 of 5</td></tr>
<tr><td>Part 3 Result</td><td>If the answer to all questions 8-10 are “No”, then the DMA is categorized as “Biotreatment with Partial Infiltration” for the purposes of LID BMP type selection.

If the answer to any of questions 8-10 is “Yes” then the site is categorized as “Biotreatment with No Infiltration” for the purposes of LID BMP type selection.</td><td colspan="2"><u>Biotreatment with No Infiltration</u></td></tr>
</table>

Worksheet 8: Static Volume Method for Sizing Bioretention BMPs with Underdrains in SOC

DMA-1A, PLANTER BOX 1A

Part 1: Calculate Design Storm Volume				
1	Enter design capture storm depth, *d* (inches)	d=	0.75	inches
2a	Enter the combined effect of provided HSCs, d_{HSC} (inches) (based on Worksheet 4)	d_{HSC}=	0	inches
2b	Calculate the remainder of the design capture storm depth, dremainder = d - d_{HSC}	$d_{remainder}$=	0.75	inches
3a	Enter DMA area tributary to BMP(s), A (acres) excluding any self-retaining areas	A=	0.093	acres
3b	Enter DMA Imperviousness, imp (unitless) after removal of self-retaining areas	imp=	0.785	
3c	Calculate runoff coefficient, C= (0.75 x imp) + 0.15	C=	0.74	
3d	Calculate runoff volume, DCV = (C x $d_{remainder}$ x A x 43560 x (1/12)) (See Section E.2.2)	DCV=	187.0	cu-ft
Part 2: Select Initial BMP Effective Footprint Area (can be iterative)				
4a	Calculate minimum area required for BMP to avoid premature clogging from Section E.4.1 (as percent of impervious tributary area)	$\%A_{min,clog}$=	2.8	%
4b	Calculate minimum area required for BMP to meet volume reduction requirements (Partial Infiltration category only) using Section E.4.2	$\%A_{min,vol}$=	1.9	%
4c	Effective footprint of BMP as percent of tributary impervious area, must be equal to or greater than both $\%A_{min,clos}$ and $\%A_{min,vol}$ (as applicable)	$\%A_{BMP\_EFF}$	2.8	%
4d	Effective footprint of BMP ($\%A_{BMP\_EFF}$ * A * imp)	A_{BMP_EFF}	89.0	sq-ft
Part 3: Calculate Retention Volume in BMP				
5a	Determine gravel layer depth (18 inches or an alternative depth that will infiltrate within 48 hours)	D_{gravel}	18	inches
5b	Calculate effective retention storage depth of gravel layer $D_{eff,gravel}$ = 0.4 porosity * Dgravel (Partial Infiltration Category only)	$D_{eff,gravel}$	-	inches
6	Calculate volume retained in gravel layer (Partial Infiltration Category only) $V_{gravel} = D_{eff,gravel} * A_{BMP\_EFF}$ * (1 ft/12 inches)	V_{gravel_retain}	-	cu-ft
7a	Media depth D_{media} (24 inches typical) See BMP fact sheet (Appendix G)	D_{media}	24	inches
8b	Calculate volume retained in soil media layer, Vmedia =0.1*D_{media}*A_{BMP_EFF} * (1 ft/12 inches)	V_{media_retain}	17.8	cu-ft
Part 4: Calculate Required and Provided Biofiltered Volume				
9	Calculate the remaining DCV by subtracting the retained volume in the gravel layer and media layer from the initial design volume, DCV_{remain}= DCV-V_{gravel}-V_{media}	DCV_{remain}	169.2	cu-ft

9	Calculate the required static biofiltration volume to be provided in the pores of the media and surface ponded storage above the underdrain, $V_{biofilter\_storage\_req} = 0.75 * DCV_{remain}$	$V_{biofilter\_storage\_req}$	126.9	cu-ft
10a	Surface storage ponding depth (6-12 inches typical) See BMP fact sheet (Appendix G)	$D_{ponding}$	8	inches
10b	Calculate effective depth of the biofiltration storage above the underdrain, $D_{effective\_biotreat} = 0.2 * D_{media} + D_{ponding} + 0.4*D_{gravel}$	$D_{effective\_biotreat}$	20	in
11	Calculate static biofiltration storage volume provided in pores of media, and surface ponded storage above the underdrain Vbiofilter_storage = $(D_{effective\_biotreat}) * A_{BMP\_EFF} * (1\ ft/12\ in)$	$V_{biofilter\_storage}$	148.4	cu-ft
12	The $V_{biofilter\_storage} > V_{biofilter\_ storage\_req}$. ……. OK.	**148.4**	**>**	**126.9**

Worksheet 8: Static Volume Method for Sizing Bioretention BMPs with Underdrains in SOC

DMA-1B, PLANTER BOX 1B

Part 1: Calculate Design Storm Volume				
1	Enter design capture storm depth, *d* (inches)	d=	0.75	inches
2a	Enter the combined effect of provided HSCs, d_{HSC} (inches) (based on Worksheet 4)	d_{HSC}=	0	inches
2b	Calculate the remainder of the design capture storm depth, dremainder = d - d_{HSC}	$d_{remainder}$=	0.75	inches
3a	Enter DMA area tributary to BMP(s), A (acres) excluding any self-retaining areas	A=	0.055	acres
3b	Enter DMA Imperviousness, imp (unitless) after removal of self-retaining areas	imp=	0.782	
3c	Calculate runoff coefficient, C= (0.75 x imp) + 0.15	C=	0.74	
3d	Calculate runoff volume, DCV = (C x $d_{remainder}$ x A x 43560 x (1/12)) (See Section E.2.2)	DCV=	110.3	cu-ft
Part 2: Select Initial BMP Effective Footprint Area (can be iterative)				
4a	Calculate minimum area required for BMP to avoid premature clogging from Section E.4.1 (as percent of impervious tributary area)	$\%A_{min,clog}$=	2.8	%
4b	Calculate minimum area required for BMP to meet volume reduction requirements (Partial Infiltration category only) using Section E.4.2	$\%A_{min,vol}$=	1.9	%
4c	Effective footprint of BMP as percent of tributary impervious area, must be equal to or greater than both $\%A_{min,clos}$ and $\%A_{min,vol}$ (as applicable)	$\%A_{BMP\_EFF}$	2.8	%
4d	Effective footprint of BMP ($\%A_{BMP\_EFF}$ * A * imp)	A_{BMP_EFF}	52.5	sq-ft
Part 3: Calculate Retention Volume in BMP				
5a	Determine gravel layer depth (18 inches or an alternative depth that will infiltrate within 48 hours)	D_{gravel}	18	inches
5b	Calculate effective retention storage depth of gravel layer $D_{eff,gravel}$ = 0.4 porosity * Dgravel (Partial Infiltration Category only)	$D_{eff,gravel}$	-	inches
6	Calculate volume retained in gravel layer (Partial Infiltration Category only) V_{gravel} = $D_{eff,gravel}$ * A_{BMP_EFF} * (1 ft/12 inches)	V_{gravel_retain}	-	cu-ft
7a	Media depth D_{media} (24 inches typical) See BMP fact sheet (Appendix G)	D_{media}	24	inches
8b	Calculate volume retained in soil media layer, Vmedia =0.1*D_{media}*A_{BMP_EFF} * (1 ft/12 inches)	V_{media_retain}	10.5	cu-ft
Part 4: Calculate Required and Provided Biofiltered Volume				
9	Calculate the remaining DCV by subtracting the retained volume in the gravel layer and media layer from the initial design volume, DCV_{remain}= DCV-V_{gravel}-V_{media}	DCV_{remain}	99.8	cu-ft

9	Calculate the required static biofiltration volume to be provided in the pores of the media and surface ponded storage above the underdrain, $V_{biofilter\_storage\_req} = 0.75 * DCV_{remain}$	$V_{biofilter\_storage\_req}$	74.8	cu-ft
10a	Surface storage ponding depth (6-12 inches typical) See BMP fact sheet (Appendix G)	$D_{ponding}$	8	inches
10b	Calculate effective depth of the biofiltration storage above the underdrain, $D_{effective\_biotreat} = 0.2 * D_{media} + D_{ponding} + 0.4*D_{gravel}$	$D_{effective\_biotreat}$	20	in
11	Calculate static biofiltration storage volume provided in pores of media, and surface ponded storage above the underdrain Vbiofilter_storage = $(D_{effective\_biotreat}) * A_{BMP\_EFF} * (1 ft/12 in)$	$V_{biofilter\_storage}$	87.4	cu-ft
12	The $V_{biofilter\_storage} > V_{biofilter\_storage\_req}$. ……. OK.	**87.4**	>	**74.8**

MISC-1: BIORETENTION SOIL MEDIA

Bioretention soil media is a critical design element for bioretention BMPs, including INF-3, BIO-1, and BIO-6. It is also part of the design of some configurations of swales (BIO-2) and filter strips (BIO-3). Finally, it can be used as a filtering layer below infiltration systems to augment treatment and protect groundwater quality.

All bioretention soil media must provide appropriate properties for filtering stormwater and supporting vegetation.

In addition, for systems that filter water through BSM into an underdrain (BIO-1, BIO-6), additional criteria apply for media infiltration rate and chemical suitability to avoid pollutant leaching or premature clogging.

Also known as:
- *Bioretention media*
- *Biofiltration media*

Street-end biofiltration with planting/storage media
Source: City of Portland

Applicability of BSM Specification Elements

The model specifications described in this fact sheet include elements that do not apply to all BMP types. The following table identifies the elements of the model specifications that apply to the different types of BMPs.

BMP Type	Composition and Material Specifications	Basic Testing of Combined Mix	Infiltration Testing of Combined Mix	Chemical Suitability Testing of Combined Mix (leaching potential)
Bioretention with Underdrains (BIO-1, BIO-6)	X	X	X	X
BIO-1 or BIO-6 draining to nutrient-sensitive water bodies	X	X	X	X
Bioretention without Underdrains (INF-3)	X	X		
Amended Soils as Treatment Layer in Other Infiltration BMPs	X	X		
Swales (BIO-2) with Amended Soil Layer	X	X		
Filter Strips (BIO-3)	X	X		

General Criteria and Composition

- BSM should consist of 70 to 80% fine sand and 20 to 30% stable, well aged compost **by volume**, each meeting the quality standards described in the following sections. Alternative mix designs may be developed and tested to demonstrate suitability. Deviations from these ranges and material types may also be needed to achieve low nutrient leaching designs, where necessary. [*Note: The unit weight of compost is typically less than half of the unit weight of sand. Therefore, the percentage by mass is different.]*
- BSM should be designed to achieve the long term hydraulic design requirements associated with the design of the facility (i.e., design infiltration rate).
    - For BIO-1 and BIO-6 (systems with underdrains), the hydraulic conductivity should be evaluated via testing and conform to an acceptable range due to the importance of this value in sizing and performance of systems. Selection of an appropriate infiltration rate and evaluation of mix acceptability is described in "Infiltration Rate Evaluation" section of this Fact Sheet.
    - For other applications of BSM, infiltration rate of media is not as critical in design and can be assured via simpler checks on particle size information obtained as part of "Basic Whole Mix Testing Recommendations" part of this Fact Sheet.
- BSM should support the growth of hardy native plants suited to a well drained sandy soil. However BSM should not be excessively enriched, which can lead to excessive weeds and leaching of nutrients. Agronomic suitability and avoidance of excessive nutrient leaching is evaluated as part of "Basic Whole Mix Testing Recommendations" part of this Fact Sheet.
- BSM for use in BIO-1 or BIO-6 (systems with underdrains) should be more carefully evaluated for nutrient and other pollutant leaching potential as described in "Chemical Suitability Evaluation" part of this Fact Sheet.
- Blending should be conducted at a soil blending facility using an appropriate mechanical method to achieve complete and uniform mixing, such as a drum mixer. Moving piles of material around with a loader and/or transferring back and forth between bins to mix components is typically not adequate to achieve uniform mixing.
- Testing of the actual whole BSM mix to be delivered to the project is strongly recommended; prior testing conducted by the manufacturer may be used in place of project-specific testing provided that it is recent (within 6 months) and represents the actual mix proportions and compontents that are proposed for the project.
- Procurement, handling, and placement of BSM should adhere to guidelines in "Construction Guidelines" part of this Fact Sheet.

Sand for Bioretention Soil Media

- Sand should be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material.
- Sand should be washed.
- All aggregate passing the No. 200 sieve size should be non-plastic.
- Sand for bioretention should be analyzed by an accredited lab using #200, #100, #40, #30, #16, #8, #4, and 3/8 sieves (ASTM D 422 or as approved by the local permitting authority) and meet

the following gradation (Note: all sands complying with ASTM C33 for “fine aggregate concrete sand” comply with the gradation requirements below):

Sieve Size (ASTM D422)	Sieve Size (mm)	% Passing (by weight)	
		Minimum	Maximum
3/8 inch	9.5	100	100
#4	4.8	90	100
#8	2.4	70	100
#16	1.2	40	95
#30	0.60	15	70
#40	0.42	5	55
#100	0.15	0	15
#200	0.075	0	5

- Coefficient of Uniformity (Cu = D60/D10) should be equal to or equal to or greater than 4
- Note: the gradation of the sand component of the media an important major factor in the infiltration rate of the media mix. If the desired infiltration rate of the media cannot be achieved within the specified proportions of sand and compost), then it may be necessary to utilize sand at the coarser end of the range specified in the table above (“minimum” column) with more uniform particle size (i.e., poorly graded). Sand products such as “filter sand” and “top dressing sand” tend to meet the C33 specification and support higher infiltration rates.

Compost for Bioretention Soil Media

Compost should be a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes, or other organic materials not including manure or biosolids meeting standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program). **It is expected that only select compost products will meet this specification.** Compost quality should be verified via a lab analysis to be:

- Feedstock materials shall be specified and include one or more of the following: landscape/yard trimmings, grass clippings, food scraps, and agricultural crop residues.
- Organic matter: 35-75% dry weight basis.
- Carbon and Nitrogen Ratio: 15:1 < C:N < 40:1; preferably above 20:1 to reduce the potential for nitrogen leaching/washout.
- Nitrogen between 0.6 and 3% by dry weight.
- Physical contaminants (manmade inert materials) not exceeding 1% by dry weight.
- Maturity/Stability (qualitative):Compost shall have dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell, containing recognizable grass or leaves, or is hot (120 F) upon delivery or rewetting is not acceptable.
- Maturity (seed emergence and seedling vigor): greater than 80% relative to positive control (Method TMECC 5.05-A, USDA and U.S. Composting Council)

- Stability (Carbon Dioxide evolution rate): less than 2.5 mg CO2-C per g compost organic matter (OM) per day or less than 5 mg CO2-C per g compost carbon per day, whichever unit is reported. (Method TMECC 5.08-B, USDA and U.S. Composting Council). Alternatively a Solvita rating of 6 or higher is acceptable.
- Toxicity: any one of the following measures is sufficient to indicate non-toxicity:
  - NH4:NH3 < 3
  - Ammonium < 500 ppm, dry weight basis
  - Seed Germination > 80% of control
  - Plant trials > 80% of control
  - Total Boron should be <80 ppm, soluble boron < 2.5 ppm
- Salinity: < 6.0 mmhos/cm or Soluble Salt Concentration less than 10 dS/m (Method TMECC 4.10-A, USDA and U.S. Composting Council).
- pH between 6.5 and 7.5 (may vary with plant palette)
- Compost for bioretention should be analyzed by an accredited lab using #200, ¼ inch, ½ inch, and 1 inch sieves (ASTM D 422 or as approved by the local permitting authority) and meet the following gradation:

Sieve Size (ASTM D422)	% Passing (by weight)	
	Minimum	Maximum
1 inch	99	100
½ inch	90	100
¼ inch	40	90
#200	0	10

- Tests should be sufficiently recent to represent the actual material that is anticipated to be delivered to the site. If processes or sources used by the supplier have changed significantly since the most recent testing, new tests should be requested. Compost quality can vary significanly by season and by batch.
- Note: the gradation of compost used in bioretention media can have an important influence on the saturated hydraulic conductivity of the media. To achieve a higher saturated hydraulic conductivity, it may be necessary to utilize compost at the coarser end of this range (“minimum” column). The percent passing the #200 sieve (fines) is believed to be the most important factor in hydraulic conductivity. In addition, a coarser compost mix provides more heterogeneity of the bioretention media, which is believed to be advantageous for more rapid development of soil structure needed to support health biological processes. This may be an advantage for plant establishment with lower nutrient and water input.

Mulch for Bioretention Soil Media

- The bioretention panting area should generally be covered with 2 to 4 inches (average 3 inches) of well aged, double or triple shredded mulch at the time of construction and an additional placement of 1 to 2 inches of mulch should be added annually. Mulch should be stockpiled and stored at least 12 months prior to application to the BMP and must be non-floating to avoid clogging of overflow structures. *The intention is to help sustain the nutrient levels, suppress weeds, retain moisture, and maintain infiltration capacity*.

- Inorganic mulch such as rock, may be used.

Basic Whole Mix Testing Recommendations

Basic whole mix testing should be done for any application of BSM in stormwater BMPs. The blended BSM should be submitted to an agronomic laboratory for a standard "Agronomic Soil Suitability Test" with texture class and organic matter analyses included (estimated $110 to $150).

- Organic Matter: between 2 and 5 percent by dry weight

  [Note: This range is not incompatible with the organic content requirements of compost. If compost is 20 percent of the mix by volume, this represents about 7.5 percent of the mix by dry weight. If compost has an organic fraction of 35 percent to 75 percent by dry weight, then the total mix organic content would be 2.5 to 5.5 percent]

- Total Nitrogen: 0.1 to 0.25% by dry weight (100 to 250 mg/kg)

  [Note: Similar to the explanation above, this is not incompatible with the compost nitrogen requirements]

- Plant Available Phosphorus (also known as "P Index") (based on weak acid extraction: ammonium Bicarbonate/DTPA soil analysis or similar): 10 to 50 mg/kg (P Index 10 to 50)
- Percent Sand/Silt/Clay: Less than 2 percent clay; 5 to 20 percent silt or infiltration testing showing greater than 10 inches per hour
- pH range: 6.0-7.5
- Salinity less than 3.0 millimho/cm (as measured by electrical conductivity)
- Sodium adsorption ration (SAR) less than 3.0
- Chloride less than 150 ppm
- An assessment of agricultural suitability for hearty, well-suited plants based on test results should be conducted, including recommendations for adding amendments, chemical corrections, or both.

Testing reports should include:

- Date of Testing
- Project Name
- The Contractor's Name
- Source of Materials and Supplier's Name
- Adequate information to demonstration conformance with the criteria above.

Rationale: A BSM that aheres to the general guidelines for mix composition, sand properties, and compost properties should provide acceptable properties for most applications. However, due to ranges of physical and chemcial properties that exist in sand and compost specifications and variability in supply stocks, basic testing of the specific whole BSM proposed for the project is strongly recommended. The ranges of criteria are intended to avoid mixes that have clear material quality issues.

Infiltration Rate Evaluation

This section appiles to BIO-1 or BIO-6 where a specific range of media infiltration rates is established in design and is critical for sizing.

- The saturated hydraulic conductivity or infiltration rate of the whole BSM shall be measured by one of the following methods:
  - Measurement of hydraulic conductivity (USDA Handbook 60, method 34b) (commonly available as part of standard agronomic soil evaluation – estimated $30 to 50 per sample), or
  - ASTM D2434 Permeability of Granular Soils (at approximately 85 percent relative compaction Standard Proctor, ASTM D698)
- BSM should conform to hydraulic criteria associated with the BMP design configuration that best applies to the facility where the BSM will be installed (options describe below).
  - **Systems with hydraulic control on the outlet of the underdrain system** (i.e., outlet control). For systems in which the flowrate of water through the media is controlled via an outlet control device (e.g., orifice or valve) affixed to the outlet of the underdrain system, the infiltration rate or hydraulic conductivity of the media should be at least 20 inches per hour and not more than 40 inches per hour. The outlet control device should control the flowrate to between 5 and 12 inches per hour. This configuration reduces the sensitivity of system performance to the permeability of the material, reduces the likelihood of short circuiting through media, and allows more precise design and control of system flow rates. For these reasons, outlet control should be considered the preferred design option.
  - **Systems with free-flowing underdrain system** (i.e., flowrate is controlled by the permeability of the BSM). For systems with underdrains that are not restricted, the BSM should have minimum measured hydraulic conductivity of 8 inches per hour to ensure adequate flow rate through the BMP and longevity of the system. This results in a recommended design infiltration rate of 2 to 4 inches per hour to account for potential compaction and clogging. The BSM should have a maximum measured hydraulic conductivity of no more than 20 inches per hour to provide adequate contact time and treatment. Where this limit cannot be achieved, an outlet controlled configuration should be considered. In all cases, an upturned elbow system on the underdrain, measuring 6 to 12 inches above the invert of the underdrain, should be used to control velocities in the underdrain pipe and reduce potential for solid migration through the system.

Rationale: The media infiltration rate is a critical parameter in sizing and design of BIO-1 and BIO-6. It is necessary to confirm that the infiltration rate is reasonably consistent with what has been used in sizing and design and is capable of providing adequate treatment. Infiltration rates that are too slow may not provide long term capture performance adequate to meet sizing criteria. Infiltration rates that are too high may not provide adequate treatment or can be susceptible to short-circuiting unless used in an outlet controlled configuration.

Chemical Suitability Evaluation

This section appiles to BIO-1 or BIO-6 (systems with underdrains). In these systems, it is more critical to ensure that significant increases in pollutants will not occur as a result of filtration of water through the media (i.e., pollutant leaching). Nutrients are the most common form of leached pollutants. However, metals have also been observed.

The basic testing described above is adequate where nutrients or metals are not identified as impairments or TMDLs.

Where nutrients or metals are identified as impairments or TMDLs in any receiving water, the standard “Agronomic Soil Suitability Test” should be augmented with Saturated Media Extract Method (aka “saturation extract”) testing that covers at least the following parameters.

- Nitrate as N: < 3 mg/L

- Plant Available Phosphorus (P Index): 10 to 30 mg/kg (this is a tighter range than specified for basic evaluation above)
- Zinc < 0.1 mg/L (100 ppb)
- Copper < 0.025 mg/L (25 ppb)
- Lead < 0.025 mg/L
- Arsenic < 0.02 mg/L
- Cadmium < 0.01 mg/L
- Mercury < 0.01 mg/L
- Selenium < 0.01 mg/L

The Synthetic Precipitation Leaching Procedure (SPLP) (EPA SW-846, Method 1312) may also be used.

Criteria should be met as stated where a pollutant is associated with a water quality impairment or Total Maximum Daily Load (TMDL) in any downstream receiving water. Criteria may be waived or modified, at the discretion of the reviewer, where a pollutant does not have a nexus to a water quality impairment or TMDL of downstream receiving water(s).

Note that Saturation Extract and SPLP tests are expected to result in somewhat more leaching than would be experienced with real stormwater; therefore a direct comparison to water quality standards or effluent limitations is not appropriate.

Alternative Mix Components and Proportions

Alternative mix components and proportions may be utilized, provided that the whole blended mix conforms to the criteria identified in the Basic Whole Mix Testing, Infiltration Rate Evaluation, and Chemical Suitability Evaluation, as applicable. Alternative mix designs may include alternative proportions, alternative organic amendments (e.g., peat, coco coir pith) and/or use of natural soils. Alternative mixes are subject to approval by the reviewer. Alternative mixtures may be particularly applicable for systems with underdrains in areas where phosphorus is associated with a water quality impairment or a Total Maximum Daily Load (TMDL) in a downstream receiving water.

Construction Guidelines

- The Contractor should not deliver or place soils in wet or muddy conditions. The Contractor should protect soils and mixes from absorbing excess water and from erosion at all times. The Contractor should not store materials unprotected from rainfall events (>0.25 inches). If water is introduced into the material while it is stockpiled, the Contractor should allow material to drain prior to placement
- BSM should be thoroughly mixed prior to delivery using mechanical mixing methods such as a drum mixer.
- BSM should be lightly compacted and placed in loose lifts approximately 12 inches (300 mm) to ensure reasonable settlement without excessive compaction, such as via a rolling landscaping compaction drum (hand operated). Compaction within the BSM area should not exceed 75 to 85% standard proctor within the designed depth of the BSM. Machinery shouldl not be used in the bioretention facility to place the BSM. A conveyor or spray system should be used for media placement in large facilities. Low ground pressure equipment may be authorized for large facilities at the discretion of the reviewer.

- Placement methods and BSM quantities should account for approximately 10 percent reduction in media volume due to settling. Planting methods and timing should account for settling of media without exposing plant root systems.
- The Permittee construction inspector may request up to three double ring infiltrometer tests (ASTM D3385) or approved alternate tests to confirm that the placed material meets applicable infiltration rate range. In the event that the infiltration rate of placed material does not meet applicable criteria, the Permittee may require replacement and/or decompaction of materials.
- Close adherence to the material quality controls herein are necessary in order to assure sufficient permeability to infiltrate/filter runoff during the life of the facility, support healthy vegetation, and minimize pollutant leaching.
- Acceptance of the material should be based on test results conducted no more than 120 days prior to delivery of the blended BSM to the project site and certified to be representative of the mix composition that is actually used. For projects installing more than 100 cubic yards of BSM, batch-specific tests of the blended mix should be provided to the Permittee inspector for every 100 cubic yards of BSM along with a site plan showing the placement locations of each BSM batch within the facility.

Integration with Other Specifications

BSM specifications are related to, and may depend or have dependency on other specifications, including but not limited to:

- Filter course and drainage layer (See MISC-3)
- Plantings and Hydroseed (See MISC-4)
- Underdrains (See BIO-1)
- Outlet control structures (See BIO-1)

Narrative Guidance for Balancing Plant Growth with Nutrient Leaching

Where the BMP discharges to receiving waters with nutrient impairments or nutrient TMDLs, there is a particular balance that needs to be maintained between providing enough nutrients for plant growth while avoiding chronic leaching of nutrients from the media.

- In general, the potential for leaching of nutrients can be minimized by:
  - Utilizing stable, aged compost (as required of media mixes under all conditions).
  - Utilizing other sources of organic matter, as appropriate, that are safe, non-toxic, and have lower potential for nutrient leaching than compost (e.g., wood compost, peat, coco coir pith).
  - Reducing the content of compost or other organic material in the media mix to the minimum amount necessary to support plant growth and healthy biological processes.
- A botanist, agronomist, and/or landscape architect can be consulted to assist in balancing the interests of plant establishment, water retention capacity (irrigation demand), and the potential for nutrient leaching. The following practices should be considered in developing the media mix design:
  - The actual nutrient content and organic content of the selected compost source should be considered when specifying the proportions of compost and sand. The compost specification allows a range of organic content over approximately a factor of 2 and nutrient content may vary more widely. Therefore determining the actual organic content

and nutrient content of the compost expected to be supplied is important in determining the proportion to be used for amendment.

- A commitment to periodic soil testing for nutrient content and a commitment to adaptive management of nutrient levels can help reduce the amount of organic amendment that must be provided initially. Generally, nutrients can be added planting areas through the addition of organic mulch, but cannot be removed.
- Plant palettes and the associated planting mix should be designed with native plants where possible. Native plants generally have a broader tolerance for nutrient content, and can be longer lived in leaner/lower nutrient soils. An additional benefit of lower nutrient levels is that native plants will generally have less competition from weeds.
- Nutrients are better retained in soils with higher cation exchange capacity (CEC). CEC can be increased through selection of organic material with naturally high CEC, such as peat, and/or selection of inorganic material with high CEC such as some sands or engineered minerals (e.g., low P-index sands, zeolites, rhyolites, etc). Including higher CEC materials would tend to reduce the net leaching of nutrients.
- Soil structure can be more important than nutrient content in plant survival and biologic health of the system. If a good soil structure can be created with very low amounts of compost, plants survivability should still be provided. Soil structure is loosely defined as the ability of the soil to conduct and store water and nutrients as well as the degree of aeration of the soil. While soil structure generally develops with time, planting/storage media can be designed to promote earlier development of soil structure. Soil structure is enhanced by the use of amendments with high hummus content (as found in well-aged organic material). In addition, soil structure can be enhanced through the use of compost/organic material with a distribution of particle sizes (i.e., a more heterogeneous mix).
- Younger plants are generally more tolerant of lower nutrient levels and tend to help develop soil structure as they grow. Starting plants from smaller transplants can help reduce the need for organic amendments and improve soil structure. The project should be able to accept a plant mortality rate that is somewhat higher than starting from larger plants and providing high organic content.

- With these considerations, it is anticipated that less than 20 percent compost amendment could be used, while still balancing plant survivability and water retention.

We wish to express our gratitude to following individuals for their feedback on the design of planting/storage media for nutrient sensitive receiving waters in Southern California.

Deborah Deets, City of Los Angeles Bureau of Sanitation

Drew Ready, LA and San Gabriel Rivers Watershed Council

Rick Fisher, ASLA, City of Los Angeles Bureau of Engineering

Dr. Garn Wallace, Wallace Laboratories

Glen Dake, GDML

Jason Schmidt, Tree People

The guidance provided herein does not reflect the individual opinions of any individual listed above and should not be cited or otherwise attributed to those listed.

BIO-1: BIOINFILTRATION

Category: Biotreatment with Partial Infiltration

[This fact sheet also serves as the base fact sheet for INF-3 and BIO-6.]

Also known as:
- Rain Gardens
- Bioretention with Internal Water Storage
- Bioretention with Elevated Underdrain

Source: Geosyntec Consultants

Bioinfiltration facilities are designed for biotreatment with partial infiltration of runoff. Water is biotreated via filtering through a vegetated bed of engineered media. Water is infiltrated via an aggregate storage layer that is designed to discharge only when the storage layer is full. Bioinfiltration facilities are commonly incorporated into parking lot islands, cul-de-sacs, traffic circles, road shoulders, and road medians. These facilities can be used in areas where there are no hazards associated with partial infiltration but infiltrating the full DCV is infeasible. These facilities may not result in retention of the full DCV, but they can be used to achieve the maximum feasible volume reduction through infiltration and ET while providing biotreatment of the remaining portion of the required treatment volume.

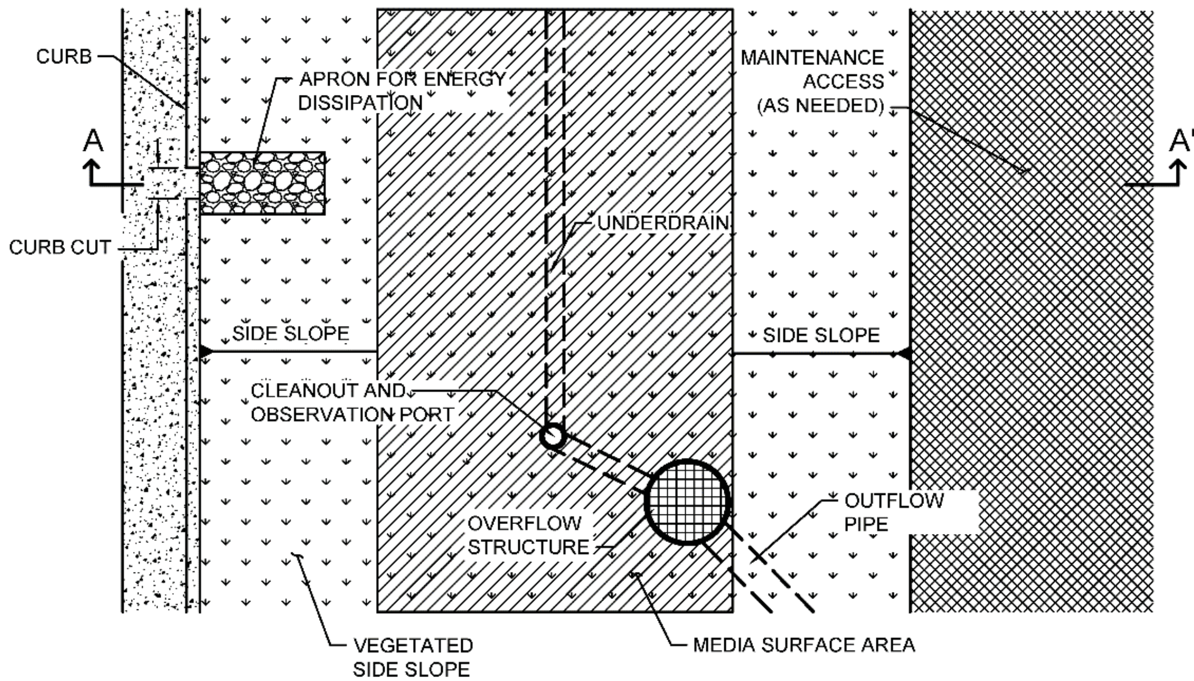
Pollutant Removal Considerations

TSS	Phosphorus	Nitrogen	Metals	Bacteria	Oil & Grease	Organics	Trash
H	M	M	H	M	H	M	H

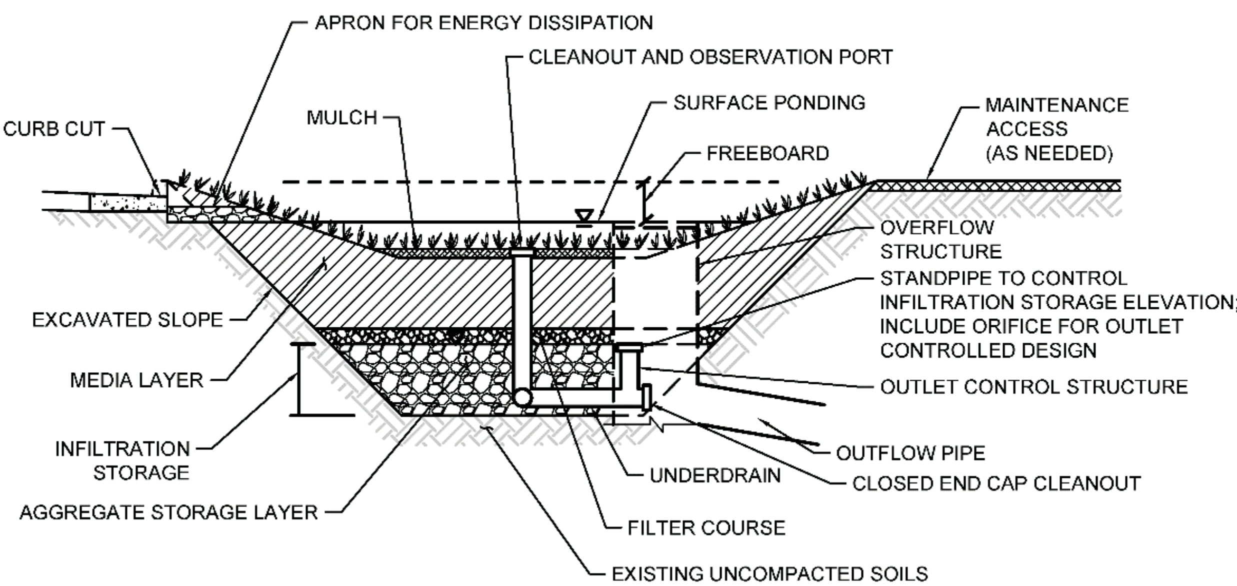
Recommended Siting Criteria

Siting Criteria	Intent/Rationale
☐ BMP placement adheres to geotechnical recommendations with respect to geological hazards and setbacks.	Must not negatively impact existing site geotechnical concerns.
☐ BMP is located in an area of the site most suitable for partial infiltration.	To the extent practicable, BMPs must be sited to take advantage of areas where infiltration is likely to be highest.
☐ Tributary area is ≤ 5 acres, preferably ≤ 1 acre.	Larger biofiltration facilities have a higher potential for scour and short circuiting and may require more specific construction methods. Section 4.4.7 provides specific design considerations for larger facilities.
☐ Sediment sources are controlled prior to operation of the system.	Facility should not be used in areas that will continue to receive elevated sediment loading following construction, such as from open space area.

Example Schematic Design - Plan and Section View



PLAN
NOT TO SCALE



SECTION A-A'
NOT TO SCALE

Recommended BMP Component Dimensions

BMP Component	Dimension	Intent/Rationale
Freeboard	≥ 6 inches if system has internal overflow Freeboard not required if offline with acceptable bypass	Freeboard provides for water to enter overflow structures and minimizes risk of uncontrolled surface discharge. Lower freeboard (or no freeboard) is allowable if there is an acceptable bypass pathway when the WQ storage is full, such as flow along the curb line to a storm inlet downstream.
Surface Ponding	≥ 3 inches	A lower limit is needed to provide enough surface storage for water to be able to enter the media. Also, very shallow depths are more susceptible to construction error and change over time with O&M activities.
Surface Ponding	≤ 18 inches	Deeper surface ponding depths may require demonstration that premature clogging is not likely and may require fencing.
Ponding Area Side Slopes	3H:1V or shallower	Gentler side slopes are safer, less prone to erosion, able to establish vegetation more quickly and easier to maintain. Vertical walls may be acceptable with appropriate considerations for safety.
Mulch	2-4 inches (average 3 inches)	Mulch is intended to suppress weeds and maintain moisture for plant growth. Mulch also retains sediment and allows sediment to be removed before it clogs the media bed.
Media Layer	≥ 18 inches (24 to 36 inches preferred)	A deeper media layer provides additional filtration and supports plants with deeper roots. The media layer must extend across the BMP to the waterline to ensure no infiltrated water bypasses the media.
Filter Course	4-6 inches	Typically made up of 2 to 3 inches of coarse sand and 2 to 3 inches of pea gravel, both washed. Thinner layers are less effective and may be more challenging to accurately construct.
Infiltration Storage	≥ 18 inches	Provides enhanced volume control. May include the pea gravel portion of the filter course and the full depth of the aggregate storage layer, depending on the outlet control elevation and design.
Underdrain Diameter	≥ 6 inches	Facilitates simpler cleaning.
Cleanout Diameter	≥ 6 inches	Facilitates simpler cleaning.

Recommended Design Criteria and Considerations

Design Criteria	Intent/Rationale
Pretreatment	
☐ Select pretreatment to provide acceptable clogging timeframe per guidance in Fact Sheet MISC-5 and **Appendix E.4.1**.	BMP performance and longevity is increased. Premature clogging is avoided.
Surface Ponding	
☐ Finish grade of the facility has ≤3 inches of elevation difference across the bottom of the facility.	Flatter surfaces reduce erosion and channelization within the facility and reduce the potential for development of preferential pathways.
☐ Surface ponding is limited to a 24-hour drawdown time.	24-hour drawdown time is recommended for plant health.
Vegetation	
☐ An irrigation system with a connection to water supply should be provided, as needed.	Seasonal irrigation may be needed to ensure robust vegetative processes in relatively coarse-grained media material.
☐ Plant materials should be tolerant of summer drought (unless irrigated), ponding fluctuations, and saturated soil conditions for up to 48 hours; native plant species and/or hardy cultivars that are not invasive and do not require chemical fertilizers or pesticides should be used to the maximum extent feasible. See recommended plant list in **Fact Sheet MISC-4.**	Plants suited to the climate and ponding depth are more likely to survive.
☐ In right of way areas, plant selection should not impair traffic sightlines or vehicle access.	Vegetation should be selected to be compatible with operation of the system and support adjacent uses.
Mulch	
☐ Well-aged, double or triple shredded hardwood mulch that has been stockpiled or stored for at least 12 months. Mulch must be non-floating to avoid clogging of overflow structure.	Mulch provides moisture retention and captures some sediment before it enters the media. Aged hardwood mulch will not rob the soil of nitrogen needed for new plants and will decompose slowly.
Media Layer	
☐ Planting/storage media shall conform to the criteria in **Fact Sheet MISC-1.**	Media is one of the most critical elements of the system and must be specified carefully to avoid pollutant export issues, plant health issues, or premature clogging.
Filter Course Layer	
☐ A filter course is used to prevent migration of fines through layers of the facility. Filter fabric is not used.	Migration of media can cause clogging of the aggregate storage layer void spaces or subgrade. Filter fabric is more likely to clog.
☐ Filter course is washed and free of fines.	Washing aggregate will help eliminate fines that could clog the facility and produce turbidity

Design Criteria	Intent/Rationale
	washout events. For infiltration and partial infiltration systems, washing shall not occur in situ as it could clog the underlying infiltration surface.
☐ Filter course should adhere to guidance provided in **Fact Sheet MISC-3.**	Gradation relationship between layers can evaluate factors (e.g., bridging, permeability, and uniformity) to determine if particle sizing is appropriate or if an intermediate layer is needed.
Aggregate Storage Layer	
☐ The aggregate storage layer depth below the underdrain invert is determined based on a minimum of 18 inches of stone or the depth, which can include the pea gravel portion of the filter course, that will drain within 48 hours at the design infiltration rate of the underlying soil.	The intent of this layer is to maximize incidental volume reduction.
☐ Washed river rock or open-graded, crushed rock.	Washing aggregate will help eliminate fines that could clog the aggregate storage layer void spaces or subgrade.
Inflow, Underdrain and Outflow Structures	
☐ Inflow, underdrains and outflow structures are accessible for inspection and maintenance.	Maintenance access is essential to ensure long-term performance.
☐ Inflow velocities are held to less than 1 ft/s. Dispersed flow or energy dissipation (e.g., riprap, level spreader, curb cut drop and apron) for piped inlets should be provided at inlet to prevent erosion.	High inflow velocities can cause erosion, scour and/or channeling.
☐ An underdrain cleanout with a lockable cap is placed every 100 to 200 feet as required based on underdrain length.	Properly spaced cleanouts will facilitate underdrain maintenance.
☐ At least one observation port is provided in each cell to allow inspection of subsurface water level.	This feature is necessary to facilitate inspection and performance confirmation (i.e., the infiltration storage is draining and providing the volume reduction anticipated).
☐ Underdrain is placed 3 inches above the bottom elevation of the aggregate storage layer.	Separation from subgrade or the liner lessens the risk of fines entering the underdrain and can improve hydraulic performance by allowing perforations to remain unblocked. This configuration allows the system to be fully drained, if needed. Under normal conditions, the water level is controlled via an elbow or standpipe configuration such that the sump storage depth can be adjusted without excavation of the media bed, if needed.
☐ An outlet control approach to maintain subsurface water level and manage flow rates through the media is strongly preferred. To maintain the subsurface water level, an upturned	Outlet control helps prevent preferential pathways and media loss. It also reduces the sensitivity of system performance on the hydraulic conductivity of the media, allowing

	Design Criteria	Intent/Rationale
	elbow/standpipe system or equivalent is used in the receiving outlet structure. To control flow rates through the media, an orifice is used, if possible. Orifice size should not be less than 0.5 inches.	media to be specified with a greater factor of safety against clogging.
☐	The outlet control is provided in the catch basin or manhole where the underdrain connects and is accessible for observation and maintenance.	Using outlet control in the receiving catch basin or manhole allows the system to be adapted without requiring excavation.
☐	Underdrains made of are slotted pipe per **MISC-3**.	Slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.
☐	An overflow device is required at the top of the ponding depth to safely convey overflow to the downstream receiving system unless the system is offline and will bypass externally to the facility.	Planning for controlled overflow lessens the risk of property damage due to flooding.

Calculations and Sizing Method

See **Appendix E** for acceptable sizing methods. Checks on footprints associated with clogging risk and volume reduction should be conducted as part of sizing. Retention volume is the volume within the stone reservoir below the underdrain elevation and up to 0.1 inch per inch of pores within the soil (suction/ET storage). Biotreatment volume is the volume in ponded water and soil pores.

Construction Guidance

	Construction Guidance	Intent/Rationale
☐	Plans should include a construction sequence for the BMP. Revisions proposed by the contractor should be reviewed by the engineer. The construction sequence should address erosion control, utilities, BMP installation, inspections, testing and certifications, final grading, vegetation, stabilization, and post-construction monitoring.	Construction sequencing is critical to avoid issues/damage and allow appropriate inspections, testing, and certifications to be performed.
☐	Excavate and place media in dry weather, or at least 48 hours after the end of rainfall.	Wetter soil is typically more susceptible to compaction.
☐	Avoid compaction of the base and sidewalls of facilities. Alleviate compaction as needed using mechanical tilling equipment (e.g., rototiller).	Infiltration rates are typically very susceptible to compaction. Infiltration should be maximized.
☐	Keep sediment out of the facility during construction as much as practicable using sediment and erosion control measures (e.g., silt fence, filter logs, check dams). Remove any confining layer that accumulates as a result of sedimentation. If the location of BMP is used as a temporary erosion and sediment control facility, it	Sediment accumulation can impair infiltration rates.

	Construction Guidance	Intent/Rationale
	should be completely rehabilitated via over excavation, before being placed into service as a post-construction BMP.	
☐	Traffic within the BMP should be avoided unless impractical. If traffic within the system is allowed, only wide track and low-ground pressure equipment is allowed.	Compaction of the system must be avoided as much as possible.
☐	Account for settlement of media when setting finished grades and planting depths.	Media will tend to settle approximately 10 percent. Failure to account for this can result in dimensions different than intended and/or exposure of plant roots.
☐	Use staking, surveying, or other methods to confirm thickness of filter course and media layers.	A uniform thickness of layers is important for effectiveness and to reduce preferential pathways.
☐	Establish the construction sequence to allow for inspection of buried infrastructure (e.g., underdrain, filter course) before it is buried.	It is impractical to inspect buried elements once they are covered.
☐	Fully stabilize sources of sediment within the tributary area (i.e., no exposed soil) prior to placing the finished BMP into service.	Erosion and sedimentation can seriously impair the hydraulic conductivity of the media bed and require restoration and revegetation of the surface of the media bed.
☐	Allow plants and mulch to stabilize for as long as practicable (preferably several months) prior to placing the finished BMP into service.	Stabilization of the system allows plants to mature and mulch to settle and "knit" before stressing the system with stormwater loading.

Adaptability Considerations

This type of BMP provides a high degree of adaptability. Adjustments to the design and/or operation of the system may be needed if observations from more detailed investigation, construction, or operation are different than what was estimated in design and permitting.

Adjust standpipe elevation and/or uncap lower underdrain (pre- or post-construction) – this can be done to reduce the amount of infiltrated volume and make the system act as bioretention with underdrains (BIO-6). This adaptation could take place between the Preliminary/Conceptual WQMP and the Final Project WQMP should issues with infiltration be identified or following construction should infiltration rates be determined to be lower than estimated.

Add a liner as part of detailed design (prior to construction) – this can be done to further limit infiltration if issues with any level of infiltration are identified as part of detailed design. This adaptation could take place between the Preliminary/Conceptual WQMP and the Final Project WQMP.

To allow for these adaptations, calculations in the WQMP should demonstrate that the system will still be adequately sized if the retention compartment is converted to biofiltration.

O&M Activities and Frequencies

Activity	Frequency
GENERAL INSPECTIONS	
Remove trash and debris	Four times per year during wet season, including inspection just before the wet season and within 24 hours after at least two storm events ≥ 0.5 inches.
Repair eroded facility areas	
Inspect and maintain access roads	
Inspect and resolve areas of standing water	
Remove minor sediment in facility bottom	
Provide vector control if needed	
Identify any needed corrective maintenance that will require site-specific planning or design	
ROUTINE MAINTENANCE	
Vegetation	
Irrigate as recommended by a landscape professional, typically for the first 3 years to establish vegetation	As needed
Remove undesirable vegetation	Four times per year during wet season, including inspection just before the wet season.
Reseed or replant areas of thin or missing vegetation	Annually
Mulch	
Remove and replace mulch in areas where significant sediment (>1 inch) has accumulated	Annually
Add an additional 1-2 inches of mulch; replace any mulch that is removed	Annually
Media Layer	
Scarify media to promote infiltration while removing mulch	Annually
Replace top 3-6 inches of media layer and replace vegetation	Estimated every 10 years (highly site specific)
Replace full depth of media and replace vegetation	Estimated every 30 years (highly site specific)
Inflow, Underdrain and Outflow Structures	
Check energy dissipation function and add riprap	Four times per year during wet season, including inspection just before the wet season.
Inspect inlets and outlets and remove accumulated sediment	Four times per year during wet season, including

Activity	Frequency
	inspection just before the wet season.
Flush underdrain	As needed
Repair structural damage to inlets, outlets, and underdrain	As needed
CORRECTIVE (MAJOR) MAINTENANCE	
Prepare documentation of issues and resolutions for review by appropriate parties; modify WQMP if needed.	Before major maintenance
Document major maintenance activities; record modified WQMP and as-built plan set if needed	After major maintenance
Take photographs before and after from the same vantage point	Before and after

BIO-6: BIORETENTION WITH UNDERDRAIN

Category: Biotreatment

Also known as:
Biofiltration
Planter Box

Source: Geosyntec Consultants

This BMP is very similar to BIO-1, but is tailored to be located in conditions that do not support a significant level of infiltration or where infiltration must be avoided.

Fact Sheet BIO-1 should be the primary resource for guidelines about this BMP. Fact Sheet BIO-6 does not repeat this guidance; it only presents the specific differences that should be considered in design, construction, and O&M in cases where there is not appreciable infiltration.

There are three primary options for adapting the guidance from BIO-1 to serve in conditions where no appreciable level of infiltration is feasible.

No changes to BIO-1 - Where minor incidental infiltration is permissible from the perspective of risks, but does not occur in a significant rate, it is acceptable to simply design the system following the guidance in BIO-1. Standing water in the underdrains for an extended period is an acceptable design variation known as "Internal Water Storage." This configuration improves nutrient and bacteria removal. It can also result in minor volume reduction even in very tight soils.

Add liner to BIO-1 – Where infiltration must be avoided due to risk of impacts, an impermeable liner of some sort should be used. Continuing to provide aggregate storage layer and internal water storage, as included in BIO-1 is preferred due to pollutant removal benefits.

Eliminate internal water storage – In conditions not suitable for partial infiltration and that do not have nutrients as a pollutant of concern, is is acceptable to eliminate the internal water storage zone. This can reduce the thickness of the gravel storage layer compared to BIO-1. It reduces the effectiveness of the BMP to remove nutrients (from M to L) and bacteria (from H to M).

Pollutant Removal Considerations

Config	Sediment	Phosphorus	Nitrogen	Metals	Bacteria	Oil & Grease	Organics	Trash
With Internal Water Storage	H	M	M	H	H	H	M	H

Without Internal Water Storage	H	L	L	H	M	H	M	H

Recommended Design Criteria and Considerations (only differences from BIO-1 are listed)

Aggregate Storage Layer – Internal Water Storage Configuration Only		
☐	The aggregate storage layer depth below the underdrain invert is a minimum of 18 inches of stone.	The intent of this layer is to provide treatment processes associated with an internal water storage zone.
Underdrain Aggregate Layer –No Internal Water Storage Configuration Only		
☐	The aggregate underdrain layer must provide at least 6 inches of cover on the top and sides of the underdrain pipe and 3 inches below the pipe	The intent of this layer is to provide treatment processes associated with an internal water storage zone.
☐	Underdrains, aggregate, and filter course material maybe located in trenches rather than over the entire bottom of the BMP.	Because volume reduction and/or internal water storage is not a goal, it is not necessary to provide a storage layer.
Impermeable Liner		
☐	Liner has a minimum thickness of 30 mils.	Minimizes tearing and penetration by aggregate or other protrusions.
☐	Liner is free of holes, blisters, undispersed raw materials, contamination by foreign matter, and other defects.	Minimizes facility stormwater loss and contamination.
☐	Liner withstands the range of temperature encountered by open exposure at the site without degradation or deterioration of the lining system.	Minimizes liner deterioration.
☐	Liner, and all other parts of the lining system in contact with liquid is resistant to stormwater pollutants including small concentrations of floating hydrocarbons such as hydraulic oil, diesel fuel, and gasoline.	Minimizes liner deterioration.
☐	Liner is bedded between appropriate material at least 6 inches above and below liner, or greater subject to manufacturer recommendations.	Appropriate bedding materials should be free of sharp objects and any objects larger than 1 inch in dimension. Sand, clean soil, and/or rounded pea gravel are typically appropriate bedding materials.
Observation Port		
☐	An observation port is not necessary for BIO-6.	It is not necessary to inspect the rate of drawdown of infiltration storage.

Calculations and Sizing Method

See **Appendix E** for acceptable sizing methods. Sizing calculations should not take credit for any amount of infiltration. The internal water storage zone should be assumed to be full and not included in sizing calculations.

Construction Guidance (only differences from BIO-1 are listed)

	Construction Guidance	Intent/Rationale
☐	Same as BIO-1, except it is not necessary to protect the BMP location from compaction or construction-phase sedimentation. All other provisions from BIO-1 apply.	It is not necessary preserve infiltration capacity of underlying soils.

O&M Activities and Frequencies

No differences in O&M activities compared to BIO-1.

Appendix F
Tribal Consultation Communications

CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

Gabrieleno Band of Mission Indians
Kizh Nation Andrew Salas, Chairperson
P.O. Box 393
Covina, CA, 91723

Dear Mr. Salas,

The City of Laguna Beach is commencing its Assembly Bill (AB) 52 consultation process for the 2354 San Clemente Street Project (Project). The Project site consists of two parcels (APNs 656-122-04 and 656-122- 05) totaling approximately 0.4 acres, directly adjacent to the terminus of San Clemente Street. A map of the Project site is provided as Attachment 1.

The Project proposes to remove the existing single-family residence, detached guest house, and associated site improvements, and construct a new two-story, 3,583 square-foot single-family residence with attached 528 square-foot two-car garage, elevated deck, pool and spa, hardscaping, and landscaping. Development of the residential structure would be limited to the previously-developed southeastern parcel; the northwestern parcel would remain undeveloped. The Project also proposes street improvements to San Clemente Street within the existing right-of-way to provide adequate fire engine turnaround. The proposed residential development would include on-site grading of approximately 520 cubic-yards of cut and 85 cubic-yards of fill. Grading within the right-of-way would include 15 cubic-yards of cut and 35 cubic-yards of fill.

The proposed Project is consistent with the corresponding General Plan and Zoning designations. The project would require approval of Design Review, a Coastal Development Permit, and Variance by the City of Laguna Beach.

The City of Laguna Beach maintains a list of interested tribes pursuant to AB 52. You are receiving this letter because you appear on the AB 52 list and wish to be contacted for CEQA projects. A record search of the NAHC Sacred Lands File (SLF) was completed on the above referenced project and results were positive.

Your participation in this local planning process is important. If you possess any information or knowledge regarding Native American Sacred Lands or other cultural resources in and around the Project site, and wish to consult with the City of Laguna Beach, please contact Chris Dominguez, Senior Planner at the City. Please consider this letter as the initiation of the process required pursuant to AB 52. Pursuant to Public Resources Code (PRC) Section 21080.3.1(d), your organization has 30 days upon receipt of this letter to submit a written request for AB 52 consultation on the Project to the City of Laguna Beach. Should consultation be desired, please identify a primary point of contact for the Tribe in your written request.

Thank you very much for your assistance. We look forward to your response.

Sincerely,

Chris Dominguez

Chris Dominguez, Senior Planner
City of Laguna Beach
505 Forest Avenue, Laguna Beach, CA 92651
(949) 497-0745 | cdominguez@lagunabeachcity.net

Attachments
1. Project Location Map

CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

Gabrieleno/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693
San Gabriel, CA, 91778

Dear Mr. Morales,

The City of Laguna Beach is commencing its Assembly Bill (AB) 52 consultation process for the 2354 San Clemente Street Project (Project). The Project site consists of two parcels (APNs 656-122-04 and 656-122- 05) totaling approximately 0.4 acres, directly adjacent to the terminus of San Clemente Street. A map of the Project site is provided as Attachment 1.

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The proposed Project is consistent with the corresponding General Plan and Zoning designations. The project would require approval of Design Review, a Coastal Development Permit, and Variance by the City of Laguna Beach.

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Chris Dominguez

Chris Dominguez, Senior Planner
City of Laguna Beach
505 Forest Avenue, Laguna Beach, CA 92651
(949) 497-0745 | cdominguez@lagunabeachcity.net

Attachments
1. Project Location Map

CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

Gabrielino /Tongva Nation
Sandonne Goad, Chairperson
106 1/2 Judge John Aiso St., #231
Los Angeles, CA, 90012

Dear Ms. Goad,

The City of Laguna Beach is commencing its Assembly Bill (AB) 52 consultation process for the 2354 San Clemente Street Project (Project). The Project site consists of two parcels (APNs 656-122-04 and 656-122- 05) totaling approximately 0.4 acres, directly adjacent to the terminus of San Clemente Street. A map of the Project site is provided as Attachment 1.

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The proposed Project is consistent with the corresponding General Plan and Zoning designations. The project would require approval of Design Review, a Coastal Development Permit, and Variance by the City of Laguna Beach.

The City of Laguna Beach maintains a list of interested tribes pursuant to AB 52. You are receiving this letter because you appear on the AB 52 list and wish to be contacted for CEQA projects. A record search of the NAHC Sacred Lands File (SLF) was completed on the above referenced project and results were positive.

Your participation in this local planning process is important. If you possess any information or knowledge regarding Native American Sacred Lands or other cultural resources in and around the Project site, and wish to consult with the City of Laguna Beach, please contact Chris Dominguez, Senior Planner at the City. Please consider this letter as the initiation of the process required pursuant to AB 52. Pursuant to Public Resources Code (PRC) Section 21080.3.1(d), your organization has 30 days upon receipt of this letter to submit a written request for AB 52 consultation on the Project to the City of Laguna Beach. Should consultation be desired, please identify a primary point of contact for the Tribe in your written request.

Thank you very much for your assistance. We look forward to your response.

Sincerely,

Chris Dominguez

Chris Dominguez, Senior Planner
City of Laguna Beach
505 Forest Avenue, Laguna Beach, CA 92651
(949) 497-0745 | cdominguez@lagunabeachcity.net

Attachments
1. Project Location Map

March 31, 2023

Gabrielino Tongva Indians of California Tribal Council
Robert Dorame, Chairperson
P.O. Box 490
Bellflower, CA, 90707

Dear Mr. Dorame,

The City of Laguna Beach is commencing its Assembly Bill (AB) 52 consultation process for the 2354 San Clemente Street Project (Project). The Project site consists of two parcels (APNs 656-122-04 and 656-122- 05) totaling approximately 0.4 acres, directly adjacent to the terminus of San Clemente Street. A map of the Project site is provided as Attachment 1.

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Thank you very much for your assistance. We look forward to your response.

Sincerely,

Chris Dominguez

Chris Dominguez, Senior Planner
City of Laguna Beach
505 Forest Avenue, Laguna Beach, CA 92651
(949) 497-0745 | cdominguez@lagunabeachcity.net

Attachments
1. Project Location Map

March 31, 2023

Gabrielino-Tongva Tribe
Charles Alvarez,
23454 Vanowen Street
West Hills, CA, 91307

Dear Mr. Alvarez,

The City of Laguna Beach is commencing its Assembly Bill (AB) 52 consultation process for the 2354 San Clemente Street Project (Project). The Project site consists of two parcels (APNs 656-122-04 and 656-122- 05) totaling approximately 0.4 acres, directly adjacent to the terminus of San Clemente Street. A map of the Project site is provided as Attachment 1.

The Project proposes to remove the existing single-family residence, detached guest house, and associated site improvements, and construct a new two-story, 3,583 square-foot single-family residence with attached 528 square-foot two-car garage, elevated deck, pool and spa, hardscaping, and landscaping. Development of the residential structure would be limited to the previously-developed southeastern parcel; the northwestern parcel would remain undeveloped. The Project also proposes street improvements to San Clemente Street within the existing right-of-way to provide adequate fire engine turnaround. The proposed residential development would include on-site grading of approximately 520 cubic-yards of cut and 85 cubic-yards of fill. Grading within the right-of-way would include 15 cubic-yards of cut and 35 cubic-yards of fill.

The proposed Project is consistent with the corresponding General Plan and Zoning designations. The project would require approval of Design Review, a Coastal Development Permit, and Variance by the City of Laguna Beach.

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Thank you very much for your assistance. We look forward to your response.

Sincerely,

Chris Dominguez

Chris Dominguez, Senior Planner
City of Laguna Beach
505 Forest Avenue, Laguna Beach, CA 92651
(949) 497-0745 | cdominguez@lagunabeachcity.net

Attachments
1. Project Location Map

March 31, 2023

Juaneno Band of Mission Indians
Sonia Johnston, Chairperson
P.O. Box 25628
Santa Ana, CA, 92799

Dear Ms. Johnston,

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City of Laguna Beach
505 Forest Avenue, Laguna Beach, CA 92651
(949) 497-0745 | cdominguez@lagunabeachcity.net

Attachments
1. Project Location Map

CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

Juaneno Band of Mission Indians Acjachemen Nation
Belardes Joyce Perry, Tribal Manager
4955 Paseo Segovia
Irvine, CA, 92603

Dear Ms. Perry,

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(949) 497-0745 | cdominguez@lagunabeachcity.net

Attachments
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CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

Juaneno Band of Mission Indians Acjachemen Nation 84A
Heidi Lucero, Chairperson
31411-A La Matanza Street
San Juan Capistrano, CA, 92675

Dear Ms. Lucero,

The City of Laguna Beach is commencing its Assembly Bill (AB) 52 consultation process for the 2354 San Clemente Street Project (Project). The Project site consists of two parcels (APNs 656-122-04 and 656-122- 05) totaling approximately 0.4 acres, directly adjacent to the terminus of San Clemente Street. A map of the Project site is provided as Attachment 1.

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City of Laguna Beach
505 Forest Avenue, Laguna Beach, CA 92651
(949) 497-0745 | cdominguez@lagunabeachcity.net

Attachments
1. Project Location Map

CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

Soboba Band of Luiseno Indians
Isaiah Vivanco, Chairperson
P. O. Box 487
San Jacinto, CA, 92581

Dear Mr. Vivanco,

The City of Laguna Beach is commencing its Assembly Bill (AB) 52 consultation process for the 2354 San Clemente Street Project (Project). The Project site consists of two parcels (APNs 656-122-04 and 656-122- 05) totaling approximately 0.4 acres, directly adjacent to the terminus of San Clemente Street. A map of the Project site is provided as Attachment 1.

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Attachments
1. Project Location Map

CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

Preservation Alliance
PO Box 54132
Irvine, CA 92619-4132

Dear California Cultural Resources Preservation Alliance,

The City of Laguna Beach is commencing its Assembly Bill (AB) 52 consultation process for the 2354 San Clemente Street Project (Project). The Project site consists of two parcels (APNs 656-122-04 and 656-122- 05) totaling approximately 0.4 acres, directly adjacent to the terminus of San Clemente Street. A map of the Project site is provided as Attachment 1.

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CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

Gabrielino Tongva Indians of California Tribal Council
Christina Conley, Tribal Consultant and Administrator
P.O. Box 941078
Simi Valley, CA, 93094

Dear Ms. Conley,

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Thank you very much for your assistance. We look forward to your response.

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(949) 497-0745 | cdominguez@lagunabeachcity.net

Attachments
1. Project Location Map

CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

Juaneno Band of Mission Indians Acjachemen Nation
Belardes Matias Belardes, Chairperson
32161 Avenida Los Amigos
San Juan Capistrano, CA, 92675

Dear Mr. Belardes,

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CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

La Jolla Band of Luiseno Indians
Norma Contreras, Chairperson
22000 Highway 76
Pauma Valley, CA, 92061

Dear Ms. Contreras,

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1. Project Location Map

CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

Pala Band of Mission Indians
Shasta Gaughen, Tribal Historic Preservation Officer PMB 50
35008 Pala Temecula Rd.
Pala, CA, 92059

Dear Ms. Gaughen,

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1. Project Location Map

CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

Pauma Band of Luiseno Indians
Temet Aguilar, Chairperson
P.O. Box 369
Pauma Valley, CA, 92061

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CITY OF LAGUNA BEACH
PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

Santa Rosa Band of Cahuilla Indians
Lovina Redner, Tribal Chair
P.O. Box 391820
Anza, CA, 92539

Dear Ms. Redner,

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PLANNING DIVISION
505 Forest Avenue | Laguna Beach, CA 92651 | (949) 497-0714

March 31, 2023

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Joseph Ontiveros, Cultural Resource Department
P.O. BOX 487
San Jacinto, CA, 92581

Dear Mr. Ontiveros,

The City of Laguna Beach is preparing an Initial Study/Mitigated Negative Declaration (ISMND) for the 2354 San Clemente Street Project (Project). The Project site consists of two parcels (APNs 656-122-04 and 656-122-05) totaling approximately 0.4 acres, directly adjacent to the terminus of San Clemente Street. A map of the Project site is provided as Attachment 1.

The Project proposes to remove the existing single-family residence, detached guest house, and associated site improvements, and construct a new two-story, 3,583 square-foot single-family residence with attached 528 square-foot two-car garage, elevated deck, pool and spa, hardscaping, and landscaping. Development of the residential structure would be limited to the previously-developed southeastern parcel; the northwestern parcel would remain undeveloped. The Project also proposes street improvements to San Clemente Street within the existing right-of-way to provide adequate fire engine turnaround. The proposed residential development would include on-site grading of approximately 520 cubic-yards of cut and 85 cubic-yards of fill. Grading within the right-of-way would include 15 cubic-yards of cut and 35 cubic-yards of fill.

The proposed Project is consistent with the corresponding General Plan and Zoning designations. The project would require approval of Design Review, a Coastal Development Permit, and Variance by the City of Laguna Beach.

You are receiving this letter because you appear on a contact list provided by the Native American Heritage Commission (NAHC). The contact list contains Native American tribes who may also have knowledge of cultural resources in the project area. A record search of the NAHC Sacred Lands File (SLF) was completed on the above referenced project and results were positive.

Your participation in this local planning process is important. If you possess any information or knowledge regarding Native American Sacred Lands or other cultural resources in and around the Project site, and wish to consult with the City of Laguna Beach, please contact Chris Dominguez, Senior Planner at the City.

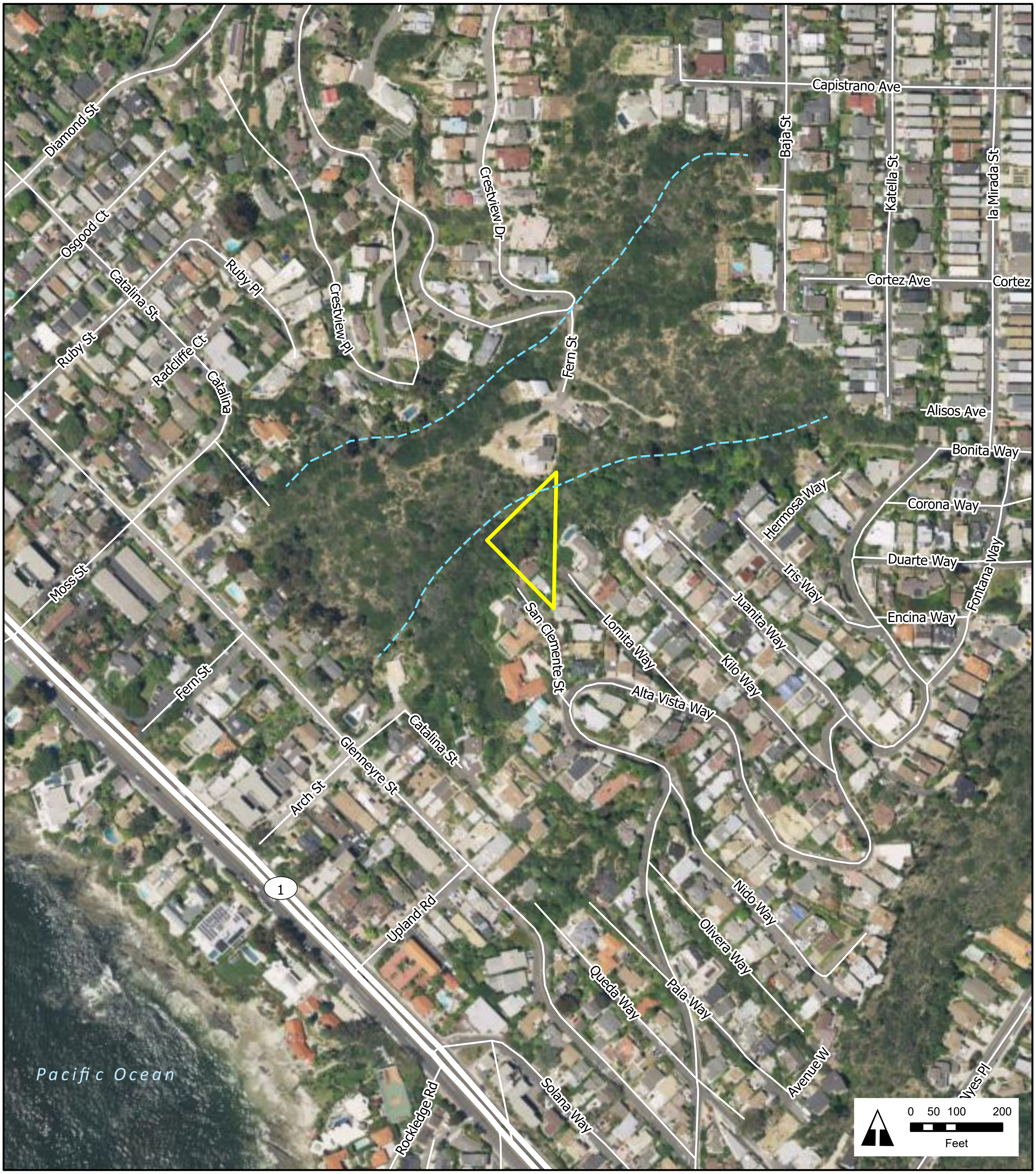
Thank you very much for your assistance. We look forward to your response.

Sincerely,

Chris Dominguez

Chris Dominguez, Senior Planner
City of Laguna Beach
505 Forest Avenue, Laguna Beach, CA 92651
(949) 497-0745 | cdominguez@lagunabeachcity.net

Attachments
1. Project Location Map



Legend

Project Boundary

Ephemeral Stream

2354 SAN CLEMENTE STREET IS/MND
LAGUNA BEACH, CALIFORNIA

Attachment 1:
Project Location Map

Sources: Orange County GIS; USGS Transportation Network; USGS National Hydrography Dataset; ArcGIS Online World Imagery Map Service. Map date: February 15, 2023.

De Novo Planning Group
A Land Use Planning, Design, and Environmental Firm

C.C.R.P.A.
Preserving The Past For The Future

California Cultural Resource Preservation Alliance, Inc.

P.O. Box 54132
Irvine, CA 92619-4132

An alliance of American Indian and scientific communities working for the preservation of archaeological sites and other cultural resources.

April 20, 2023

Christian Dominguez, Senior Planner
City of Laguna Beach
515 Forest Avenue
Laguna Beach, CA 92651Christian Dominguez

Re: 2354 San Clemente Street Project

Dear Mr. Dominguez:

Thank you for the notification regarding the above-mentioned project. CCRPA is not a tribal entity, however, we have tribal members on our Board and our mission is to preserve cultural resources. We appreciate the notification. We always have concerns regarding the cultural sensitivity of the Laguna Beach area because prior to European contact, the Laguna Beach coast was densely populated by the ancestors of the Juaneño/Acjachemen and there is always the potential for the presence of buried archaeological resources.

The project area appears to be culturally sensitive as it is situated in a largely undeveloped area and near a possible source of water. As these elements are known to be associated with pre-contact habitation and archaeological resources can be present beneath structures where the soil has not been disturbed by deep excavations, we have the following recommendations: A qualified archaeologist should be hired to conduct a records search at the South Central Coastal Information Center at California State Fullerton to determine whether archaeological sites have been recorded in the vicinity. In any event, we strongly recommend that a qualified archaeologist and culturally related Native American monitor any ground disturbance.

Sincerely,

Patricia Martz, Ph.D.
President

From: Dominguez, Christian CD
To: Joyce Perry
Subject: RE: Tribal Response, 2354 San Clemente Street Project
Date: Thursday, June 29, 2023 10:49:32 AM

Hi Joyce,

I have not heard back, so I am reaching out to see if you had a chance to review the CHRIS report and would still like a formal consultation meeting. Otherwise, we will take into consideration your recommendation for active monitoring during ground disturbing activities for the project.

Thank you,

Chris Dominguez
Senior Planner | City of Laguna Beach
E: cdominguez@lagunabeachcity.net
P: (949) 497-0745

From: Dominguez, Christian CD
Sent: Monday, May 8, 2023 8:56 AM
To: Joyce Perry <kaamalam@gmail.com>
Subject: RE: Tribal Response, 2354 San Clemente Street Project

Good morning Mrs. Perry,

Please see attached for a copy of the project technical memo that includes the CHRIS report.

Sincerely,

Chris Dominguez
Senior Planner | City of Laguna Beach
E: cdominguez@lagunabeachcity.net
P: (949) 497-0745

From: Dominguez, Christian CD
Sent: Sunday, May 7, 2023 9:29 PM
To: Joyce Perry <kaamalam@gmail.com>
Subject: RE: Tribal Response, 2354 San Clemente Street Project

Good evening Mrs. Perry,

Thank you for your response and preliminary comments. I am working to obtain a copy of the CHRIS report from one of our consultants who conducted the records search, and will forward a copy to you. In the meantime, it would be helpful if you could let me know some options over the next few weeks for when you can be available to meet via Zoom to consult on this project.

Sincerely,

Chris Dominguez
Senior Planner | City of Laguna Beach
E: cdominguez@lagunabeachcity.net
P: (949) 497-0745

From: Joyce Perry <kaamalam@gmail.com>
Sent: Wednesday, May 3, 2023 5:17 PM
To: Dominguez, Christian CD <cdominguez@lagunabeachcity.net>
Subject: Tribal Response, 2354 San Clemente Street Project

I am responding on behalf of the Juaneno Band of Mission Indians, Acjachemen Nation-Belardes to your letter pursuant to AB52 regarding the 2354 San Clemente Street Project, . This project is located within our territory, and a sensitive area to our tribe. We wish to consult on this project as it moves forward.

Due to the sensitivity of the area, our preliminary recommendation is for Native Monitoring by representatives of the Juaneno Band of Mission Indians, Acjachemen Nation-Belardes during ground disturbance,

Can you please provide the CHRIS report for the project area as well as any proposed mitigation measures?

Thank you and we look forward to hearing from you.

Joyce Stanfield Perry
Húu'uni 'óomaqati yáamaqati- Teach peace

Payomkawichum Kaamalam - President
kaamalam.com

Juaneño Band of Mission Indians, Acjachemen Nation
Cultural Resource Director

Appendix G
Alternative Materials and Methods of Construction Design Report

27372 CALLE ARROYO
SAN JUAN CAPISTRANO, CALIFORNIA 92675
T 949.450.2525 F 949.450.2626

August 5, 2022 11588

City of Laguna Beach
Attention: Mr. Dennis Bogle, Building Official
505 Forest Avenue
Laguna Beach, California 92651

Subject: Revised Request for Alternative Materials, and Methods of Construction Design for 2354 San Clemente Street, City of Laguna Beach, California

Dear Mr. Bogle:

In accordance with the 2019 California Fire Code (CFC), Chapter 1, Section 104.9 (or then current edition at the time of construction), the applicant, Mr. Kevin Aaronson, is requesting an alternate method of fire protection for the proposed demolition of the current wood-sided, non-sprinklered single-family residence, attached single-car garage, and guest house with an interconnected wooden deck area, and replacing them with a new code compliant, ignition resistive, fully-sprinklered single-family residence with an attached two-car garage, an interconnected concrete decking area and pool at 2354 San Clemente Street, Laguna Beach, California. This Alternate Materials, Design, and Methods of Construction (AM&M) report provides specific analysis of the property, which is constrained in terms of providing the required Laguna Beach Fire Department (LBFD) property access, including an inadequate dead end street turnaround. Additionally, this report also provides specific analysis of the property, which is constrained in terms of providing a full 195 feet of fuel modification zone (FMZ) on site and does not fully conform to the 2019 CFC requirement to provide an effective distance to the rear of the structure by exceeding the 150 feet hose pull distance from the driveway entrance around all sides of the proposed structure. This AM&M provides information about the on-site available fuel modification and a proposed fire department turnaround option to meet the 2019 Fire and Building Code requirements (or then current editions at the time of construction), as well as an evaluation of the site's fire environment and risk, available on-site fuel modification area, and alternative means of fire protection.

A field assessment of the project site and adjacent areas was conducted by a Dudek Fire Protection Planner on December 12, 2018, in order to document existing site conditions and determine potential actions for addressing the protection to the residence. The project's architect provided a plan set and details pertinent to Dudek's fire protection assessment for the field assessment. Evaluations of the area's topography, natural vegetation and fuel loading, closest fire hydrant location, fire department access, and general susceptibility to wildfire formed the basis of the site risk assessment. Representative site photographs were collected and are provided in Attachment 1: *Photograph Log*. Field observations were utilized to augment existing site data in formulating the recommendations detailed in this AM&M.

This AM&M demonstrates that the proposed new code-compliant, ignition resistive, fully-sprinklered single-family remodeled residence with attached two-car garage, upgraded landscaping, and on- and- off-site fuel modification zones will be in compliance with applicable portions of the City of Laguna Beach (City) Municipal Code, Chapter 15.01 and the City's Landscape/Fuel Modification Guidelines and Maintenance Program (rev. December 2019). The Project will also be consistent with the 2019 edition of the California Building Code (CBC), Chapter 7A (or then current edition at the time of construction); 2019 edition of the California Fire Code (CFC), Chapter 49 (or then current edition at the time of construction); and 2019 edition of the California Residential Code (CRC), Section 237 as adopted and amended by the City.

1 Project Location

Site Address:	**2354 San Clemente Street** Laguna Beach, California 92651 APN Nos. 656-122-04 and 656-122-05
Owner:	Kevin Aaronson
Building Construction Type:	Type V-B, Fully Fire Sprinklered
Building Occupancy Type:	Multi-story, Single-family Residence (R-3/U)
Current Fire Protection Systems:	None

2 Project Background for AM&M

Project Description

The Project is located within the City of Laguna Beach at 2354 San Clemente Street, approximately 0.5 miles from the Pacific Ocean. The Proposed Project's location is illustrated in Figure 1, *Project Vicinity Map and* Figure 2, *Project Site Location Map*. The Project site lies within a portion of the far northwest corner of Section 31 of Township 7 South and Range 8 West on Laguna Beach, California, U.S. Geological Survey (USGS), 7.5-minute quadrangle.

The Project site located at the end San Clemente Street, encompasses two (2) lots (APN Nos. 656-122-04 and 656-122-05); the first is considered a buildable lot with an existing single-family structure and guest house and the second is considered a non-buildable lot that is to remain as a natural open space zone. A 'significant watercourse' traverses through the non-buildable parcel which requires a minimum setback of 25 feet from both sides of the center flow line. A modified fuel modification plan has been prepared for the non-buildable parcel, which is explained in further detail in Section 5 and shown in Attachment 3. The combined area of both lots is currently 18,604 square feet (ft^2) (approximately 9,257 ft^2 on the buildable lot and approximately 9,347 ft^2 on the non-buildable open space zone) with an approximately 500 ft^2 single-family residence (including an attached, one-car garage) and 500 ft^2 detached guest house. With the proposed project, the existing single-family residence and guest house will be demolished and replaced with a new code compliant, ignition resistive, fully-sprinklered two-level single-family residence with attached garage. The backyard landscape and adjacent undeveloped, naturally vegetated open space land to the north/northwest currently include several of the City's "target plant species" that are found in the Laguna Beach Fire Department (LBFD) guidelines. The Project proposes to remove and replace the existing plant materials within the buildable parcel that are on the City's fuel modification zones species list with ignition resistive, maintained landscape adhering to the Zone A fuel modification guidelines. The City of Laguna Beach Municipal Code (Chapter 25.41) does not allow for building or modifying within the non-buildable, naturally vegetated open space parcel to the north and west in a way that would take away from its naturally vegetated state (i.e. the installation of an irrigation system to the naturally vegetated hillside). Additionally, Section 25.50.030(D)(1) and (2)(a) requires a setback of twenty-five feet be maintained from both sides of the centerline of a significant watercourse. Due to the restrictions within the non-buildable parcel to the north and west, the Project is proposing a modified fuel modified zone that includes a reduced Zone B irrigated zone outside of the 'significant watercourse' 50-foot setback area (25 feet of setback required on each both sides of the watercourse) requiring 50 percent thinning and removal of all dead and dying vegetation and all 'Target Species'[1], and a reduced Zone C non-irrigated Thinning Zone within the 'significant watercourse' setback area. Zone B shall be irrigated by casting water from the buildable parcel thus no permanent irrigation will be placed within the non-buildable parcel (see Attachments 3a and 3b – *Proposed Fuel Modification Plan*). The reduced Zone B and Zone C will reduce the fuel height and density of the plant material located on the hillside, which will result in significantly reduced flame lengths and fire intensity associated with fire in the mix of California coastal sage scrub, pampas grass, and other native and non-native species fuel types. Fuel modification associated with adjacent properties completely envelope the Project site and its associated fuel modification. The single-family residence to the north of the Project site, located at 565 Fern Street extends 193 feet from the southernmost point of the home to the existing house located at 2354 San Clemente Street. Thinning as a result of fuel modification for that residence has already occurred within areas mapped as Zone C. Additionally, the single-family residence to the east located at 2412 Lomita Avenue, has fuel modification within and beyond 2354 San Clemente Street. And all or nearly all of the required fuel modification for the proposed replacement residential structure at 2354 San Clemente Street would be included within the fuel modification area for the existing residential structure as well as for the surrounding three existing single-family residences. It is assumed that fuel modification for the proposed new residence would have minimal impact on the natural communities occurring within the study area of the Project site (2354 San Clemente Street Biological Resources Assessment, ESA. June 2022). Additional Fire Protection Measures are proposed for this Project, as allowed by the LBFD, because the standard 195-feet-wide fuel modification zone is not achievable for the entire lot and the current property does not conform to the 150 feet hose pull requirement. The in-lieu measures are summarized on page 10 in the Compensating Fire Protection Measures section of this report.

Existing Lot Conditions

As indicated in Figure 3, *Proposed Site Plan*, the buildable parcel's configuration is a parallelogram with the west and east ends ranging from approximately 86 to 156 feet in length and the north and south boundaries approximately 67 feet in width, respectively, totaling approximately 9,257 ft^2 and the non-buildable, open space parcel's configuration is also a parallelogram with the west and east ends ranging from approximately 156 to 210 feet in length and the north and south boundaries approximately 58 feet in width respectively, totaling approximately 9,347 ft^2. Currently, the existing residence, guest house and interconnected decking area are elevated. There is an approximately three-foot wide walkway on the eastern side of the existing residence allows for access to the interconnected deck area and rear guest house, as well as access to the

[1] The study area supports areas that have been designated as "High Value Habitat" under the Laguna Beach General Plan Open Space and Conservation Element (City of Laguna Beach 2006b). Species identified as target species unacceptable for the Fuel Modification Zones include lemonade berry; where fuel modification within the lemonade berry scrub may be needed, avoidance or selective thinning of scrubs other than lemonade berry may be removed, minimizing the impact to this natural community.

side yard; the walkway does not connect all the way around the residence, not conforming to the LBFD fire department access requirements. The Project site is located within a residential community that lies southwest of Aliso Creek Canyon and is located in a wildland urban interface (WUI) open space area. The eastern, southern, and portion of the western boundaries of the property are adjacent to existing residences and landscaped yards. The topography of the parcel with the existing residence is built on includes a steep west/northwest-facing hillside with an approximate 46% slope. The elevations on the Project site vary from roughly 266 feet above mean sea level (amsl) at the base of the canyon to roughly 342 amsl at the northeastern corner of the property.

Additionally, the Project site is located in an area with urban development in all directions, including the residences located across the drainage / sensitive habitat "open space" area directly to the north and west of the Project site. The privately-owned undeveloped "open space" lots that are directly west of the Project site (APN's #656-122-04 and #656-122-03), including the non-buildable lot associated with this project, contain ornamental trees including Eucalyptus trees (*Eucalyptus spp.)* and Canary Island Pine (*Pinus canariensis)*, as well as a mix of coastal chaparral-sagebrush vegetation, California Buckwheat ((*Eriogonum fasciculatum*), California sagebrush (*Artemisia californica*), Black sage (*Salvia mellifera*), and lemonadeberry (*Rhus integrifolia*). Lesser components include laurel sumac (*Malosma laurina*) and toyon (*Heteromeles arbutifolia*). The neighboring parcels vary in their existing condition with residential properties above and to the north, south, and east of older and newer construction. The subject residence is technically located in a Very High Fire Hazard Severity Zone (VHFHSZ) per LBFD and does have an "FM" (fuel modification) designation in the City's GIS mapping website: http://gisweb.lagunabeachcity.net/Html5Viewer/index.html?configBase=http://gisweb.lagunabeachcity.net/Geocortex/Essentials/REST/sites/GISMap3/viewers/HTML5_22/virtualdirectory/Resources/Config/Default (City of Laguna Beach 2019). The project area is within a potential "ember zone" from the naturally-vegetated hillside above and adjacent to the property.

The newly proposed, code-compliant, ignition resistive, fully-sprinklered single-family remodeled residence with an attached two-car garage is accessed from San Clemente Street, an approximately 275-foot dead-end residential street that is accessed from Alta Vista Way. San Clemente varies in width of dedicated right-of-way from approximately 16 feet to 50 feet, however, the actual paved road varies from only 15 feet to 26 feet due to the surrounding, existing developments. San Clemente Street is considered a 'paper street,' meaning the unimproved right-of-way of San Clemente Street extends west beyond the existing end of the street, however, due to the steep naturally vegetated open space area, the street has never been improved as a through street, and likely never will. Because San Clemente Street is an approximately 275-foot dead-end residential street and does not have a code-compliant turnaround due to the street being so narrow, it does not meet the requirement for a fire apparatus road. However, the junction of San Clemente Street and Alta Vista Way meets the turnaround requirement for a 60-foot "Y" turnaround. San Clemente Street allows for parking on the eastern side of the street for the first approximate 100 feet. The entire western side of the street and the remainder of the eastern side of the street has "No Parking" signs posted.

The nearest fire hydrant (at the driveway entrance of 2399 San Clemente Street), near the intersection of Alta Vista Way and San Clemente Street, is approximately 250 feet from the property, which is within the required minimum fire hydrant spacing distance of 500 feet (2019 CFC, Appendix C, Table C102.1). The applicant's architect has obtained and completed a Service Availability Letter (hydrant flow report) from the LBFD Fire Marshal and water purveyor (see Attachment 6 – *Completed Hydrant Flow Report*).

Post Construction Condition

With the proposed Project, the existing wood-sided, non-sprinklered single-family residence, attached one-car garage, and guest house with an interconnected wooden deck area will be demolished and replaced with a new code compliant, ignition resistive, fully-sprinklered single-family residence and attached two-car garage with an interconnected concrete decking area and pool. After the proposed remodel, the new two-level structure will occupy 3,583 ft^2 of livable space, 1,378 ft^2 of 1-hour Class A construction interconnected decking area, and a 528 ft^2 attached, two-car garage (located on the street level), with driveway entrance from San Clemente Street. Current exterior materials include board and batten vertical wood siding walls and a combustible wood interconnected decking area. With the proposed remodel, the exterior materials of the new residence and attached two-car garage will be with smooth stucco walls, along with metal and stone siding materials to meet the current ignition resistive requirements. All windows for the entire new single-family residence will be **upgraded to dual pane windows with both panes tempered glass.** The current roof area will be completely demolished, and a new class A-fire rated roof and associated assembly will be installed. With the proposed roof configurations, there will be attic or void spaces above portions of the first and second story living spaces, as well as above the garages, requiring ventilation to the outside environment. The attic spaces will meet the CFC and CBC requirements with either ember-resistant roof vents or a minimum 1/16-inch mesh and shall not exceed 1/8-inch mesh for side ventilation. In addition, the new residential design will provide an unimpeded, all-weather, non-combustible minimum three-foot wide, stairway/pathway around all sides of the proposed residence for firefighters to safely perform their job around the entire perimeter of the structure (See Attachment 2, *Fire Department Site Access Plan*). The new lower-level decking area will be built with concrete and ignition resistive surfaces with steel and single pane glass rails, and the upper-level decking area will be constructed with a non-combustible tile on 1-hour Class A construction with waterproof membrane with steel and single pane glass rails. A new full National Fire Protection Association (NFPA) 13D, code exceeding automatic interior sprinkler system will be installed within all rooms and void spaces of the residential house, including all closets and bathrooms, and the attached two-car garage. Because the farthest point of the residence will not be within the required 150 feet from San Clemente Street, the applicant proposes the installation of a code exceeding wet standpipe system and an exterior sprinkler head system. The **wet standpipe system will** augment the enhanced interior fire sprinkler system which will function similarly to a system that provides structure protection, with a high degree of success confining or reducing fire spread to the room of origin, extending flashover, providing additional time for firefighter response, and minimizing firefighting resource demands. As such, the modified fire protection system will exceed the life safety function of a normal NFPA 13D, providing the functional equivalency for firefighter access within 150 feet of the shared driveway access by providing a water source closer to the new residence, when properly designed and installed. The wet standpipe system (Fire Department Connections or FDCs) will be installed from the driveway entrance to the rear of the structure. The wet standpipe system will be maintained at all times by a licensed contractor pursuant to NFPA 25 or similar guidelines approved by the Fire Marshal. Signage for both the fire department connection (FDC) riser and the standpipe hose connection shall be red with white letters on a durable sign (metal or rigid plastic). Signage shall be permanently attached to the FDC riser or the standpipe hose connection riser. Both risers are to be painted OSHA red. Signage on FDC riser to state “FDC serves wet standpipes and fire sprinkler system”. Signage on hose connection riser to state “Wet Standpipe Hose Connection.” Furthermore, the installation of an exterior fire sprinkler system under all projections (roof, decks, overhangs, etc.) on all levels of the north and west sides of the residence (exposed sides of the residence to the vegetation on the hillsides below) to also help mitigate for the inability to achieve the required hose pull length. The exterior fire sprinkler heads are required to comply with the ‘Exposed Protection’ requirements of NFPA 13, Sections 11.3.2 (including both subsections 11.3.2.1 and 11.3.2.2), which describe the design and installation standards that are required to be followed. The recommended upgrades to the interior and exterior of the structure will offset the need of a Phos Chek system, as previously recommended in the Fire Protection Plan by Douglas Nickles in December 2008. A supervised fire alarm system will also be installed pursuant to NFPA 72 and LBFD standards and smoke detectors shall be installed at the ceiling of every room.

A *Preliminary Landscape Plan* set (Attachments 4a and 4b) has been prepared by M.D. Wilkes Design and Consulting, includes removing all existing site vegetation within Zone A and Zone B that are not on the City's fuel modification zones species list, except those found to be special-status plant species such as lemonade berry, and replanted with new low flammability, drought tolerant shrubs and ground cover approved by LBFD. Landscape plants will be watered by a permanent, automatic irrigation system that will maintain the vegetation in a hydrated condition to prevent ignition by embers from a wildfire. Additionally, the naturally vegetated open space area in the adjacent non-buildable parcel will include an extended irrigated Zone A area to achieve a full 20-foot setback zone extending out from the buildable lot, an irrigated Zone B for all areas outside the 'significant watercourse' setback areas (irrigation provided by Zone B shall be irrigated by casting water from the buildable parcel thus no permanent irrigation will be placed within the non-buildable parcel), and a Zone C non-irrigated and 50-percent thinned fuel modification zone (FMZ). The landscaping will be routinely maintained and as needed per LBFD's VHFHSZ landscaping guidelines. Should future water availability issues be realized due to extended drought, the landscape will be limited to low density, drought tolerant species that do not facilitate fire ignition or spread.

3 Fire Environment

It is important to note that wildland fire may transition to urban fire if structures are receptive to ignition. Structure ignition depends on a variety of factors and can be prevented through a layered system of protective features including fuel modification directly adjacent the structure(s), application of known ignition resistive materials and methods, and suitable infrastructure for firefighting purposes. Understanding the existing wildland vegetation and urban fuel conditions on and adjacent the site along with the site's weather, topography and fire history are necessary to understand the potential for fire within and around the project. The majority of the Laguna Beach coastal area, including the Project area, lie within an area statutorily designated a Local Responsibility Area "Very High Fire Hazard Severity Zone," by the LBFD and CAL FIRE. This classification indicates that the terrain, fuels, weather and ignition sources combine to create an environment that would facilitate fire spread and presents a potential hazard to persons and property. Fires in this portion of Orange County may be affected by seasonal winds that result in fast moving, unpredictable wildfire.

The following description provides details regarding the site's fire environment and general risk from wildland fire.

- The property at 2354 San Clemente Street is within an area subject to occasional weather extremes that may facilitate wildfire ignition and spread;
- The property is within a WUI area (along the northern and western sides of property) and is subject to occasional weather extremes that may facilitate wildfire ignition and spread;
- Terrain within the vicinity of the project may facilitate the spread of fire due to steep, vegetation covered slopes;

- There is a potential risk from ember generated wildfires based on natural, unmaintained fuels to the north and west of the Project's perimeter and associated with adjacent structures that will be less ignition resistive than the proposed residence;
- The unnamed canyon above and adjacent to the Project site has no recorded fires and the Project Area has not burned during the recorded fire history period for Laguna Beach. Typical fire return intervals for sage scrub vegetation types ranges between 20–30 years, while that for chaparral vegetation ranges between 40–60 years (up to 100 years) indicating that these open space areas may be susceptible to wildfire, although there is research supporting much longer historic fire intervals for chaparral (Conard and Weise 1998, Keeley and Fotheringham 2001, and others);
- Strong winds may funnel down the adjacent drainage and pre-heat fuels on southeast/northwest facing slope to the north and west of the Project site. Vegetation on hillside will ignite quickly and generate embers;
- Required LBFD fuel modification zones are not possible on site given the parcel sizes and the City of Laguna Beach Municipal Code standards;
- The primary wildfire concerns are considered to be: 1) embers spotting into fuels up-slope from the structure and burning down-slope, toward the structure and 2) structure fire on neighboring lots;
- The remodeled residence and the upgraded landscape and hardscape will improve overall fire hazard conditions by converting a vegetated parcel to an ignition resistive structure and landscape.

4 Fire Risk Assessment

Based on Dudek's assessment, it is expected that wildfires will have the possibility of occurring nearby this site post-development. Fires burning in the adjacent fuel beds often display moderate fire intensity and thresholds for spread that are observed to depend on environmental factors like wind or slope. Wildland fire from the north and northwest along an existing drainage, as well as northeast along the existing drainage that parallel Nyes Place are considered to be the most likely threat for a wildland fire. The Project site includes steep terrain, seasonally flammable vegetation (grasses and chaparral to the north and west) and unpredictable wind patterns that all influence fire spread rates and behavior. There is no recorded history of fire near the project area, but that does not indicate that the fuels will not burn under the right conditions. However, the 2016 Laguna Fire more recently burned about 47 acres approximately 4.5 mile to the north/northeast and the 2018 Aliso Fire burned about 175 acres approximately 6 miles to the north near the Aliso Wood Canyon Park.

As such, a fire burning in the vicinity of the Project during the fall condition (worst-case scenario) would be moderately fast moving downslope and include average flame lengths of up to a model estimated 44 feet for non-maintained, sage and chaparral fuels (See Attachment 5: *Fire Behavior Modeling Summary*). However, vegetation management and/or alternative methods for reducing fire spread rates and fire intensity are important considerations for mitigating direct flame impingement on a structure. Burning embers during a wildfire represent the greatest risk to structures that are set back from wildland fuels. The annual cutting of the sage and chaparral fuels to a height below three inches will reduce the potential risk of a wildland fire spreading onto the subject parcel. It is possible that burning embers would ignite spot fires on the subject parcel, but the proposed remodel to the current residence will be hardened to prevent ember intrusion (self-closing exterior doors, Class-A fire-rated roof, and dual-tempered/

dual pane windows) and the landscape will be treated to minimize receptive fuels, thus minimizing the likelihood of ignitions. Given the heavy, consistent fuels in close proximity to the structure, combined with the structure's ignition resistance level following construction, the risk of wildfire damage to the structure is considered low to moderate. The newly remodeled residential structure, landscape, and hardscape will improve fire safety on the parcel from current conditions and will provide improved firefighter access and defensible space. Wildfire may occur in the vicinity of the project and the homeowners will need to be aware of fire safety procedures, maintain the property's landscapes and structural features, and develop a personal evacuation plan (See Section 10).

5 Fuel Modification

As mentioned, the property is adjacent to undeveloped, naturally-vegetated land and is considered to be within a wildland urban interface (WUI) area, per definition of LBFD. As such, the property requires modification of natural vegetation at the WUI and an integrated landscape plan, including a fuel modification zone. The naturally vegetated areas on the slopes to the north and west of the Project site are a potential wildfire threat. As previously discussed, the proposed landscape plan includes removal of all highly flammable (target plants) species not consistent with the LBFD fuel modification guidelines (within the buildable and non-buildable parcels outside of the 'significant watercourse' setback area) and landscaping with ornamental plants suitable for the location within a fully-irrigated, Zone A setback FMZ (LBFD, 2019). For the naturally vegetated open space area in the adjacent non-buildable parcel, an extended irrigated Zone A area to achieve a full 20-foot setback zone extending out from the buildable lot, an irrigated Zone B shall require 50 percent thinning and removal of all dead and dying vegetation and all 'Target Species for all areas outside the 'significant watercourse' setback areas, except those found to be special-status plant species such as lemonade berry, and a Zone C non-irrigated and 50-percent thinned FMZ will be created. Irrigation provided by Zone B shall be irrigated by casting water from the buildable parcel thus no permanent irrigation will be placed within the non-buildable parcel.

A fuel modification zone is a strip of land where combustible vegetation has been removed and/or modified and partially or totally replaced with more adequately spaced, drought-tolerant fire resistant plants in order to provide a reasonable level of protection to structures from wildland fire. A typical landscape/fuel modification installation in Laguna Beach consists of a minimum 195-foot-wide zone comprised of a 20-foot setback zone (Zone A), a minimum 50-foot zone typically irrigated, (Zone B), and an additional 125-foot minimum of vegetation thinning zones (Zones C and D). Based on the steep and limited building area on the property and the undeveloped, open space lands to the north and northwest, it is not possible to achieve the City's standard fuel modification zone depth on site. It is proposed that the entire buildable parcel be managed and maintained as an fully irrigated, Zone A FMZ and that the non-buildable open space parcel be converted into an extended irrigated Zone A area to achieve a full 20-foot setback zone extending out from the buildable lot, an irrigated Zone B with 50 percent thinning and removal of all dead and dying vegetation and all 'Target Species for all areas outside the 'significant watercourse' setback areas, and a Zone C non-irrigated and 50-percent thinned FMZ. Due to the City of Laguna Beach Municipal Code (Chapter 25.41, O-S Open Space) which does not allow for building or modifying the open space area in a way that would take away from its natural state (i.e. the installation of an irrigation system to the naturally vegetated hillside). Chapter 25.41 states, "This zone is intended to protect and preserve open space land which are of notable ecological, scenic, cultural, and scientific value so that such land remains a permanent community resource." Additionally, Section 25.50.030(D)(1) and (2)(a) requires a setback of twenty-five feet be maintained from both sides of the centerline of a significant watercourse. The available managed and maintained fuel modification area (Zones A, B, and C) within the property boundaries, will extend a maximum 20 feet to the south, approximately 100 feet to the west (extending into the open space area), approximately 150 feet on the north side of the property (extending into the northern corner of the open space area) and approximately 19 feet on the eastern side of the property. Due to the City of Laguna Beach Municipal Code (Chapter 25.41) restrictions that do not allow any building or modification (installing an irrigation system on the hillside) within the naturally vegetated open space area to the north and west, we are proposing a modified fuel modified zone that includes a reduced Zone B irrigated zone outside of the 'significant watercourse' 50-foot setback area (25 feet of setback required on each both sides of the watercourse) requiring 50 percent thinning and removal of all dead and dying vegetation and all 'Target Species', and a reduced Zone C non-irrigated Thinning Zone within the 'significant watercourse' setback area. Zone B shall be irrigated by casting water from the buildable parcel thus no permanent irrigation will be placed within the non-buildable parcel. Attachments 3a, 3b, 4a, and 4b provide detailed illustrations of the proposed Zones A, B, and C, along with plant materials and fire and fuel maintenance notes. Additional home and property wildfire protection is proposed in this AM&M report to compensate for the constrained fuel modification zone due to the property size. These fire protection features are detailed in the proposed Compensating Fire Protection Mitigation Measures section below.

6 Code/Ordinance Requirements

This AM&M proposes alternatives in lieu of the absence of the requirements for:

1. Constrained 195-foot fuel modification width within the development footprint area due to property boundaries restraints.
2. Farthest point of building shall not be greater than 150 feet from fire apparatus access road (CFC 503.1.1). The Project as designed is unable to meet the required 150 feet hose pull from the fire apparatus to the rear of the proposed residence along the north, south, and west sides.

   The Project as designed will provide an unimpeded, all-weather, noncombustible concrete, minimum three feet wide firefighter access pathway/stairway with unlimited vertical clearance around all sides of the proposed structure for firefighters to safely perform their job around the entire perimeter of the structure. Firefighter access shall be made without the need for special tools (ladders) or ability and have permanent improvements installed when ascending or descending from street level (e.g., stairs). As such, firefighters will be able to achieve entry into the residence around the building.

7 Code Compliance (Intent)

The applicant proposes to add a wet standpipe system and an exterior fire sprinkler head system to augment the automatic interior fire sprinkler system as described in the sections above. The modified system will function similarly to a system that provides structure protection, with a high degree of success confining or reducing fire spread to the room of origin, extending flashover, providing additional time for firefighter response, and minimizing firefighting resource demands. As such, the modified fire protection system and other building features listed below will be part of a system of code-exceeding fire protection measures to provide functional equivalency for fire fighter access and the possibility for a delayed response time.

8 Compensating Fire Protection Features

Based on Dudek's assessment, the project site includes three areas that do not fully conform to the City Fire Department requirements: 1) Constrained 195-foot fuel modification width; 2) Providing the appropriate LBFD property access, including an inadequate dead end street turnaround; and 3) The site does not meet the City's 150 feet of hose pull around the entire single-family residence with attached two-car garage.

Given the potential fire hazard of the Project's location, in addition to the existing residence and guest house being completely demolished and remodeled to the latest ignition resistive codes, including an automatic interior fire sprinkler system with code-exceeding coverage within all rooms of the proposed single-family structure, including all closets and bathrooms, and attached two-car garage, the 2354 San Clemente Street residence and attached two-car garage will include the following Alternative Materials and Methods for additional prevention, protection, and suppression in compensation for the absence of standard LBFD fuel modification zone and constrained fire department emergency vehicle and firefighter access based on a site specific hazard assessment:

1. **Constrained 195-Foot Fuel Modification Width:**

   The Fuel Modification is constrained to 20 feet to the south, approximately 100 feet to the west (extending into the open space area), approximately 150 feet on the north side of the property (extending into the northern corner of the open space area) and approximately 19 feet on the eastern side of the property. The remaining fuel modification is not possible due to its size. Thus, it shall be required the entire buildable parcel of the property (rear, side, and front yards) to be maintained as an irrigated Zone A, according to LBFD Guidelines. The adjacent non-buildable open space parcel will be converted into an extended Zone A irrigated setback zone, a reduced Zone B irrigated zone outside of the 'significant watercourse' 50-foot setback area (25 feet of setback required on each both sides of the watercourse) requiring 50 percent thinning and removal of all dead and dying vegetation and all 'Target Species', and a reduced Zone C non-irrigated Thinning Zone within the 'significant watercourse' setback area, due to the City of Laguna Beach Municipal Code (Chapter 25.41, O-S Open Space Zone) which does not allow for building or modifying the open space area in a way that would take away from its natural state (i.e. installation of an irrigation system to the naturally vegetated hillside). Zone B shall be irrigated by casting water from the buildable parcel thus no permanent irrigation will be placed within the non-buildable parcel. All of the existing site vegetation and shrubs within the buildable parcel and within Zones A and B on the non-buildable parcel shall be removed prior to construction to accommodate the proposed residence and landscape, except those found to be special-status plant species such as lemonade berry. This will address the existing vegetation issues in the Zone A that are not consistent with the LBFD Guidelines. The proposed plant palette for the site's landscaping is consistent with LBFD Guidelines (see Attachment 3). Accordingly, Zones A, B, and C will require the following:

Zone A - Irrigated Zone (Structure to Buildable Property Boundary)

The purpose of the zone A is to provide a defensible space for fire suppression forces and to protect structures from radiant and convective heat of wildland fires. No combustible construction shall be allowed within the 20-foot setback zone.

Zone A - Specific Requirements

a) All existing target (highly flammable) species will be removed.

b) Automatic irrigation systems to maintain healthy vegetation with high moisture content.

c) Pruning of foliage to reduce fuel load, vertical continuity, and removal of plant litter and dead wood. Maintenance to be provided on an ongoing basis.

d) Trees and tree form shrub species are usually not allowed within 10 feet of combustible structures (measured from the edge of a full growth crown).

e) Trees and tree form shrub species are not allowed to extend beyond the property line (measured from the edge of a full growth crown). It should be noted that the one (1) Dwarf Strawberry (*Arbutus unedo compacta')* tree, one (1) California Sycamore (*Platanus racemosa)* tree, and the two (2) Coast Live Oak (*Quercus agrifolia)* trees, will have their canopies maintained to be within the property line.

f) Tree and tree form shrub species or groupings of 1 to 3 plants are not allowed within 10 feet of adjacent tree species or groupings as measured from the edge of a full growth crown.

g) Special consideration should be given for rare and endangered species, geologic hazards, tree ordinances, or other conflicting restrictions.

h) Maintenance including ongoing removal and/or thinning of undesirable combustible vegetation, replacement of dead/dying fire resistant plantings, maintenance of the operations integrity and programming of the irrigation system, regular trimming to prevent ladder fuels will occur at least annually and as needed.

i) A minimum three (3)-foot wide, all-weathered, non-combustible stairway/pathway with horizontal clearance and unlimited vertical clearance around the exterior of the structure (CFC 504.1) shall be provided for Firefighter access (see Attachment 2). Firefighter access shall be made without the need for special tools (ladders) or ability and have permanent improvements installed when ascending or descending from street level (e.g., stairs). As such, firefighters will be able to achieve entry into the residence around the building.

j) No combustible construction shall be allowed in Zone A.

k) No permanent or portable barbeques/grills, fire pits, fireplaces or other flame generating device shall be permitted within 30 feet of non-fire resistive plants/vegetation.

l) No vines shall be permitted on combustible structures (e.g., Type V non-rated structure).

m) Fuel modification will be pre-designed and installed by the project developer.

n) No exposed wood will be allowed on the wildland exposed side(s) of the project's structure. Exceptions to allow pre-treated, fire retardant wood or heavy timber construction or a California State Fire Marshal's- listed WUI product on some exterior wall or under-eave surfaces for nonstructural decorative treatments may be proposed for approval by LBFD.

o) No combustible fences or gates will be allowed. Wood fences and gates using fire retardant treated wood products may be approved. No plant material (i.e., vines) will be allowed on the fence.

p) All doors around the exterior of the structure, excluding the main entrance and sliding glass (sliders) doors, shall be self-closing and conform to the exterior door assembly standards addressed in CBC Chapter 7A, Section 704A.3.2.3.

Zone B - Irrigated Zone

Zone B is a 12-feet, 4-inch to 42-feet, 6-inch irrigated zone located directly adjacent to the Irrigated Zone A that requires 50 percent thinning and removal of all dead and dying vegetation and all 'Target Species', except those found to be special-status plant species such as lemonade berry. Zone B shall be planted with drought-tolerant, deep-rooted, moisture retentive plants found in the approved Laguna Beach Fire Department Plant List. A permanent automatic irrigation system shall be installed to maintain healthy vegetation with high moisture content. Due to the City of Laguna Beach Municipal Code (Chapter 25.41, O-S Open Space Zone) which does not allow for building or modifying the open space area in a way that would take away from its natural state (i.e. installation of an irrigation system to the naturally vegetated hillside) and the required 50-foot setback area (25 feet of setback required on each both sides of the watercourse), the property owner will not be allowed to install a permanent automatic irrigation system. Instead, we are proposing to irrigate Zone B by casting water from the buildable parcel thus no permanent irrigation will be placed within the boundaries of this zone. All dead and dying vegetation and undesirable plant species shall be removed within Zone B and no structure shall be built with combustible materials. The following specific requirements shall be followed in Zone B:

a) Groundcover shall be maintained at a height not to exceed 18 inches;

b) Native grasses should be allowed to go to seed. Native grasses shall be cut after annual seeding and cut to a maximum height of 8 inches;

c) Irrigation shall be designed to supplement native vegetation, and establish and maintain planted natives and ornamentals;

d) Trees and tree form shrub species are not allowed within 10 feet of combustible structures;

e) Trees and tree form shrub species are not allowed within 10 feet of adjacent tree species as measured from the edge of a full grown crown;

f) Trees and tree form shrub species are not allowed to extend beyond the property line.

Zone C - Thinning Zone (Non-irrigated)

Zone C is a 0 to 71-feet, 8-inch zone that requires 50 percent thinning and removal of all dead and dying vegetation and undesirable species, except those found to be special-status plant species such as lemonade berry. The thinning zone is meant to reduce the amount of fuel load within the wildland area adjacent to the residential structures, with the intent of reducing the amount of radiant and convective heat a wildfire will produce. Thinning zones are located adjacent to the irrigated zone and can extend 125 feet or more into wildland areas. Due to the City of Laguna Beach Municipal Code (Chapter 25.41, O-S Open Space Zone) which does not allow for building or modifying the open space area in a way that would take away from its natural state (i.e. installation of an irrigation system to the naturally vegetated) and the required 50-foot setback area (25 feet of setback required on each both sides of the watercourse), the property owner will not be allowed to remove all undesirable plant species, nor all dead and dying vegetation from the thinning zones. As in Zone A, combustible construction is not allowed in Zone C. It shall be the responsibility of the homeowner to meet and maintain the 50 percent thinning in Zone C, as well as the following City ordinances and Zone specific requirements:

a) All fine fuels reduced to a maximum of 8-12 inches in height;

b) Native grasses should be allowed to go to seed. Native grasses shall be cut after annual seeding and cut to a maximum height of 8 inches;

c) Trees and tree form shrub species are not allowed within 10 feet of combustible structures;

d) Trees and tree form shrub species are not allowed within 10 feet of adjacent tree species as measured from the edge of a full grown crown;

e) Trees and tree form shrub species are not allowed to extend beyond the property line;

f) Maintain sufficient cover to prevent erosion without requiring pruning.

2. Inadequate LBFD Dead End Street Length and Turnaround

Due to the limiting road width lengths, inadequate dead-end street length, and fire engine turnaround, Fire Department turnaround configurations were created to suffice the City of Laguna Beach Fire Department access requirements. The configuration included in this AM&M (Figure 4 – *2354 San Clemente Street Cul-De-Sac Configuration*) includes an oblong, off-set cul-de-sac providing 44 feet of unobstructed turnaround space at the end of San Clemente Street, plus an additional approximately 20 feet of driveway turnaround space. Additionally, we are proposing to widen the northern side of San Clemente to provide 20 feet of unobstructed road width within the proposed cul-de-sac design. The cul-de-sac will require that the no parking along both sides of San Clemente Street remain as is. Fire Lane "No Parking" signs will be installed no more than 50 feet apart and the curbs will be painted red as well.

3. 150 feet hose pull requirement

To compensate for this shortage around the exterior of the single-family residence, ***a code-exceeding wet standpipe system will be installed from the driveway to the rear of the structure*** and will provide a fire hose line for the remainder of the northern and western sides of the structure and the hillside below. Water will be pumped through two-way, freestanding fire department 2.5-inch inlet and outlet standpipe hose connection (a 2.5-inch connection near the driveway entrance and a 3-inch underground standpipe with a 2.5-inch connection along the eastern side of the property). The standpipe hose connection system will be used as an auxiliary connection to supply water for LBFD use around the proposed new single-family structure. The standpipe hose connection outlets will be strategically located around the exterior of the single-family residence so that firefighter hose lines will be able to access all entry points into the proposed structure (see Attachment 2 for proposed standpipe hose connection locations). The locations of the standpipe hose connections will be reviewed and approved by LBFD prior to installation. The wet standpipe system will be designed and installed per the 2019 CFC and NFPA 14 with a main 3-inch underground standpipe tied into the new single-family residences sprinkler system downstream from check value on the riser in order to keep standpipe system wet at all times. Wet standpipe system will be tested and maintained annually, or as needed, by a licensed contractor pursuant to NFPA 25 or similar guidelines approved by the Fire Marshal. All inspection and testing documentation shall be forwarded to the LBFD Fire Marshal, annually. Providing test records and performing maintenance on the FDC standpipe system shall be made a deed encumbrance for present and future property owners. Signage for both the FDC riser and the standpipe hose connection shall be red with white letters on a durable sign (metal or rigid plastic). Signage shall be permanently attached to the FDC riser or the standpipe hose connection riser. Both risers are to be painted OSHA red. Signage on FDC riser to state "FDC serves wet standpipes and fire sprinkler system". Signage on hose connection riser to state "Wet Standpipe Hose Connection." Furthermore, an exterior fire sprinkler head system shall be designed and installed by an approved Fire Sprinkler Engineer and are required to comply with the 'Exposed Protection' requirements of NFPA 13, Sections 11.3.2 (including both subsections 11.3.2.1 and 11.3.2.2), which describe the design and installation standards that are required to be followed. The exterior fire sprinkler heads will be installed under all projections (roofs, decks, overhangs, etc.) on all levels of the north and west sides of the new residence to also help mitigate for the inability to achieve the required 150-foot hose pull length and as an additional fire protection feature to reduce the amount of radiant heat transfer to the residence from a wildfire.

4. Additional Fire Prevention and Protection Measures

   a. All rooms within the remodeled single-family residence and attached two-car garage, will be provided with an NFPA 13D fire sprinkler system with additional coverage. The NFPA 13D system is required:

i. To be designed by a licensed fire protection engineer or LBFD-approved sprinkler contractor.

ii. To include coverage in all accessible build up areas, closets, bathrooms, and subterranean garage. The full coverage of accessible build up areas exceeds NFPA 13D, CFC, and CRC.

iii. To provide fire inspector's test value five feet above grade.

iv. To install a fire sprinkler box in garage with wrench and three heads of each type used in design of fire sprinkler system;

v. To provide sufficient water supply as determined by fire sprinkler hydraulic calculations, which may require increased meter and piping size. If fire flow is insufficient for the designed system, alternative options, such as a fire pump designed to boost fire flow, may be considered, to the approval of LBFD. Alternative options will be submitted to LBFD for approval before installation

- **A fire alarm system shall be installed in accordance with NFPA 72, *Fire Protection Signaling System* and LBFD requirements, for monitoring the flow switch and inter-connection with the dwellings smoke detectors. The fire alarm system will be supervised by a third party alarm company. The system will be tested annually, or as needed, with test results provided to LBFD (smoke detectors are code exceeding).**

- **All windows shall be dual pane, both panes tempered. Dual pane, one pane tempered glass has been shown during testing and in after fire assessments to significantly decrease the risk of breakage and ember entry into structures. Therefore, requiring code-exceeding dual pane, both panes tempered is anticipated to be an important safety measure that provides enhanced structure protection and provides mitigation for reduced fuel modification zones and limited setbacks from adjacent structures. *The window upgrade also exceeds the requirements of Chapter 7A of the CBC and providing additional protection for the structure's most vulnerable, exterior side (code exceeding)*.**

- External dryer vents will be baffled or fitted with ember resistive mesh.

- **Since property ownership may occasionally change, the fire protection provisions in this AM&M shall be recorded as a deed encumbrance against the property that will be subject to disclosure.** Recording the AM&M conditions notifies all future owners that there are approved fire protection measures that need to be followed or updated should changes be proposed for this property.

9 Supporting AM&M Justifications

The following site-specific features, analysis, and discussion provide justification for approval of the proposed residential remodel and addition project at 2354 San Clemente Street:

Construction to Recent Codes

The existing single-family residence, one-car garage, and guest house will be remodeled and built to the 2019 California Building (Chapter 7A) and Fire Codes, as adopted by Laguna Beach. These codes adopted in 2007 and updated in 2010, 2013, 2016, and 2019, focus on preventing embers from penetrating into structures, a leading cause for structure loss from WUI fires. Structures that include construction to Chapter 7A of the 2019 CFC, as the remodeled residence and attached two-car garage will, have a higher probability of avoiding or reducing damage from wildfire. The 1993 Laguna Fire burned through northern portions of Laguna Beach and structures were lost. That fire moved quickly through the canyons, burning older, vulnerable structures. Embers penetrating structures were likely responsible for some of the structure losses. The existing roof on the residence will completely demolished, and upgraded with a new class A-fire rated roof and associated assembly. With the proposed roof configurations, there will be attic or void spaces above portions of the first and second story living spaces, as well as above the garages, requiring ventilation to the outside environment. The attic spaces will meet the CFC and CBC requirements with either ember-resistant roof vents or a minimum 1/16-inch mesh and shall not exceed 1/8-inch mesh for side ventilation. All existing windows will be removed and upgraded to dual pane with dual tempered glass throughout the property, providing an added level of protection from breakage. Exterior walls and appendages will be ignition resistive and ongoing landscaping maintenance requirements and restrictions will minimize the possibility of flammable plants or other landscape items from igniting and causing long-duration, high BTU sources directly touching the exposed sides of the structure.

Structure Ignition

There are two primary concerns for structure ignition: 1) radiant and/or convective heat and 2) burning embers (NFPA 1144 2008, IBHS 2008, and others). Burning embers have been a focus of building code updates for at least the last decade, and new structures in the WUI built to these codes have proven to be very ignition resistant. Likewise, radiant and convective heat impacts on structures have been minimized through the Chapter 7A exterior fire ratings for walls, windows and doors. Additionally, provisions for modified fuel areas separating wildland fuels from structures have reduced the number of fuel-related structure losses. As such, most of the primary components of the layered fire protection system provided to the 2354 San Clemente Street residence are required by City and state codes, but are worth listing because they have been proven effective for minimizing structural vulnerability to wildfire and, with the inclusion of required interior sprinklers (required in the 2019 Building/Fire Code updates), of extinguishing interior fires, should embers succeed in entering a structure. Even though these measures are now required by the latest Building and Fire Codes, at one time, they were used as mitigation measures for buildings in WUI areas, because they were known to reduce structure vulnerability to wildfire. These measures performed so well, they were adopted into the code. However, these requirements are true for a new development, but because this project is considered a minor remodel, this project does not require the installation of an automatic interior fire sprinkler system. The following project features are required for this project and form the basis of the system of protection necessary to minimize structural ignitions as well as providing adequate access by emergency responders:

a. Planned and maintained fuel modification zone (Irrigated Zone A within the buildable parcel and extending into the non-buildable parcel, a reduced Irrigated Zone B within the non-buildable parcel outside of the required ‘significant watercourse’ setback area requiring 50 percent thinning and removal of all dead and dying vegetation and all 'Target Species', and a 50-percent thinned Zone C for areas within the required 'significant watercourse' setback area of the non-buildable parcel)

b. Application of Chapter 7A, ignition resistive building requirements

c. Non-combustible, ignition resistive walls and doors

d. Multi-pane glazing with both panes tempered

e. Enhanced automatic interior fire sprinkler system to code for occupancy type (upgraded to require sprinklers in all rooms of the residence, including closets and bathrooms, and the attached two-car garage)

Fire Sprinkler System

The proposed single-family residence and attached street-level two-car garage will be provided with an NFPA 13D automatic internal fire sprinkler system with additional coverage. The upgraded fire protection system will exceed the life safety function of a normal NFPA 13D, when properly designed and installed. The upgraded system will function similarly to a system that provides structure protection, with a high degree of success confining or reducing fire spread to the room of origin, extending flashover, providing additional time for firefighter response, and minimizing firefighting resource demands.

Fire Detection and Alarm System

The residence will have electric-powered, hard-wired smoke detectors and a fire alarm system. These fire detection and alarm systems shall be installed in accordance with NFPA 72, Fire Protection Signaling System and LBFD requirements. The fire alarm system will be supervised by a third-party alarm company. The system will be tested annually, or as needed, with test results provided to LBFD.

Exterior Windows

A potentially vulnerable structure component with regard to radiant or convective heat exposure is a structure's windows. The typical duration of large flames from burning vegetation is on the order of 1 minute and up to several minutes for larger fuels at a specific location (Cohen 1995; Butler et al. 2003; Ramsay and Rudolph 2003; Cohen and Quarles 2011). Tests of various glazing products indicate that single pane, tempered glass failure may occur 120–185 seconds from exposure (University of California 2011; Manzello et al. 2007) but those tests include direct and constant heating that would not be experienced during a wildfire near the residence. Depending on the heat applied and the type of glass used in the various studies, the cracking/failure time varied. However, given the short duration of maximum heat (likely 20-30 seconds for the grasses and maintained shrubs on the slope behind the structure), the loss of heat over distance, the fire-rated minimum 20-minute glazing specified for this project, wildfire heat and flame will be reduced, and heat experienced by the windows from the wildland fire is not expected to be enough (in temperature or duration) to cause window failure.

Should a window fail, such as due to a neighboring parcel's natural vegetation or structure fire, the interior, automatic fire sprinklers provide a level of protection and some ability to minimize fire spread beyond the room of origin (NFPA 13D is a life safety sprinkler system designed to provide residents the ability to exit the structure, however, during most wildfire events, residents will have been evacuated and the system may help contain a room fire caused by an ember through a failed window). However, Quarles et al. (2010) provides strong endorsement for tempered glass performance. His research and tests conclude that multi-pane (2–3 panes) with at least one pane tempered is well suited for wildfire exposures. He indicates that tempered glass is at least four times stronger and much more resistant to thermal exposures than normal annealed glass. The use of dual pane, both panes tempered glass on the north-facing side of the structure provides several benefits, with thermal exposure performance the most important for this study. ***Requiring both panes to be tempered provides an added level of protection appropriate for the fire environment at this project site.***

In summary, highly ignitable homes can ignite during wildland fires without fire spreading near the structure (Cohen 1995). However, this site will include the latest ignition resistant construction materials and methods for roofs, walls, vents, windows, appendages, along with highly managed landscape and fuel modification areas.

10 Additional Comments

The goal of the fire protection features, both required and those offered above and beyond the Codes, provided for the 2354 San Clemente Street residence will provide the structure with the ability to survive a wildland fire with little intervention of firefighting forces. Preventing structure ignition results in firefighter and resident hazard reduction and reduces property damage and losses. Mitigating ignition hazards and fire spread potential reduces the threat to structures and can help the fire department optimize the deployment of personnel and apparatus during a wildfire. The analysis in this AM&M report provides support and justifications for acceptance of the additional fire protection measures for this project based on the site-specific fire environment.

It is important to note that the proposed remodeled single-family residence with attached two-car garage is not a shelter-in-place structure. It is recommended that the homeowners or other occupants who may reside at the residence at 2354 San Clemente Street adopt a conservative approach to fire safety. This approach must include maintaining the landscape and structural components according to the appropriate standards and embracing a “Ready, Set, Go!” stance on evacuation[2]. Accordingly, occupants shall evacuate the residence and the area as soon as they receive notice to evacuate, or sooner, if they feel threatened by wildfire or Red Flag Warning[3] conditions when fire ignition and spread is facilitated. Fire is a dynamic and somewhat unpredictable occurrence and it is important for residents to educate themselves on practices that will improve their home survivability and their personal safety.

11 Limitations

This AM&M report does not provide guarantee that residents and visitors will be safe at all times because of the fire protection features it requires. There are many variables that may influence overall safety. This report provides requirements and recommendations for implementation of the latest fire protection features that have proven to result in reduced structure fire or wildfire related risk and hazard.

2 Information regarding Ready!Set!Go! program can be downloaded at http://lagunabeachcity.net
3 Red Flag Warnings are issued by the National Weather Service when conditions are conducive to the formation of wildfires. Dry conditions combined with high winds and low humidity are the hallmarks of weather conducive to producing large wildfires.

For maximum benefit, project contractors, engineers, designers, and architects are responsible for proper implementation of the concepts and requirements set forth in this AM&M report. Homeowners are responsible to maintain their structures and lots as required by this AM&M report, the applicable Fire Code, and the LBFD.

If you have any questions regarding this AM&M alternatives, please contact me at 760.642.8379.

Sincerely,

Noah Stamm
Fire Protection Planner III
Dudek's Urban Forestry and Fire Protection Planning

Att: Figures 1-4
Attachment 1, Photograph Log
Attachment 2, Fire Department Site Access Plan
Attachments 3a and 3b, Proposed Fuel Modification Plan
Attachments 4a and 4b, Preliminary Planting Plan
Attachment 5, Fire Behavior Modeling Summary
Attachment 6, Completed Laguna Beach Fire Department Hydrant Flow Report

11 Signatures:

Requested by:

Kevin Aaronson
The Aaronson Group – Property Owner

Geoff Sumich – Project Architect
Geoff Sumich Design

Approved by City of Laguna Beach:

Dennis Bogle
Building Official

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Date: 12/27/2018 - Last saved by: lterry - Path: Z:\Projects\j11558002354 San Clemente St\MAPDOCS\AMM Figs\Fig1 Vicinity split.mxd

SOURCE: USGS 7.5 Minute Series Laguna Beach Quadrangle

DUDEK

0 1,000 2,000 Feet

FIGURE 1

Project Location

2354 San Clemente Street, Laguna Beach, CA AM&M

SOURCE: BING MAPPING SERVICE

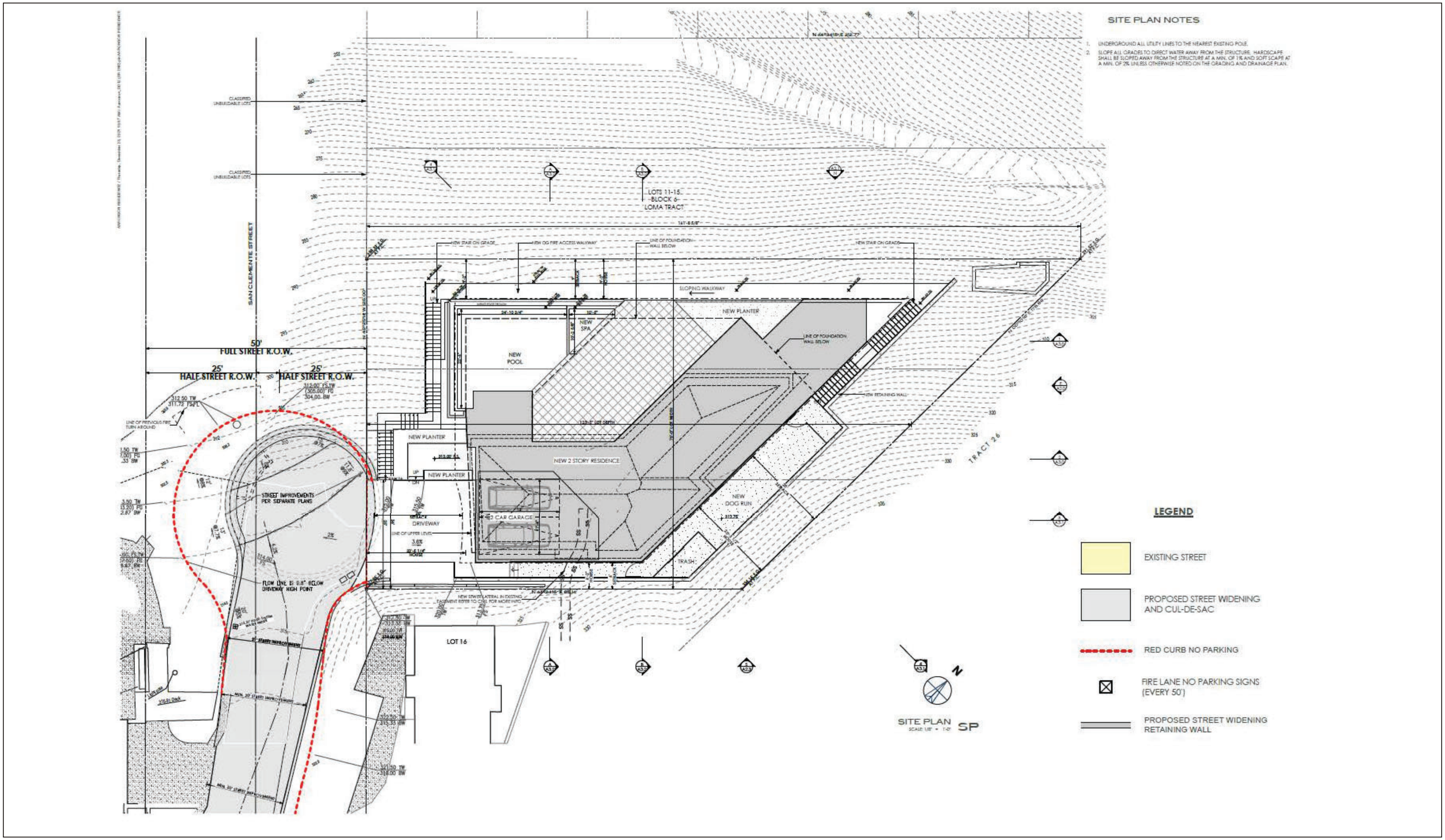
DUDEK

0 40 80 Feet

FIGURE 2

Project Site Location

2354 San Clemente Street, Laguna Beach, CA AM&M



SOURCE: GEOFF SUMICH DESIGN, 2022

DUDEK

FIGURE 3

Proposed Site Plan

DUDEK

0' 20' 40' Feet

Figure 4

San Clemente Street Cul-De-Sac Configuration (32-foot Diameter)

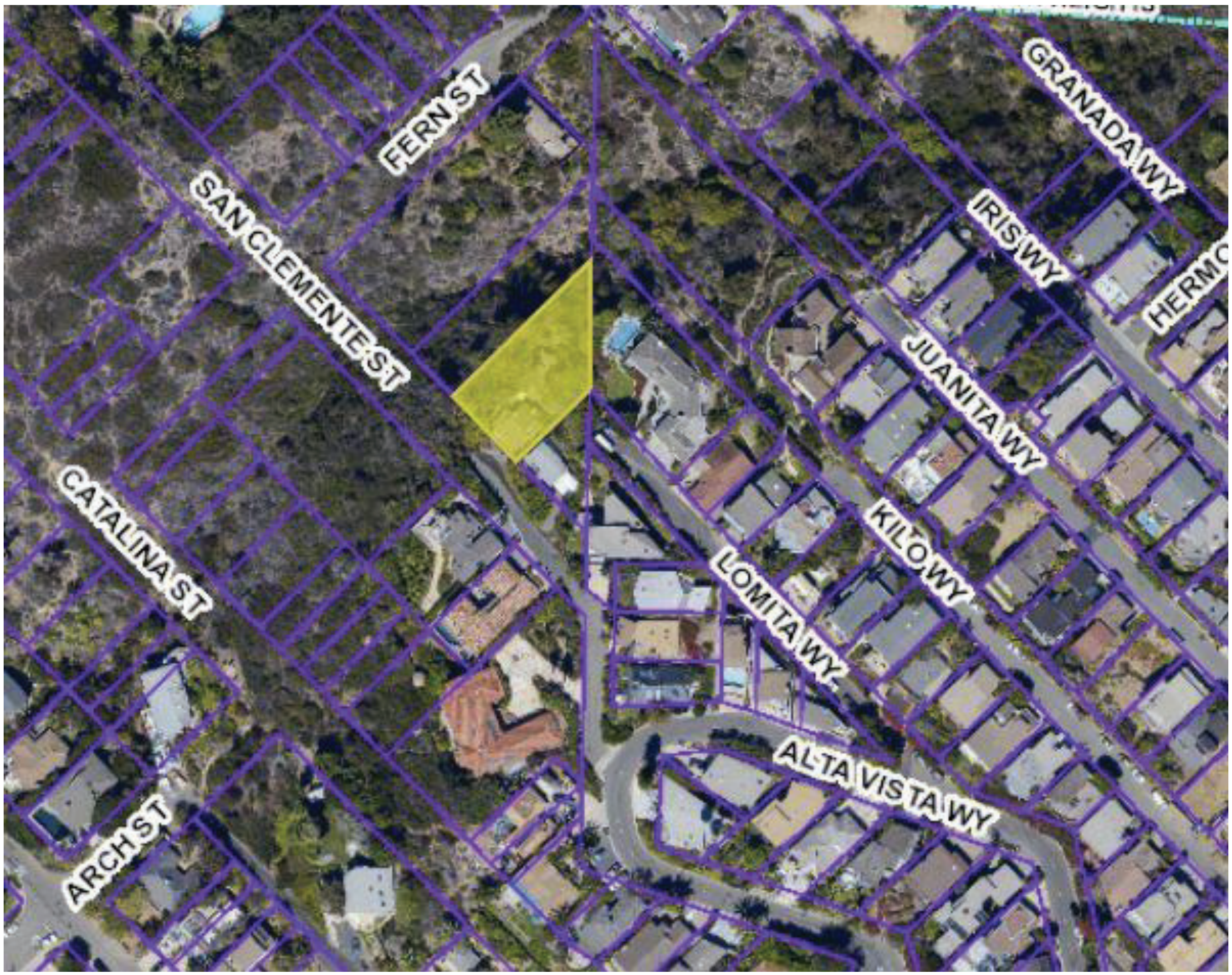
2354 San Clemente Street, Laguna Beach, CA AM&M Report

August 2022

Attachment 1

Photograph Log

2354 San Clemente Street Photograph Log



Photograph 1. Photograph of the front entrance and driveway entrance of the existing residence. Photograph taken facing northeast.

Photograph 2. Photograph of the front of the existing residence, viewing vegetation on the western side of the property. Photograph taken facing north.

Photograph 3. Existing vegetation west/northwest of the existing structure. Photograph taken facing north.

Photograph 4. Existing vegetation west/northwest of the existing structure. Photograph taken facing north.

Photograph 5. Photograph of the southern (driveway entrance) to the existing residence. Photograph taken facing east. Note road extension area (red arrow).

Photograph 6. Photograph of the existing eastern side yard, which is vegetated with vines. Photograph taken facing north.

Photograph 7. Photograph of the existing vegetation northeast of the residence. Photograph taken facing north.

Photograph 8. Photograph of the existing vegetation under the existing residence. Photograph taken facing north.

Photograph 9. View looking northwest down San Clemente Street towards end of street and residence on right side of street. Photograph taken facing northwest.

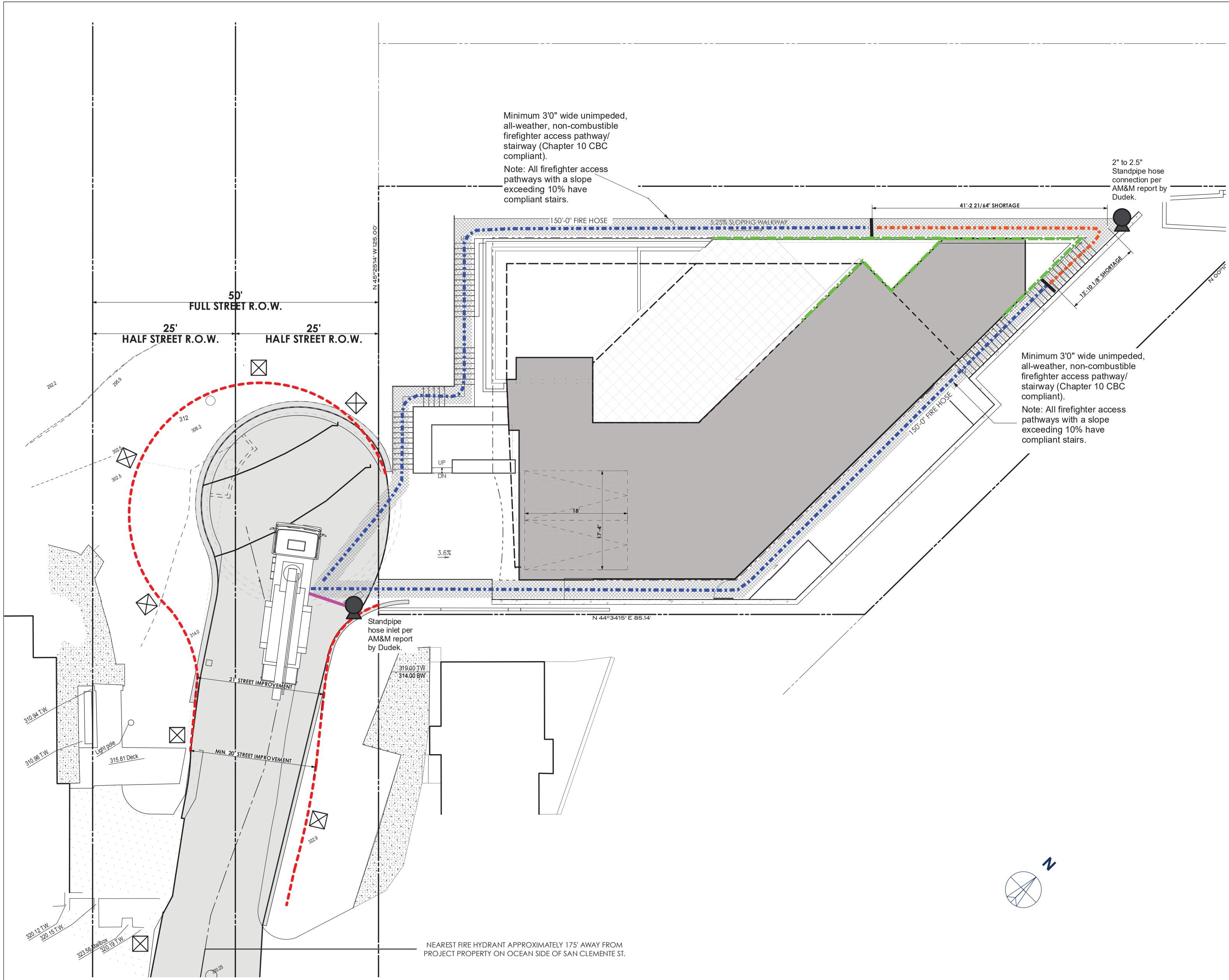
Photograph 10. View looking south up San Clemente Street towards intersection with Alta Vista Way.

Photograph 11. View looking southeast towards Alta Vista Way. Note location of closest fire hydrant approximately 250 feet from property (red arrow).

Photograph 12. View looking down drainage above property from Fern Street. Photograph taken facing southwest.

Attachment 2

Fire Department Site Access Plan



FIRE DEPARTMENT NOTES

1) See sheets A8.2-A8.11 for approved AM&M with project specific alternate methods and materials of compliance.

2) A separate (deferred) submittal for fire sprinklers may be required. System design must comply with the 2019 CFC, 2019 NFPA 13 standard, and the LBFD municipal code. Plans must be designed and installed by a qualified Fire Protection Contractor. Plans shall be submitted to and approved by the LBFD, with permit issued and appropriate inspections conducted.

3) Additional AM&M requirements for the fire sprinkler system are as follows:

-Four head calculation for the system
-Sprinkler heads in all rooms (including all closets and bathrooms regardless of size) and all voids.
-Exterior sprinkler heads under all exterior projections on all levels of the north and west sides, including under overhangs.
-Exterior sprinkler head design in accordance with the Exposed Protection requirements of NFPA 13 Section 11.3.2.

4) A separate (deferred) submittal for fire alarm system may be required and must be designed in compliance with 2019 CFC and NFPA 72, and installed by a qualified Electrical Contractor. Plans must include monitoring of tamper and flow switches, interconnection with all smoke detectors, and provide notification as requires by CFC Section 907 and LBMC. Plans must be submitted to and approved by the LBFD, with permit issued and final inspection conducted.

5) The following non-fire protection system related AM&M requirements must be included in building plan design/submittal:

-All exterior doors to be self closing, including main entrance and all sliding doors.
-All windows/door glazing dual pane/dual tempered.
-Exterior glass rails to be dual pane/dual tempered.
-Dryer vents to be fitted with baffles or ember resistant mesh.

6) All exterior fire places and fire pits must be gas fire ONLY. No solid fuel is allowed per the LBFD municipal code. Fire places and fire pits must be a minimum of 30 feet from combustible vegetation and the structure.

7) Maintain jobsite safety during construction as per Chapter 33 of the 2019 California Fire Code.

8) Complete firefighter access around the building is required, and must be in compliance with approved plans. This is subject to final fire inspection and requires approval prior to occupancy.

9) Address numbers must be placed on the exterior facing the street addressed to. Minimum size of unit / suite numbers is 4", and they must contrast with background.

10) For Fire Department inspections, call (949) 497-0352 at least 3 days in advance to schedule.

11) 3' wide concrete walkway and stairs all the way around, all weather. stairs for all areas over 10% slope, non-combustable and compliant with CBC Ch. 10.

12) See the Hydrant Report located on Sheet A8.11.

13) For fire fighter access path surface types and construction, see landscape sheet L-2.

LEGEND

- PROPOSED STREET WIDENING REMOVAL
- RED CURB NO PARKING
- FIRE LANE NO PARKING SIGNS (EVERY 50')
- ENGINE HOSE PULL WITHIN 150-FT
- ENGINE HOSE PULL BEYOND 150-FT.

NOTE: HOSE PULL DISTANCES ARE MEASURED IN SLOPE DISTANCE

- FIREFIGHTER SUPPLY LINE
- FIRE DEPARTMENT CONNECTION (FDC) WET STANDPIPE (1) INLET AND (1) HOSE CONNECTION
- EXTERIOR FIRE SPRINKLER HEADS UNDER OVERHANGS (EAVES, DECKING ETC.)
- PROPOSED STREET WIDENING RETAINING WALL

SOURCE: GEOFF SUMICH DESIGN, AUGUST 2022

DUDEK

0 16' 32' Feet

Attachment 2

FIRE DEPARTMENT SITE ACCESS PLAN

2354 San Clemente Street, Laguna Beach, CA AM&M Report

Attachment 3

Proposed Fuel Modification Plan

ZONE B NOTES

Zone B - Thinning Zone (Irrigated from adjacent buildable lot)
Zone B is a 12'-4" to 42'-6" wide zone directly adjacent to the irrigated Zone A that requires 50 percent thinning and removal of all dead and dying vegetation and all Target Species. The thinning zone is meant to reduce the amount of fuel load within the wildland area adjacent to the residential structures, with the intent of reducing the amount of radiant and convective heat a wildfire will produce. Thinning zones are located adjacent to irrigated zone A and can extend 125 feet or more into wildland areas. Due to the City of Laguna Beach Municipal Code (Chapter 25.41, O-S Open Space Zone) which does not allow for building or modifying the open space area in a way that would take away from its natural state (i.e. installation of an irrigation system to the naturally vegetated hillside) , As in Zone A, combustible construction is not allowed in Zone B. It shall be the responsibility of the homeowner to meet and maintain the 50 percent thinning in Zone B, as well as the following City ordinances and Zone specific requirements:

a) All fine fuels reduced to a maximum of 8-12 inches in height;
b) Native grasses should be allowed to go to seed. Native grasses shall be cut after annual seeding and cut to a maximum height of 8 inches;
c) Trees and tree form shrub species are not allowed within 10 feet of combustible structures;
d) Trees and tree form shrub species are not allowed within 10 feet of adjacent tree species as measured from the edge of a full grown crown;
e) Trees and tree form shrub species are not allowed to extend beyond the property line;
f) Maintain sufficient cover to prevent erosion without requiring pruning.

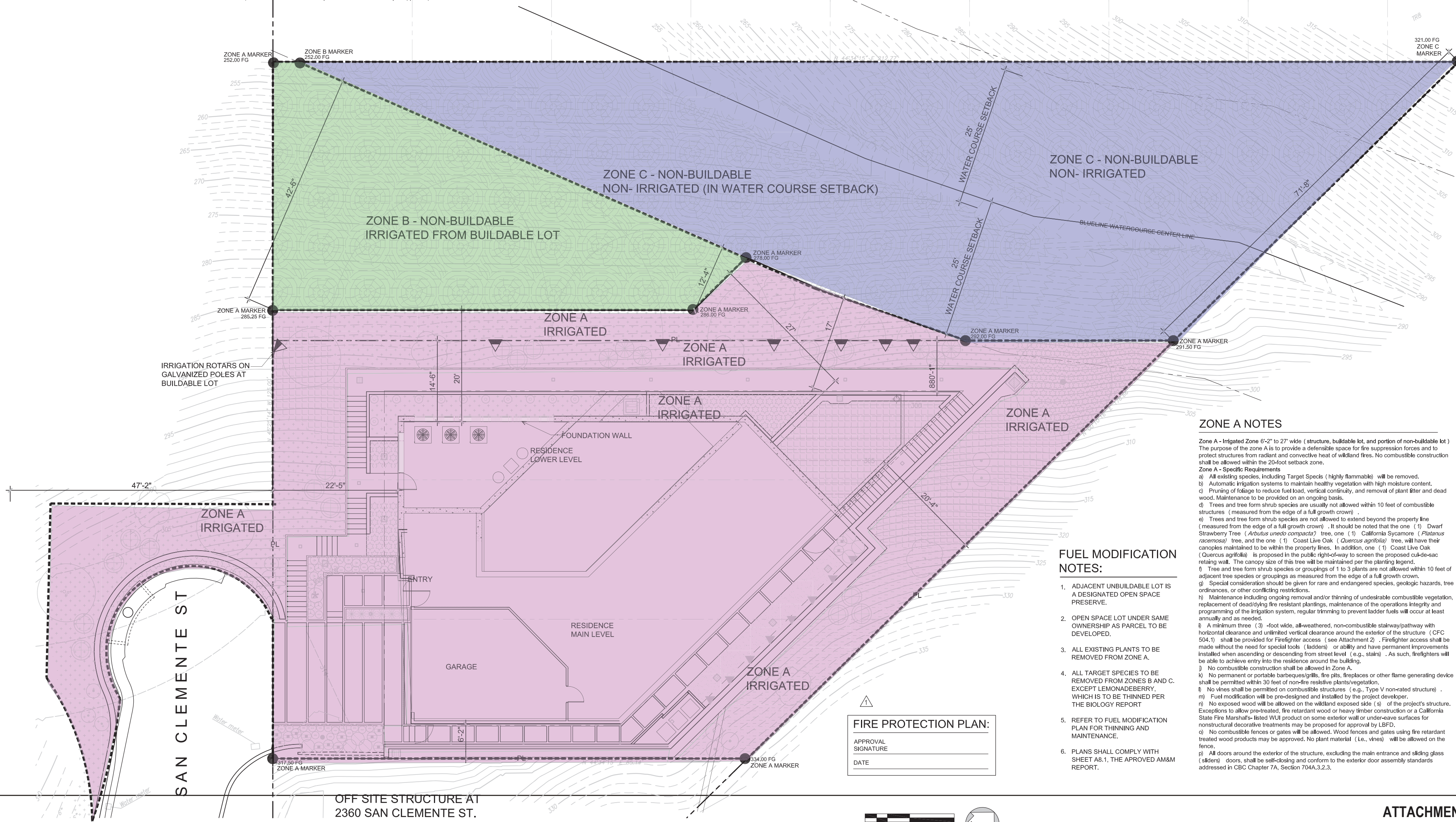
The non-buildable open space parcel (outside of the water course) shall be converted into a 50-percent thinned and irrigated FMZ, Zone B. The City of Laguna Beach Municipal Code (Chapter 25.41, O-S Open Space Zone) does not allow for building or modifying the open space area in a way that would take away from its natural state (i.e. installation of an irrigation system to the naturally vegetated hillside). Chapter 25.41 states, "This zone is intended to protect and preserve open space land which are of notable ecological, scenic, cultural, and scientific value so that such land remains a permanent community resource." Zone B shall be irrigated by casting water from the buildbale parcel thus no permanent irrigation devices will be physically placed within the boundaries of this zone.

ZONE C NOTES

Zone C - Thinning Zone (Non-irrigated)
Zone C is a 0 to 71-8" wide zone that requires 50 percent thinning and removal of all dead and dying vegetation and all Target Species. The thinning zone is meant to reduce the amount of fuel load within the wildland area adjacent to the residential structures, with the intent of reducing the amount of radiant and convective heat a wildfire will produce. Thinning zone C is typically located adjacent to the irrigated zones and can extend 125 feet or more into wildland areas. Due to the City of Laguna Beach Municipal Code (Chapter 25.41, O-S Open Space Zone) which does not allow for building or modifying the open space area in a way that would take away from its natural state (i.e. installation of an irrigation system to the naturally vegetated hillside) . As in Zone A and B, combustible construction is not allowed in Zone C. It shall be the responsibility of the homeowner to meet and maintain the 50 percent thinning in Zone C, as well as the following City ordinances and Zone specific requirements:

a) All fine fuels reduced to a maximum of 8-12 inches in height;
b) Native grasses should be allowed to go to seed. Native grasses shall be cut after annual seeding and cut to a maximum height of 8 inches;
c) Trees and tree form shrub species are not allowed within 10 feet of combustible structures;
d) Trees and tree form shrub species are not allowed within 10 feet of adjacent tree species as measured from the edge of a full grown crown;
e) Trees and tree form shrub species are not allowed to extend beyond the property line;
f) Maintain sufficient cover to prevent erosion without requiring pruning.

The water course setback portion of the non-buildable open space parcel shall be converted into a 50-percent thinned FMZ, all Zone C, rather than an irrigated Zone B, due to the City of Laguna Beach Municipal Code (Chapter 25.41, O-S Open Space Zone) which does not allow for building or modifying the open space area in a way that would take away from its natural state (i.e. installation of an irrigation system to the naturally vegetated hillside). Chapter 25.41 states, "This zone is intended to protect and preserve open space land which are of notable ecological, scenic, cultural, and scientific value so that such land remains a permanent community resource."



ZONE A NOTES

Zone A - Irrigated Zone 6'-2" to 27' wide (**structure, buildable lot, and portion of non-buildable lot**)
The purpose of the zone A is to provide a defensible space for fire suppression forces and to protect structures from radiant and convective heat of wildland fires. No combustible construction shall be allowed within the 20-foot setback zone.

Zone A - Specific Requirements

a) All existing species, including Target Specis (highly flammable) will be removed.
b) Automatic irrigation systems to maintain healthy vegetation with high moisture content.
c) Pruning of foliage to reduce fuel load, vertical continuity, and removal of plant litter and dead wood. Maintenance to be provided on an ongoing basis.
d) Trees and tree form shrub species are usually not allowed within 10 feet of combustible structures (measured from the edge of a full growth crown) .
e) Trees and tree form shrub species are not allowed to extend beyond the property line (measured from the edge of a full growth crown) . It should be noted that the one (1) Dwarf Strawberry Tree (*Arbutus unedo compacta')* tree, one (1) California Sycamore (*Platanus racemosa)* tree, and the one (1) Coast Live Oak (*Quercus agrifolia)* tree, will have their canopies maintained to be within the property lines. In addition, one (1) Coast Live Oak (Quercus agrifolia) is proposed in the public right-of-way to screen the proposed cul-de-sac retaing wall. The canopy size of this tree will be maintained per the planting legend.
f) Tree and tree form shrub species or groupings of 1 to 3 plants are not allowed within 10 feet of adjacent tree species or groupings as measured from the edge of a full growth crown.
g) Special consideration should be given for rare and endangered species, geologic hazards, tree ordinances, or other conflicting restrictions.
h) Maintenance including ongoing removal and/or thinning of undesirable combustible vegetation, replacement of dead/dying fire resistant plantings, maintenance of the operations integrity and programming of the irrigation system, regular trimming to prevent ladder fuels will occur at least annually and as needed.
i) A minimum three (3) -foot wide, all-weathered, non-combustible stairway/pathway with horizontal clearance and unlimited vertical clearance around the exterior of the structure (CFC 504.1) shall be provided for Firefighter access (see Attachment 2) . Firefighter access shall be made without the need for special tools (ladders) or ability and have permanent improvements installed when ascending or descending from street level (e.g., stairs) . As such, firefighters will be able to achieve entry into the residence around the building.
j) No combustible construction shall be allowed in Zone A.
k) No permanent or portable barbeques/grills, fire pits, fireplaces or other flame generating device shall be permitted within 30 feet of non-fire resistive plants/vegetation.
l) No vines shall be permitted on combustible structures (e.g., Type V non-rated structure) .
m) Fuel modification will be pre-designed and installed by the project developer.
n) No exposed wood will be allowed on the wildland exposed side (s) of the project's structure. Exceptions to allow pre-treated, fire retardant wood or heavy timber construction or a California State Fire Marshal's- listed WUI product on some exterior wall or under-eave surfaces for nonstructural decorative treatments may be proposed for approval by LBFD.
o) No combustible fences or gates will be allowed. Wood fences and gates using fire retardant treated wood products may be approved. No plant material (i.e., vines) will be allowed on the fence.
p) All doors around the exterior of the structure, excluding the main entrance and sliding glass (sliders) doors, shall be self-closing and conform to the exterior door assembly standards addressed in CBC Chapter 7A, Section 704A.3.2.3.

FUEL MODIFICATION NOTES:

1. ADJACENT UNBUILDABLE LOT IS A DESIGNATED OPEN SPACE PRESERVE.
2. OPEN SPACE LOT UNDER SAME OWNERSHIP AS PARCEL TO BE DEVELOPED.
3. ALL EXISTING PLANTS TO BE REMOVED FROM ZONE A.
4. ALL TARGET SPECIES TO BE REMOVED FROM ZONES B AND C. EXCEPT LEMONADEBERRY, WHICH IS TO BE THINNED PER THE BIOLOGY REPORT
5. REFER TO FUEL MODIFICATION PLAN FOR THINNING AND MAINTENANCE.
6. PLANS SHALL COMPLY WITH SHEET A8.1, THE APROVED AM&M REPORT.

FIRE PROTECTION PLAN:

APPROVAL SIGNATURE

DATE

SOURCE: M.D. Wilkes Design and Consulting, AUGUST 2022

0 2 4 8 16

NORTH

DUDEK

ATTACHMENT 3a

Proposed Fuel Modification Plan

2354 San Clemente Street, Laguna Beach, CA AM&M

TARGET SPECIES UNACCEPTABLE FOR USE IN ALL FUEL MODIFICATION ZONES (A,B,C,D)

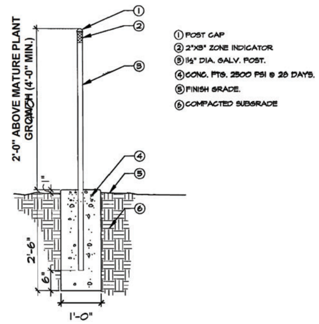
BOTANICAL NAME	COMMON BAME	FORM
ACACIA LONGIFOLIA	SYDNEY GOLDEN WATTLE	SHRUB
ACACIA REDOLENS	NCN	SHRUB
ADENOSTOMA FASCICULATUM	CHAMISE	SHRUB
ARTEMISIA CALIFORNICA	CALIFORNIA SAGEBRUSH	SHRUB
ARUNDO DONAX	GIANT REED	GRASS
ATRIPLEX LENTIFORMIS	QUAIL BUSH	SHRUB
BAMBUSA SPECIES	BAMBOO	GRASS
BRASSICA NIGRA	BLACK MUSTARD	ANNUAL
CAPROBOTUS EDULIS	HOT N TOT FIG	GROUNDCOVER
CEDRUS SPECIES	CEDAR	TREE
CARTADERIA SELLOANA	PAMPUS GRASS	GRASS
CUPRESSES SEMPERVIRENS	ITALIAN CYPRESS	TREE
CYNARA CARDUNCULUS	ARTICHOKE THISTLE	PERENNIAL
CYTISUS SPECIES	BROOM	SHRUB
DELOSPERMUM SPECIES	ICEPLANT	GROUNDCOVER
DROSANTHEMUM SPECIES	ICEPLANT	GROUNDCOVER
ERIOGONUM FASCICULATUM	BUCKWHEAT	SHRUB
EUCALYPTUS SPECIES	GUMS	TREE
FARGESIA SPECIES	BAMBOO	GRASS
HEDERA CANARIENSIS	ALGERIAN IVY	GROUNDCOVER
JUNIPERUS SPECIES	JUNIPER	SHRUB/ TREE
LAMPRANTHUS SPECIES	ICEPLANT	GROUNDCOVER
MELALEUCA LINARIFOLIA	FLATLEAF PAPERBARK	TREE
MELALEUCA QUINQUENERVIA	CAJEPUT TREE	TREE
NICOTIANA GLAUCA	TREE TOBACO	PERENNIAL
OTATEA ACUMINATA	MEXICAN WEEPING BAMB.	GRASS
PENNISETUM SETACEUM	FOUNTAIN GRASS	GRASS
PHYLLOSTACHYS SPECIES	BAMBOO	GRASS
PINUS SPECIES	PINE	TREE
RICINUS COMMUNIS	CASTOR BEAN PLANT	PERENNIAL
SALVIA (NATIVE AND VARIENTIES)	SAGE	SHRUB
SASCOLA AUSTRALIS	RUSSIAN THISTLE	ANNUAL
SEMIARUNDINARIA FASTUOSA	NARIHIRA BAMBOO	GRASS
SCHINUS TERENBINTHIFOLIUS	BRAZILIAN PEPPER	TREE
THUJA SPECIES	ARBORVITAE	SHRUB
UMBELLULARIA CALIFORNICA	CALIFORNIA BAY	TREE
VINCA MAJOR	PERIWINKLE	GROUNDCOVER
WASHINGTONIA SPECIES	FAN PALM	PALM

ADDITIONAL TARGET SPECIES UNACCEPTABLE FOR USE IN FUEL MODIFICATION ZONE A (Zone closest to combustable structures)

BOTANICAL NAME	COMMON BAME	FORM
ACACIA SPECIES	ACACIA/WATTLE	VARIOUS
ARCTOSTAPHYLOS SPECIES	MANZANITA	SHRUB/ TREE
ATRIPLEX SPECIES	SALTBUSH	SHRUB
BOUGAINVILLEA SPECIES	BOUGAINVILLEA	SHRUB/ VINE
CALLISTEMON SPECIES	BOTTLEBRUSH	TREE
CINNAMOMUM CAMPHORA	CAMPHOR	TREE
COTONEASTER SPECIES	COTONEASTER	SHRUB/ TREE
DODONEA VISCOSA	HOPSEED	SHRUB
HAKEA SUAVOLENS	SWEET HAKEA	SHRUB
HETEROMELES ARBUTIFOLIA	TOYON	SHRUB
LAURUS NOBILIS	BAY LAUREL	SHRUB/ TREE
MALOSMA LAURINA	SUGARBUSH	SHRUB/ TREE
MELALEUCA NESOPHILA	PINK MELALEUCA	TREE
MISCANTHUS SINENSIS	SILVER GRASS	GRASS
MUHLENBERGIA RIGENS	DEER GRASS	GRASS
PENNISETUM RUBRUM	PURPLE FOUNTAIN GRASS	GRASS
PHOENIX CANARIENSIS	CANARY ISLAND PALM	PALM
PHOENIX DACTYLIFERA	DATE PALM	PALM
RHUS INTEGRIFOLIA	LEMONADE BERRY	SHRUB
ROSMARINUS OFFICINALIS	ROSEMARY	SHRUB
SCHINUS MOLLE	CALIFORNIA PEPPER	TREE

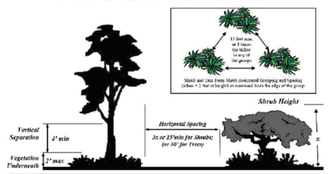
Attachment 4

ZONE MARKER DETAILS
(Marker Distances Shall Be Increased on Slopes to Accommodate Incline Measurements in Accordance With Attachment 3)



Attachment 6

Horizontal Spacing and Vertical Separation Requirements for Installation and Maintenance in All Fuel Modification Zones



Horizontal Spacing

Vegetation Less than 2 Feet in Height:
- No horizontal spacing or vertical separation is required in all zones. Ground cover in Zone D should cover the entire ground between groups of shrubs, trees, or grasses. Ground cover shall not exceed 2 feet in height.

Shrubs and Trees 2 Feet in Height or Greater:

Shrub and Tree Group Size:
- All Shrubs and Trees can be in groups of 3 specimens or less. No horizontal spacing is required inside the group.

Shrub / Tree-form Shrub Group Spacing:
- Groups of shrubs shall be spaced by the greater of the following two measurements: A distance of 15 feet minimum (or) 3 times the height of the tallest specimen in any of the groups.
- No vegetation over 2 feet in height is allowed within 15 feet from the edge of tree canopy(s).

Tree Group Spacing:
- Groups of Trees shall be spaced by a distance of 30 feet minimum regardless of height.

Vertical Separation

Shrubs and Trees Less than 10 Feet in Height:
- When the fuel modification zone is within 30 feet of the structure, a vertical separation of 2 feet minimum is required from the vegetation below. (Not required if shrubs are further than 30 feet from structure).

Shrubs and Trees 10 Feet in Height or Greater:
- A vertical separation of 4 feet minimum is required to be maintained from the vegetation below.
- Trees only: All vegetation located underneath trees, shall be a maximum of 2 feet in height.

ATTACHMENT 7
UNDESIRABLE PLAN SPECIES (Target Species)

CERTAIN PLANTS ARE CONSIDERED UNDESIRABLE IN THE LANDSCAPE DUE TO CHARACTERISTICS THAT MAKE THEM HIGHLY FLAMMABLE. PLANTS WITH THESE CHARACTERISTCS MAY NOT BE PLANTED IN FUEL MODIFICATION ZONES AS LISTED BELOW. SHOULD THESE SPECIES ALREADY EXIST WITHIN THESE AREAS, THEY MUST BE REMOVED.

PLANS SHOULD BE SUBMKITTED TO THE CITY FOR REVIEW WITHOUT THE TARGET PLANTS LISTED BELOW. IN CASES WHERE UNDESIRABLE PLANTS ARE INCLUDED IN A SUBMITTAL FOR NEW PLANTINGS OR PRESERVATION, THE APPLICANT MUST SUBMIT A REQUEST FOR USE OF ALTERNATIVE MATERIALS AND METHODS AS OUTLINED IN THE CITY OF LAGUNA BEACH FIRE DEPARTMENT GUIDELINES FOR ALTERNATIVE MATERIALS AND METHODS REQUESTS. THE REQUEST WILL BE EVALUATED BY THE FIRE DEPARTMENT FOR ACCEPTABILITY.

THE LIST OF UNDESIRABLE PLANTS IS COMPREHENSIVE, BUT NOT COMPLETE. CLOSELY RELATED SPECIES AND VARIETIES HAVING SUBSTANTIALLY SIMILAR FLAMMABLE CHARACTERISTICS AS THE IDENTIFIED SPECIES MAY ALSO NOT BE ACCEPTABLE.

APPLICANTS ARE ENCOURAGED TO MAXIMIZE FIRE SAFETY BY USING PLANTS WITH HIGH WATER CONTENT, LOW FUEL VOLUMES, SUCCULENT LEAVES AND STEMS, LOW LITTER, AND LOW AMOUNTS OF FLAMMABLE OILS AND RESINS. AVOIDANCE OF TARGET SPECIES ALONE DOES NOT CONFER MAXIMUM SAFETY.

SPACING REQUIREMENTS OF ATTACHMENT 6 APPLY TO ALL SPECIES AND MUST BE REFLECTED IN THE PLANTING DESIGN PLAN SUBMITTED TO THE CITY.

VINES ARE NOT ALLOWED ON COMBUSTIBLE STRUCTURES.

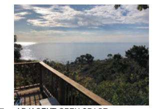
EXTENSSIVE MASSING OF GRASSES WITH HEIGHTS GREATER THAN 12" HIGH MAY NOT BE ACCEPTABLE.

ADDITIONAL FACTORS TO CONSIDER WHEN SELECTING PLANTS FOR WILDLAND INTERFACE AREA INCLUDE; DEER AND RABBIT RESISTANCE, AESTHETIC COMPATIBILITY WITH HILLSIDE CHARACTER, EROSION CONTROL, AND DROUGHT TOLERANCE.


SAN CLEMENTE ST. SOUTH


SAN CLEMENTE ST. END (NORTH)


EX. RESIDENCE ON SAN CLEMENTE ST.


ADJACENT OPEN SPACE

FIRE DEPARTMENT NOTES:

1. A SEPERATE (DEFFERED) SUBMITTAL FOR FIRE SPRINKERS IS REQUIRED. SYSTEM DESIGN MUST COMPLY WITH THE 2016 CFC AND 2016 MFPA 13 STANDARD. PLANS MUST DESIGNED AND INSTALLED BY A QUALIFIED FIRE PROTECTION CONTRACTOR. PLANS SHALL BE SUBMITTED TO AND APPROVED BY THE LBFD, WITH PERMIT ISSUED AND APPROPRIATE INSPECTIONS CONDUCTED.
2. ALL EXTERIOR FIRE PLACES AND FIRE PITS MUST BE GAS FIRED ONLY. NO SOLID FUEL IS ALLOWED PER THE LBFD MUNICIPAL CODE. FIRE PLACES AND FIRE PITS MUST BE A MINUMIM OF 10' FROM COMBUSTIBLE VEGETATION.
3. MAINTAIN JOBSITE SAFETY PER CHAPTER 33 OF THE CALIFORNIA FIRE CODE.
4. COMPLETE FIREFIGHTER ACCES IS REQUIRED AROUND THE BUILDING, AND MUST BE IN COMPLIANCE WITH THE DRB APPROVED PLANS. SEE THIS SHEET FOR DETAILS. THIS IS SUBJECT TO FINAL FIRE INSPECTION AND REQUIRED APPROVAL PRIOR TO OCCUPANCY.
5. BUILDING ADDRESS NUMBERS MUST BE PLACED ON THE EXTERIOR FACING THE STREET ADDRESSED TO. MINUMIM SIZE OF UNIT/ SUITE NUMBER IS 4", WITH THE MINIMUM SIZE BUILDING NUMBERS BEING 6". NUMBER COLOR MUST CONTRAST WITH THE BACKGROUND.
6. FOR FIRE DEPARTMENT INSPECTION, CALL (949) 497-0352 AT LEAST 3 DAYS IN ADVANCE TO SCHEDULE.

APPROVED AM&M REPORT:

REFER TO APPROVED AM&M REPORT FOR FUEL MODIFICATION DESCRIPTION.

FIRE PROTECTION PLAN:
APPROVAL SIGNATURE
DATE

ADDITIONAL NOTES

FIRE MODIFICATION AND/OR FIRE APPARATUS ACCESS ROAD SHALL BE PROVIDED PRIOR TO START OF CONSTRUCTION AND/ OR LUMBER DELIVERY.

REFER TO SHEET L-2.1 AND L-2.2 FOR PRELIMINARY PLANTING PLAN AND PLANT PALETTE

FIRE MITIGATION/ JUSTIFICATION:
REFER TO AM&M REPORT

MAPPED ENVIRONMENTALLY SENSITIVE AREAS

1. FUEL MODIFICATION ZONE
2. VERY HIGH FIRE HAZARD SEVERITY ZONE
3. HIGH VALUE HABITAT
4. OPEN SPACE PRESERVE

MAINTENANCE NOTES

THE PROPERTY OWNER SHALL UNDERTAKE ANNUAL FUEL MODIFICATION AN ALL ZONES IN ACCORDANCE WITH THE FUEL MODIFICATION NOTES AND ATTACHMENTS.

THE PROPERTY OWNER SHALL ENGAGE A THIRD PARTY INSPECTOR ON AN ANNUAL BASIS TO REVIEW THAT ALL PLANTINGS ARE BEING PROPERLY MAINTAINED IN ACCORDANCE WITH THIS PLAN.

IRRIGATION NOTE:

THE IRRIGATION SYSTEM SHALL BE DESIGNED TO BE FULLY AUTOMATIC, USING LOW-VOLUME HEADS/ DRIP OR BUBBLER IRRIGATION WITH MATCHING PRECIPITATION RATES AND HEAD TO HEAD COVERAGE. PROVIDE APPROVED BACKFLOW

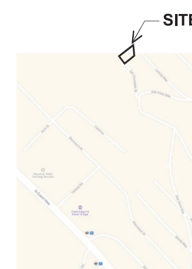
TREE MAINT. NOTE

ALL PROPOSED TREE CANOPIES SHALL BE MAINTENED TO ACHIEVE A MINIMUM 10' HORIZONTAL AND 10' VERTICAL CLEARANCE FROM THE STRUCTURE.

ALL TREE CANOPIES SHALL BE RAISED ACCORDININGS TO MAINTAIN A MINUMIM 4X UNDERSTORY PLANT HEIGHT CLEARANCE.

PLANT SPACING NOTE:

MAINTAIN 10' CANOPY SPACING BETWEEN TREES AND LARGE SHRUBS AND 3X UNDERSTORY HEIGHT VERTICAL CLEARANCE BETWEEN TREES AND UNDER PLANTINGS PER ATTACHEMENT 6



VICINITY MAP

SOURCE: M.D. Wilkes Design and Consulting, 2021

DUDEK

0 2 4 8 16
NORTH

ATTACHMENT 3a
Proposed Fuel Modification Plan
2354 San Clemente Street, Laguna Beach, CA AM&M

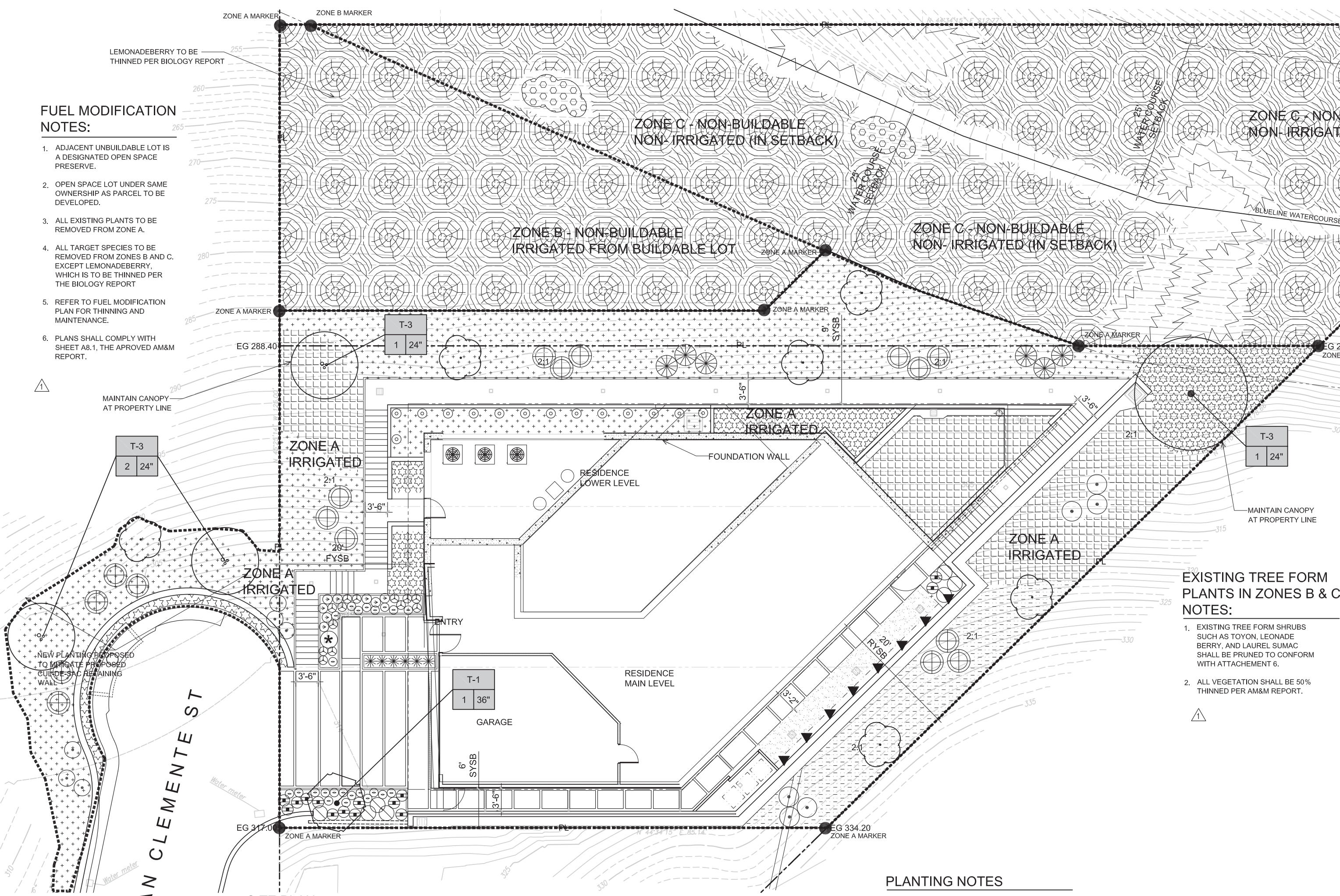
Attachment 4

Preliminary Landscape Plan Set

FUEL MODIFICATION NOTES:

1. ADJACENT UNBUILDABLE LOT IS A DESIGNATED OPEN SPACE PRESERVE.
2. OPEN SPACE LOT UNDER SAME OWNERSHIP AS PARCEL TO BE DEVELOPED.
3. ALL EXISTING PLANTS TO BE REMOVED FROM ZONE A.
4. ALL TARGET SPECIES TO BE REMOVED FROM ZONES B AND C. EXCEPT LEMONADEBERRY, WHICH IS TO BE THINNED PER THE BIOLOGY REPORT
5. REFER TO FUEL MODIFICATION PLAN FOR THINNING AND MAINTENANCE.
6. PLANS SHALL COMPLY WITH SHEET A8.1, THE APROVED AM&M REPORT.

1

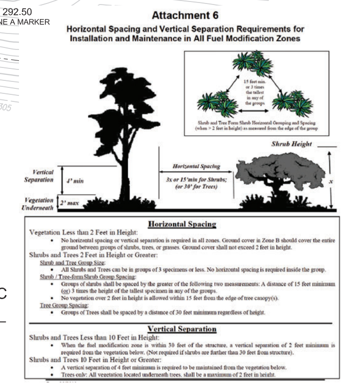


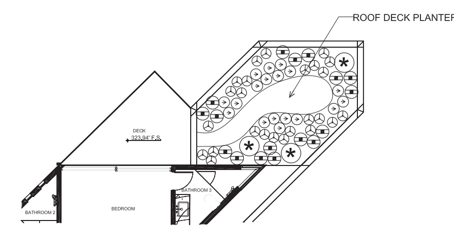
SITE PLAN

EXISTING TREE FORM PLANTS IN ZONES B & C NOTES:

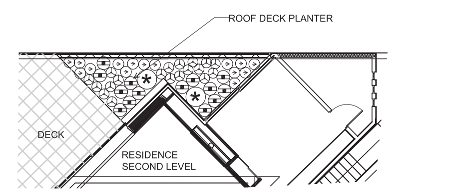
1. EXISTING TREE FORM SHRUBS SUCH AS TOYON, LEONADE BERRY, AND LAUREL SUMAC SHALL BE PRUNED TO CONFORM WITH ATTACHEMENT 6.
2. ALL VEGETATION SHALL BE 50% THINNED PER AM&M REPORT.

1





UPPER LEVEL PLAN



MAIN LEVEL PLAN

LEGEND

PA = PLANTING AREA
(E) = EXISTING
(N) = NEW
BW = BOTTOM OF WALL
DN = DOWN
FF = FINISH FLOOR
FL = FLOW LINE
FS = FINISH SURFACE
EG = EXISTING GRADE
FG = FINISH GRADE
GFF = GARAGE FINISH FLOOR
NG = NATURAL GRADE
SCO = SEWER CLEANOUT
TBM = TEMPORARY BENCHMARK
TC = TOP CURB
TOR = TOP OF ROOF
TW = TOP WALL
WV = WATER VALVE
WM = WATER METER

IRRIGATED PLANTING AREA:

ON GRADE PLANTING AREA	3,040 SF
ON STRUCTURE PLNT.AREA	160 SF
UNBUILDABLE LOT (ZONE B)	2680
TOTAL:	5,680 SF

HERITAGE TREE NOTES

1. ORIGINAL HERITAGE PINE TREE WAS REMOVED BY PREVIOUS HOME OWNER.
2. NO REPLACEMENT PINE TREE WAS EVER PLANTED.
3. PINE TREES ARE CONSIDERED TARGET SPECIES IN ALL FUEL MODIFICATION ZONES.
4. NO REPLACEMENT PINE TREE IS PROPOSED.
5. THREE NEW TREES ARE PROPOSED ON THE SUBJECT PROPERTY AS MITIGATION.

PLANTING NOTES

1. PROVIDE AUTOMATIC IRRIGATION FOR ALL NEW PLANTING AREAS, EXCEPT WHERE NOTED.
2. IRRIGATION SHALL CONSISTING OF A COMBINATION OF LOW VOLUME DRIP TUBING, BUBBLERS AND HIGH EFFICIENCY SP HEADS, CONTROLLED WITH AUTOMATIC VALVES AND A PROGRAMMABLE WEATHER SENSATIVE AUTOMATIC CONTROLLER.
3. PROVIDE A REDUCED PRESSURE BACKFLOW PREVENTER T WILL NOT BE LOCATED IN THE RIGHT OF WAY.
4. THIS PRELIMINARY PLANTING PLAN IS NOT INTENDED FOR CONSTRUCTION PURPOSES.
5. ALL EXISTING VEGETATION ON DEVELOPED PARCEL TO BE REMOVED.
6. PREVIOUS LISTED HERITAGE TREE WAS REMOVED BY PREVIOUS PROPERTY OWNER. DESIGNATED REPLACEMEN PINE TREE WAS NEVER PLANTED AND CANNOT BE PLANTED FUEL MODIFICATION ZONE.

SOURCE: M.D. Wilkes Design and Consulting, AUGUST 2022

0 2 4 8 16
NORTH

DUDEK

ATTACHMENT 4a
Preliminary Planting Plan
2354 San Clemente Street, Laguna Beach, CA AM&M

FUEL MODIFICATION NOTES:

1. ADJACENT UNBUILDABLE LOT IS A DESIGNATED OPEN SPACE PRESERVE.
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3. ALL EXISTING PLANTS TO BE REMOVED FROM ZONE A.
4. ALL TARGET SPECIES TO BE REMOVED FROM ZONES B AND C.
5. REFER TO FUEL MODIFICATION PLAN FOR THINNING AND MAINTENANCE.
6. PLANS SHALL COMPLY WITH SHEET A8.1, THE APROVED AM&M REPORT.

PLANT LEGEND

TREES:

	SYMBOL	BOTANICAL NAME	COMMON NAME	CONTAINER SIZE	WULCOL WATER USE	MAX. MAINTAINED SIZE SIZE IN 20 YEARS
T-1		ARBUTUS UNEDO COMPACTA'	DWARF STRAWBERRY TREE 1	36" BOX, MULTI-STEM	LOW	12' HIGH X 10' WIDE
T-2		PLATANUS RACEMOSA	CALIFORNIA SYCAMORE	24" BOX, STANDARD	MODERATE	25' HIGH X 15' WIDE
T-3		QUERCUS DUMOSA	SCRUB OAK	24" BOX, MULTI-STEM	VERY LOW	120' HIGH X 12' WIDE

SHRUBS:

SYMBOL	BOTANICAL NAME	COMMON NAME	CONTAINER SIZE	WULCOL WATER USE	MAINTAINED HEIGHT SIZE IN 5 YEARS
	AGAVE ATTENUATA	FOX TAIL AGAVE	15 GALLON	LOW	4' HIGH X 5' WIDE
	AGAVE 'BLUE GLOW'	BLUE GLOW AGAVE	15 GALLON	LOW	2' HIGH X 3' WIDE
	ALOE AFRICANA	SPINY ALOE	15 GALLON	LOW	4' HIGH X 4' WIDE
	ALOE STRIATA	CORAL ALOE	1 GALLON	LOW	1' HIGH X 18" WIDE
	CISTANTHE GRANDIFLORA	ROCK PURSELANE	1 GALLON	LOW	18" HIGH X 2' WIDE
	CRASSULA FULCATA	AIRPLANE PLANT	1 GALLON	LOW	2' HIGH X 3' WIDE
	DENDROMECHON HARFORDII	ISLAND BUSH POPPY	5 GALLON	LOW	6' HIGH X 6' WIDE
	GALVEZIA SPECIOSA	ISLAND SNAPDRAGON	1 GALLON	LOW	3' HIGH X 4' WIDE
	GREVILLEA LANIGERA 'COASTAL GEM'	PROSTRATE GREVILLEA	1 GALLON	LOW	12" HIGH X 4' WIDE
	SAMBUCUS MEXICANA	MEXICAN ELDERBERRY	15 GALLON, MULTI-STEM	VERY LOW	10' HIGH X 12' WIDE
	SENECIO MANDRALISCAE	BLUE CHALK STICKS	1 GALLON	LOW	8" HIGH X 2' WIDE
	WESTRINGIA FRUTICOSA 'GRAY BOX'	GRAY BOX COAST ROSEMARY	5 GALLON	LOW	2' HIGH X 3' WIDE
	HETEROMELES ARBUTIFOLIA	TOYON	EXISTING, THIN PER BIOLOGY REPORT	VERY LOW	12' HIGH X 10' WIDE
	RHUS INTEGRIFOLIA	LEMONADE BERRY	EXISTING, THIN PER BIOLOGY REPORT	VERY LOW	8" HIGH X 8' WIDE

GROUND COVER:

SYMBOL	BOTANICAL NAME	COMMON NAME	CONTAINER SIZE	WULCOL WATER USE	MAINTAINED HEIGHT SIZE IN 5 YEARS
	BACCHARUS PILULARIS PIGEON POINT'	DWARF COYOTE BUSH	1 GALLON @ 48" O.C.	LOW	2' HIGH X 6' WIDE
	CEANOTHUS GRISEUS HORIZONTALIS 'YANKEE POINT'	YANKEE POINT PROSTRATE CALIFORNIA LILAC	1 GALLON, 60" O.C.	LOW	2' HIGH X 8' WIDE
	LOBELIS LAXIFLORA SSP. ANGUSTIFOLIA	MEXICAN LOBELIA	1 GALLON, 36" O.C.	LOW	2' HIGH X 3' WIDE
	OPUNTIA LITTORALIS	COAST PRICKLY PEAR	1 GALLON, 36" O.C. INFILL AT BARE SOIL	VERY LOW	3' HIGH X 5' WIDE
	RIBES VIBURNIFOLIA 'SPOONER'S MESA'	EVERGREEN CURRANT	1 GALLON, 36" O.C.	LOW	2' HIGH X 5' WIDE
	FESTUCA ARUNDINACEA 'MARATHON II'	MARATHON II SOD	-	HIGH	-

GROUND COVER:

SYMBOL	BOTANICAL NAME	COMMON NAME	CONTAINER SIZE	WULCOL WATER USE	MAINTAINED HEIGHT SIZE IN 5 YEARS
▼	FICUS REPENS	CREEPING FIG	1 GALLON, STAKED	MODERATE	SPREADING TO 10'

PLANT IMAGES


QUERCUS DUMOSA
SCRUB OAK

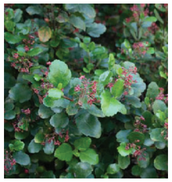

SAMBUCUC MEXICANA
MEXICAN ELDERBERRY

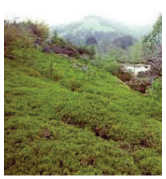

WESTRINGIA FRUTICOSA 'BLUE BOX'
BLUE BOX COAST ROSEMARY


DENDROMECON HARFORDII
ISLAND BUSH POPPY

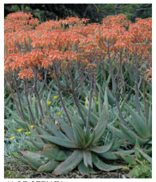

CEANOTHUS GRISEUS HORIZONTALIS 'YANKEE POINT'
PROSTRATE CEANOTHUS


GALVEZIA SPECIOSA
ISLAND SNAPDRAGON


RIBES VIBURNIFOLIA 'SPOONER'S MESA'
EVERGREEN CURRANT


BACCHARUS PILULARIS 'PIGEON POINT'
DWARF COYOTE BUSH


LOBELIA LAXIFLORA
VAR. ANGUSTIFOLIA
MEXICAN LOBELIA


ALOE STRIATA
CORAL ALOE


AGAVE ATTENUATA
FOXTAIL AGAVE


ARBUTUS UNEDO 'COMPACTA'
DWARF STRAWBERRY TREE


AGAVE 'BLUE GLOW'
BLUE GLOW AGAVE


CISTANTHE GRANDIFLORA
ROCK PURSELANE


CRASSULA FULCATA
AIRPLANE PLANT


GREVILLEA LANIGERA
'COASTAL GEM'
PROSTRATE GREVILLEA


OPUNTIA LITTORALIS
COASTAL PRICKLY PEAR


HETEROMELES ARBUTIFOLIA
TOYON
EXISTING AT UNBUILDABLE LOT


RHUS INTEGRIFOLIA
LEMONADE BERRY
EXISTING AT UNBUILDABLE LOT


ALOE AFRICANA
THORNY ALOE


PLATANUS RACEMOSA
CALIFORNIA SYCAMORE


SENECIO MANDRALISCAE
BLUE CHALK STICKS

SOURCE: M.D. Wilkes Design and Consulting, AUGUST 2022

DUDEK

ATTACHMENT 4b

Preliminary Planting Plan

2354 San Clemente Street, Laguna Beach, CA AM&M

Attachment 5

Fire Behavior Modeling Summary

ATTACHMENT 5
Fire Behavior Modeling Summary
2354 San Clemente Street, Laguna Beach, CA

BEHAVEPLUS FIRE BEHAVIOR MODELING

Fire behavior modeling has been used by researchers for approximately 50+ years to predict how a fire will move through a given landscape (Linn 2003). The models have had varied complexities and applications throughout the years. One model has become the most widely used as the industry standard for predicting fire behavior on a given landscape. That model, known as "BEHAVE", was developed by the U. S. Government (USDA Forest Service, Rocky Mountain Research Station) and has been in use since 1984. Since that time, it has undergone continued research, improvements, and refinement. The current version, BehavePlus 6.0, includes the latest updates incorporating years of research and testing. Numerous studies have been completed testing the validity of the fire behavior models' ability to predict fire behavior given site specific inputs. One of the most successful ways the model has been improved has been through post-wildfire modeling (Brown 1972, Lawson 1972, Sneeuwjagt and Frandsen 1977, Andrews 1980, Brown 1982, Rothermel and Rinehart 1983, Bushey 1985, McAlpine and Xanthopoulos 1989, Grabner, et. al. 1994, Marsden-Smedley and Catchpole 1995, Grabner 1996, Alexander 1998, Grabner et al. 2001, Arca et al. 2005). In this type of study, Behave is used to model fire behavior based on pre-fire conditions in an area that recently burned. Real-world fire behavior, documented during the wildfire, can then be compared to the prediction results of Behave and refinements to the fuel models incorporated, retested, and so on.

Fire behavior modeling conducted on this site includes a relatively high-level of detail and analysis which results in reasonably accurate representations of how wildfire may move through available fuels on and adjacent the property. Fire behavior calculations are based on site-specific fuel characteristics supported by fire science research that analyzes heat transfer related to specific fire behavior. To objectively predict flame lengths, spread rates, and fireline intensities, this analysis incorporated predominant fuel characteristics, slope percentages, and representative fuel models observed on site. The BehavePlus fire behavior modeling system, which is the industry standard, was used to analyze anticipated fire behavior within and adjacent to key areas just outside of the proposed lots.

Predicting wildland fire behavior is not an exact science. As such, the movement of a fire will likely never be fully predictable, especially considering the variations in weather and the limits of weather forecasting. Nevertheless, practiced and experienced judgment, coupled with a validated fire behavior modeling system, results in useful and accurate fire prevention planning information.

To be used effectively, the basic assumptions and limitations of BehavePlus must be understood.

- First, it must be realized that the fire model describes fire behavior only in the flaming front. The primary driving force in the predictive calculations is dead fuels less than one-quarter inch in diameter. These are the fine fuels that carry fire. Fuels greater than one inch have little effect while fuels greater than three inches have no effect on fire behavior.
- Second, the model bases calculations and descriptions on a wildfire spreading through surface fuels that are within six feet of the ground and contiguous to the ground. Surface fuels are often classified as grass, brush, litter, or slash.
- Third, the software assumes that weather and topography are uniform. However, because wildfires almost always burn under non-uniform conditions, length of projection period and choice of fuel model must be carefully considered to obtain useful predictions.
- Fourth, the BehavePlus fire behavior computer modeling system was not intended for determining sufficient fuel modification zone widths. However, it does provide the average length of the flames, which is a key element for determining "defensible space" distances for minimizing structure ignition.

Although BehavePlus has some limitations, it can still provide valuable fire behavior predictions which can be used as a tool in the decision-making process. In order to make reliable estimates of fire behavior, one must understand the relationship of fuels to the fire environment and be able to recognize the variations in these fuels. Natural fuels are made up of the various components of vegetation, both live and dead, that occur on a site. The type and quantity will depend upon the soil, climate, geographic features, and the fire history of the site. The major fuel groups of grass, shrub, trees, and slash are defined by their constituent types and quantities of litter and duff layers, dead woody material, grasses and forbs, shrubs, regeneration, and trees. Fire behavior can be predicted largely by analyzing the characteristics of these fuels. Fire behavior is affected by seven principal fuel characteristics: fuel loading, size and shape, compactness, horizontal continuity, vertical arrangement, moisture content, and chemical properties.

The seven fuel characteristics help define the 13 standard fire behavior fuel models[1] and the five custom fuel models developed for Southern California[2]. According to the model classifications, fuel models used in BehavePlus have been classified into four groups, based upon fuel loading (tons/acre), fuel height, and surface to volume ratio. Observation of the fuels in the field (on site) determines which fuel models should be applied in BehavePlus. The following describes the distribution of fuel models among general vegetation types for the standard 13 fuel models and the custom Southern California fuel models:

---

1 Anderson, Hal E. 1982. Aids to Determining Fuel Models for Estimating Fire Behavior. USDA Forest Service Gen. Tech. Report INT-122. Intermountain Forest and Range Experiment Station, Ogden, UT.

2 Weise, D.R. and J. Regelbrugge. 1997. Recent chaparral fuel modeling efforts. Prescribed Fire and Effects Research Unit, Riverside Fire Laboratory, Pacific Southwest Research Station. 5p.

- Grasses — Fuel Models 1 through 3
- Brush — Fuel Models 4 through 7, SCAL 14 through 18
- Timber — Fuel Models 8 through 10
- Logging Slash — Fuel Models 11 through 13

In addition, the aforementioned fuel characteristics were utilized in the recent development of 40 new fire behavior fuel models[3] developed for use in BehavePlus modeling efforts. These new models attempt to improve the accuracy of the standard 13 fuel models outside of severe fire season conditions, and to allow for the simulation of fuel treatment prescriptions. The following describes the distribution of fuel models among general vegetation types for the new 40 fuel models:

- Non-Burnable — Models NB1, NB2, NB3, NB8, NB9
- Grass — Models GR1 through GR9
- Grass-shrub — Models GS1 through GS4
- Shrub — Models SH1 through SH9
- Timber-understory — Models TU1 through TU5
- Timber litter — Models TL1 through TL9
- Slash blowdown — Models SB1 through SB4

BehavePlus software was used in the development of this Alternative Materials and Methods (AM&M) in order to evaluate potential fire behavior for the Project site. Existing site conditions were evaluated, and local weather data was incorporated into the BehavePlus modeling runs.

[3] Scott, Joe H. and Robert E. Burgan. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.

FUEL MODELS

Dudek utilized the BehavePlus software package to analyze fire behavior potential for the Project site at 2354 San Clemente Street in Laguna Beach. As is customary for this type of analysis, two fire scenarios were evaluated, including one summer, onshore weather condition (west and northwest from the Project Site) and one extreme fall, offshore weather condition (north and northeast of the Project Site). Fuels and terrain at and beyond this distance can produce flying embers that may affect the project, but defenses have been built into the structures to prevent ember penetration and to extinguish fires that may result from ember penetration. It is the fuels adjacent to and within fuel modification zones that would have the potential to affect the project's structures from a radiant and convective heat perspective as well as from direct flame impingement. BehavePlus software requires site-specific variables for surface fire spread analysis, including fuel type, fuel moisture, wind speed, and slope data. The output variables used in this analysis include flame length (feet), rate of spread (feet/minute), fireline intensity (BTU/feet/second), and spotting distance (miles). The following provides a description of the input variables used in processing the BehavePlus models for the Proposed Project site. In addition, data sources are cited and any assumptions made during the modeling process are described. Table 1 provides a description of the fuel model observed in the vicinity of the site that were subsequently used in the analysis for this project. Modeled areas include the chaparral (Sh5) that occur on the north / northwest facing hillside, north and adjacent to the Project site, and Eucalyptus forest woodland (FM9) that occur on the north / northwest facing hillside, north and adjacent to the Project site. A total of two fire modeling scenarios were completed for the Project site. These sites were selected based on the strong likelihood of fire approaching from these directions during a Santa Ana wind-driven fire event (fire scenario 1) and an on-shore weather pattern (fire scenario 2).

Table 1
Existing Fuel Model Characteristics

Fuel Model	Description	Location	Fuel Bed Depth (Feet)
Sh5	High Load, Dry Climate Shrub	Fuel type is concentrated on the north / northwest facing hillside adjacent and below the Project site.	4.0 ft.
FM9	Eucalyptus Forest Woodland	Fuel type is concentrated directly adjacent and north of the existing residence	<12.0 ft.

Topography

Slope is a measure of angle in degrees from horizontal and can be presented in units of degrees or percent. Slope is important in fire behavior analysis as it affects the exposure of fuel beds.

Additionally, fire burning uphill spreads faster than those burning on flat terrain or downhill as uphill vegetation is pre-heated and dried in advance of the flaming front, resulting in faster ignition rates. Slope values ranging from 15–30% were measured from U.S. Geological Survey (USGS) topographic maps.

Weather

Historical weather data for the coastal region was utilized in determining appropriate fire behavior modeling inputs for the Project area. 50th and 97th percentile moisture values were derived from Remote Automated Weather Station (RAWS) and utilized in the fire behavior modeling efforts conducted in support of this report. Weather data sets from the Bell Canyon RAWS[4] were utilized in the fire modeling runs.

RAWS fuel moisture and wind speed data were processed utilizing the Fire Family Plus software package to determine atypical (97th percentile) and typical (50th percentile) weather conditions. Data from the RAWS was evaluated from August 1 through November 30 for each year between 1995 and 2017 (extent of available data record) for 97th percentile weather conditions and from June 1 through September 30 for each year between 1995 and 2017 for 50th percentile weather conditions.

Following analysis in Fire Family Plus, fuel moisture information was incorporated into the Initial Fuel Moisture file used as an input in BehavePlus. Wind speed data resulting from the Fire Family Plus analysis was also determined. Initial wind direction and wind speed values for the two BehavePlus runs were manually entered during the data input phase. The input wind speed and direction is roughly an average surface wind at 20 feet above the vegetation over the analysis area. Table 2 summarizes the wind and weather input variables used in the Fire BehavePlus modeling efforts.

4 http://raws.wrh.noaa.gov/cgi-bin/roman/meso_base.cgi?stn=CAPC1&unit=0&time=LOCAL
Latitude: 33.551833 Longitude: -117.572944; Elevation: 793 ft.)

Table 2
BehavePlus Fire Behavior Inputs

Model Variable	Summer Weather (Onshore Winds)	Fall Weather (Offshore Winds)
Fuel Models	Sh5	Sh5
1 h fuel moisture	7%	1%
10 h fuel moisture	9%	3%
100 h fuel moisture	14%	6%
Live herbaceous moisture	60%	30%
Live woody moisture	114%	60%
20 ft. wind speed	24 mph (sustained winds)	15 mph (sustained winds); 50 mph (gusty winds)
Wind Directions from north (degrees)	300	40
Wind adjustment factor	0.4	0.4
Slope (uphill)	24%	20%

Fire Behavior Modeling Effort

As mentioned, the BehavePlus fire behavior modeling software package was utilized in evaluating anticipated fire behavior adjacent to the Proposed Project site. Three focused analyses were completed, each assuming worst-case fire weather conditions for a fire approaching the project site from the north, northwest, northeast, and west. Three fire behavior variables were selected as outputs from the BehavePlus analysis conducted for the project site, and include flame length (feet), rate of spread (mph), fireline intensity (BTU/feet/second), and surface fire spotting distance (miles). The aforementioned fire behavior variables are an important component in understanding fire risk and fire agency response capabilities. Flame length, the length of the flame of a spreading surface fire within the flaming front, is measured from midway in the active flaming combustion zone to the average tip of the flames (Andrews, Bevins, and Seli 2008). Fireline intensity is a measure of heat output from the flaming front, and also affects the potential for a surface fire to transition to a crown fire. Fire spread rate represents the speed at which the fire progresses through surface fuels and is another important variable in initial attack and fire suppression efforts (Rothermel and Rinehart 1983). Spotting distance is the distance a firebrand or ember can travel down wind and ignite receptive fuel beds. The information in Table 3 presents an interpretation of the outputs for two fire behavior variables as related to fire suppression efforts. The results of fire behavior modeling efforts are presented in Table 4.

Table 3
Fire Suppression Interpretation

Flame Length (ft)	Fireline Intensity (Btu/ft/s)	Interpretations
Under 4 feet	Under 100 BTU/ft/s	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4 to 8 feet	100-500 BTU/ft/s	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8 to 11 feet	500-1000 BTU/ft/s	Fires may present serious control problems -- torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Over 11 feet	Over 1000 BTU/ft/s	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

FIRE BEHAVIOR MODELING RESULTS

The results presented in Table 4 depict values based on inputs to the BehavePlus software and are not intended to capture changing fire behavior as it moves across a landscape. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. For planning purposes, the averaged worst-case fire behavior is the most useful information for conservative fuel modification design. Model results should be used as a basis for planning only, as actual fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

Based on the BehavePlus analysis, worst-case fire behavior is expected in non-maintained chaparral north and below the proposed Project site under Peak weather conditions (represented by Fall Weather, Scenario 1). The fire is anticipated to be a wind-driven fire from the north/northeast during the fall. Under such conditions, expected surface flame lengths reach 45 feet with wind speeds of 50+ mph. Under this scenario, fireline intensities reach 21,859 BTU/feet/second with fast spread rates of 6.81 mph and could have a spotting distance up to 2.4 miles away.

Based on the BehavePlus analysis, post development fire behavior is expected in irrigated and replanted with plants that are acceptable with LBFD (Zone-A - FM8 and Zone B – Sh1) and in 50 percent thinned, non-irrigated area (Zone C - Gs1) under peak weather conditions (represented by Fall Weather, Scenario 3). Under such conditions, expected surface flame length is expected to be significantly lower, with flames lengths reaching approximately 10 feet in the irrigated zones and approximately 14 feet in the thinned zones with wind speeds of 50+ mph. Under this scenario, fireline intensities reach 964 BTU/feet/second in the irrigated zones and 1,763 BTU/feet/second in the thinned zones with relatively slow spread rates of 1.5 mph in the irrigated zones and 3.0 mph in the thinned zones and could have a spotting distance up to 1.0 miles away in the irrigated zones and 1.1 miles away in the thinned zones.

Table 4
BehavePlus Fire Behavior Model Results

Fire Scenario	Flame Length (feet)	Spread Rate (mph)	Fireline Intensity (Btu/ft/s)	Spot Fire (Miles)
Scenario 1: 20% slope, Fall, Offshore, Extreme Winds				
Chaparral (Sh5)	23.3’ (44.4’)	1.70 (6.70)	5,320 (21,659)	0.7 (2.4) [5]
Forest Woodlands (FM9)	5.2’ (13.0’)	0.3 (1.9)	202 (1,498)	0.2 (0.8)[5]
Scenario 2: 24% slope, Summer, Onshore Winds				
Chaparral (Sh5)	17.5’	1.30	2,851	0.8[5]
Scenario 3: 20% slope, Fall, Off-shore, Extreme Winds (Post Development)				
FMZ Zone A (FM8)	1.8’ (3.0’)	0.1 (0.2)	21 (62)	0.1 (0.3)[5]
FMZ Zone B (Sh1)	1.7’ (10.6’)	0.1 (1.5)	18 (964)	0.1 (1.0)
FMZ Zone C (Gs1)	6.4’ (14.0’)	0.5 (3.0)	323 (1,763)	0.3 (1.1)

[5] It should be noted that the wind mph in parenthesis represent peak gusts of 50 mph.

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Attachment 6

Completed Laguna Beach Fire Department

Hydrant Flow Report

Laguna Beach Fire Department

505 Forest Ave., Laguna Beach, CA 92651
(949) 497-0700

HYDRANT FLOW REPORT AND FIRE FLOW INFORMATION

Please complete Section A of this form (*must be saved as an Adobe "pdf" document*) and e-mail it to: **James Brown, LBFD Fire Marshal** --- jdbrown@lagunabeachcity.net.

The LBFD will complete Section B and send to the Water Purveyor for completion of Section C. Once all Sections are complete, the LBFD will send a copy back to the requesting party via e-mail.

NOTE: Water Purveyors require a fee to be paid prior to completing Section C. Please contact them for payment information.

SECTION A: TO BE COMPLETED BY APPLICANT

Date of Request: 4/5/19 Construction Type: SFR 5A R-3/U, S13-D Square Footage*: 4300 Ft

Contact Name: Kevin Aaronson Project Address: 2354 San Clemente St.

Data Requested for: ____ Fire Protection System Design** ✓ Fire Hydrant Flow Report (Check which apply)

*Square Footage must include all attached garages, carports and solid roof patio covers.

**Include estimated water (Fire Flow) needed for System Design: __________GPM

SECTION B: TO BE COMPLETED BY LAGUNA BEACH FIRE DEPARTMENT

As required by Appendix B of the 2016 CFC, the minimum Hydrant Flow is: 875 GPM for 1 hours at a minimum residual pressure of 20 PSI. Completed by: James Brown, Fire Marshal Date: 4/5/2019

Name and Title of LBFD Representative

Water Purveyor ☑ LBCWD ☐ SCWD

SECTION C: TO BE COMPLETED BY WATER PURVEYOR

The test shall be provided from the closest junction node on the same pressure system as the proposed project.
NOTE: All water information is provided using the water purveyors' current hydraulic water model simulated under maximum day demand conditions. The pressure provided reflects at street level elevations unless noted otherwise.

Fire Flow Requested in Section A: ________GPM Static Press.: ________ PSI Residual Press.: ________ PSI

Hydrant Flow Required by Section B: 1045 GPM at 20 PSI residual pressure

Junction Node location and elevation: 2399 SAN CLEMENTE STREET(ELEV.327ft/NODE (W-FH-16-120)

Elevation of water meter for project: 317ft.

Completed by: Eric Callahan Digitally signed by Eric Callahan DN: cn=Eric Callahan, o=Laguna Beach County Water District, ou, email=ecallahan@lbcwd.org, c=US Date: 2019.04.11 09:21:58 -07'00' Engineering Tech Date: 04-11-19

Name and Title of Water Purveyor Representative