County of Santa Cruz

DEPARTMENT OF COMMUNITY DEVELOPMENT AND INFRASTRUCTURE
701 OCEAN STREET, 4TH FLOOR, SANTA CRUZ, CA 95060
(831) 454-2580 FAX: (831) 454-2131 TDD: (831) 454-2123
MATT MACHADO, DIRECTOR OF CDI
www.sccoplanning.com

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)
INITIAL STUDY/ENVIRONMENTAL CHECKLIST

Date: September 11, 2024 **Application Number:** 221077

Project Name: Locatelli Subdivision **Staff Planner:** Jonathan DiSalvo

I. OVERVIEW AND ENVIRONMENTAL DETERMINATION

APPLICANT: Swift Consulting Service **APNs:** 029-391-01, 029-391-02, 029-391-03, & 029-061-19

OWNER: Claudio Locatelli **SUPERVISORIAL DISTRICT:** First District

PROJECT LOCATION: The project is located on the southeast side of Mattison Lane within the community of Live Oak in unincorporated Santa Cruz County. Santa Cruz County is bounded on the north by San Mateo County, on the south by Monterey and San Benito counties, on the east by Santa Clara County, and on the south and west by the Monterey Bay and the Pacific Ocean.

SUMMARY PROJECT DESCRIPTION:

Proposal to demolish two existing residential dwellings and related outbuildings and to construct 24 semi-detached townhomes and one detached townhome for a total of 25 residential units. This project requires approval of a Subdivision, Planned Unit Development, Residential Development Permit with Density Bonus, Park Site Review, Roadway/Roadside Exception, and Preliminary Grading Review. (FIGURE 2)

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED: *All of the following potential environmental impacts are evaluated in this Initial Study. Categories that are marked have been analyzed in greater detail based on project specific information.*

- ☒ Aesthetics and Visual Resources
- ☐ Agriculture and Forestry Resources
- ☐ Air Quality
- ☒ Biological Resources
- ☒ Cultural Resources
- ☐ Energy
- ☒ Geology and Soils
- ☐ Mineral Resources
- ☐ Noise
- ☐ Population and Housing
- ☐ Public Services
- ☐ Recreation
- ☐ Transportation
- ☐ Tribal Cultural Resources

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED: *All of the following potential environmental impacts are evaluated in this Initial Study. Categories that are marked have been analyzed in greater detail based on project specific information.*

- ☐ Greenhouse Gas Emissions
- ☐ Hazards and Hazardous Materials
- ☐ Hydrology/Water Supply/Water Quality
- ☐ Land Use and Planning
- ☐ Utilities and Service Systems
- ☐ Wildfire
- ☐ Mandatory Findings of Significance

DISCRETIONARY APPROVAL(S) BEING CONSIDERED:

- ☐ General Plan Amendment
- ☒ Land Division
- ☐ Rezoning
- ☒ Development Permit
- ☐ Sewer Connection Permit
- ☐ Coastal Development Permit
- ☒ Grading Permit
- ☐ Riparian Exception
- ☐ LAFCO Annexation
- ☒ Other: Park Site Review

OTHER PUBLIC AGENCIES WHOSE APPROVAL IS REQUIRED (e.g., permits, financing approval, or participation agreement):

Permit Type/Action	Agency
Construction General Permit	Regional Water Quality Control Board
1602/SAA	California Department of Fish and Wildlife

CONSULTATION WITH NATIVE AMERICAN TRIBES: *Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?*

No California Native American tribes traditionally and culturally affiliated with the area of Santa Cruz County have requested consultation pursuant to Public Resources Code section 21080.3.1.

DETERMINATION:

On the basis of this initial evaluation:

- ☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
- ☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

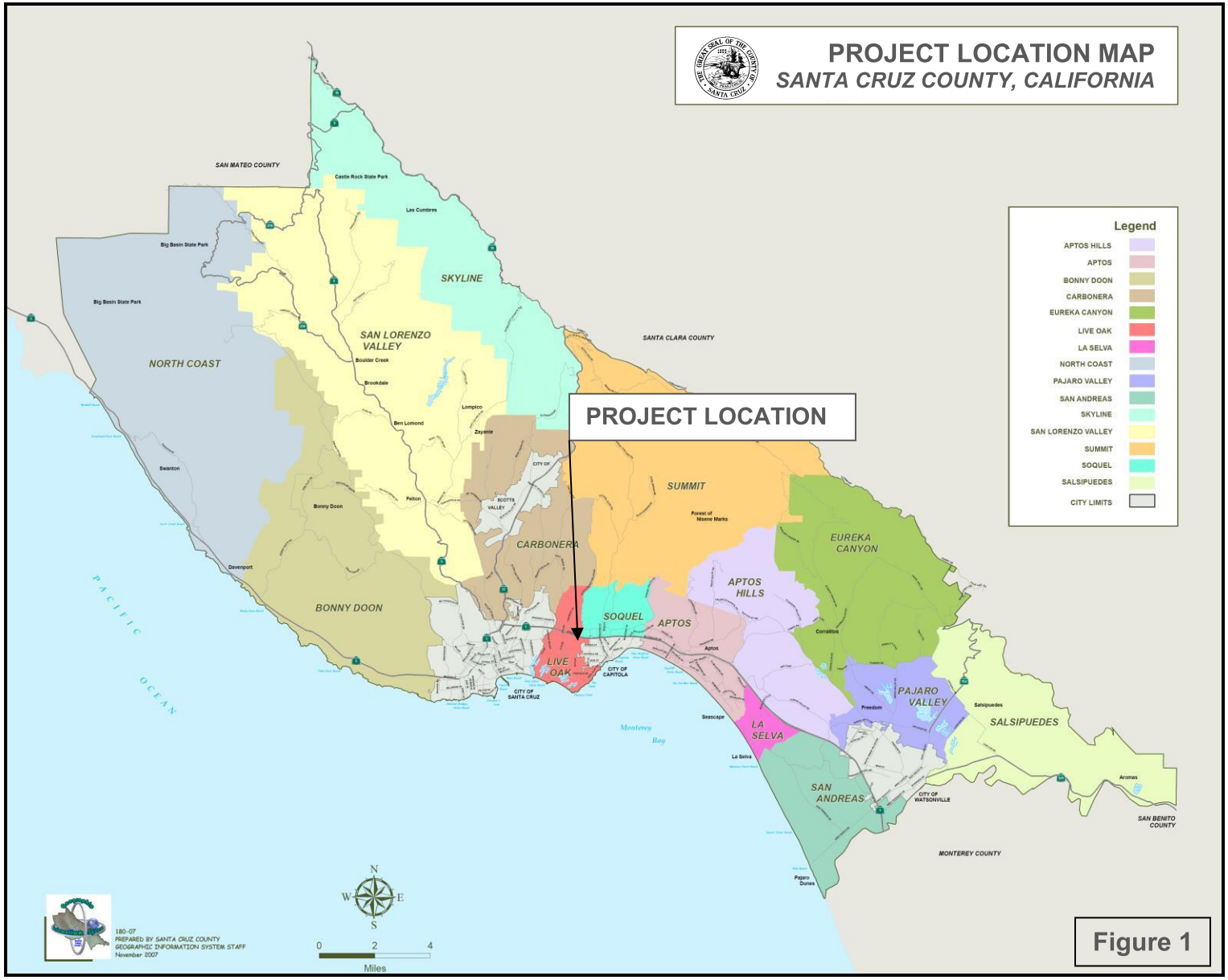
DocuSigned by:
Matt Johnston
B0A04200B3E6413...

MATT JOHNSTON, Environmental Coordinator

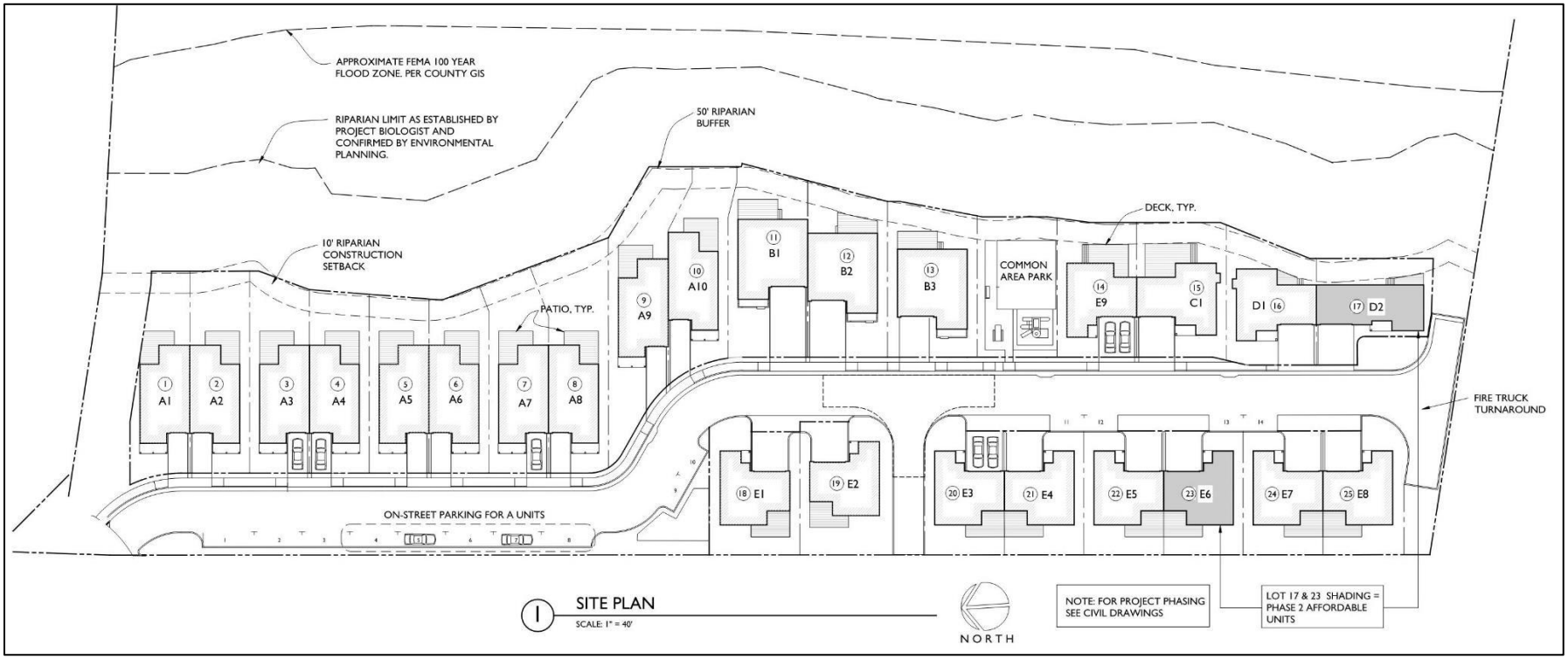
9/11/2024

Date

This page intentionally left blank.



This page intentionally left blank.



Project Site Plan **Figure 2**

This page intentionally left blank.

II. BACKGROUND INFORMATION

EXISTING SITE CONDITIONS:

Project Site Size (acres):	5.92 Acres
Existing Land Use:	Residential
Vegetation:	Oak woodland, riparian woodland, annual grassland, and residential/commercial landscaped areas.

Slope in area affected by project: ☒ 0 - 30% ☐ 31 – 100% ☐ N/A

Nearby Watercourse:	Rodeo Gulch Creek
Distance To:	Varies. Approximately 50 to 60 feet

ENVIRONMENTAL RESOURCES AND CONSTRAINTS:

Water Supply Watershed:	No	Fault Zone:	No
Groundwater Recharge:	Partially Mapped	Scenic Corridor:	No
Timber or Mineral:	No	Historic:	No
Agricultural Resource:	No	Archaeology:	Partially Mapped
Biologically Sensitive Habitat:	Partially Mapped	Noise Constraint:	No
Fire Hazard:	No	Electric Power Lines:	No
Floodplain:	Partially Mapped	Solar Access:	Available
Erosion:	No	Solar Orientation:	Southeast
Landslide:	No	Hazardous Materials:	No
Liquefaction:	High Potential	Other:	None

SERVICES:

Fire Protection:	Central FPD	Drainage District:	Zone 5
School District:	Live Oak	Project Access:	Mattison Lane
Sewage Disposal:	Santa Cruz Sanitation District	Water Supply:	City of Santa Cruz

PLANNING POLICIES:

Zone Districts:	R-1-6-D, R-1-4, PR	Special Designation:	"D" Designated Park Site Combining District
General Plan Designations:	R-UL, R-UM, O-U		
Urban Services Line:	☒ Inside	☐ Outside	
Coastal Zone:	☐ Inside	☒ Outside	

ENVIRONMENTAL SETTING AND SURROUNDING LAND USES:

Natural Environment

Santa Cruz County is uniquely situated along the northern end of Monterey Bay approximately 55 miles south of the City of San Francisco along the Central Coast. The Pacific Ocean and Monterey Bay to the west and south, the mountains inland, and the prime agricultural lands along both the northern and southern coast of the county create limitations on the style and amount of building that can take place. Simultaneously, these natural features create an environment that attracts both visitors and new residents every year. The natural landscape provides the basic features that set Santa Cruz apart from the surrounding counties and require specific accommodations to ensure building is done in a safe, responsible and environmentally respectful manner.

The California Coastal Zone affects nearly one third of the land in the urbanized area of the unincorporated County with special restrictions, regulations, and processing procedures required for development within that area. Steep hillsides require extensive review and engineering to ensure that slopes remain stable, buildings are safe, and water quality is not impacted by increased erosion. The farmland in Santa Cruz County is among the best in the world, and the agriculture industry is a primary economic generator for the County. Preserving this industry in the face of population growth requires that soils best suited to commercial agriculture remain active in crop production rather than converting to other land uses.

PROJECT BACKGROUND:

The project site is located at 2450 Mattison Lane spanning four contiguous parcels [Assessor's Parcel Numbers (APNs) 029-391-01, 02, 03 & 029-061-19]. The site is bounded by townhomes and single-family residential uses and Mattison Lane on the north, residential uses on the south, residential properties on the west, and Rodeo Creek Gulch to the east. The project site is located in a developed area, consisting primarily of low-density residential development with primarily single-family homes. The project site and several adjacent properties are underdeveloped.

The property contains two homes, several abandoned greenhouses and storage structures, trellises, and remnants of a former agricultural property that had two uses: poultry farmstead and nursery. The homes were originally constructed in 1935 and have been highly altered since original construction. The existing impervious surface area on the site is approximately 7,006 square feet. Vegetation on the site consists of oak woodland, riparian woodland, annual grassland, and residential/commercial landscaped areas. The project will remove one oak tree located along the eastern property line. The 11 oak trees that were previously on-site were removed and are considered a project impact.

Prior work has been completed in preparation of the current subdivision application. This work has included pre-application consultations and technical report reviews. Key technical reviews and approvals include:

- Review and acceptance of Geotechnical Report (REV221076)
- Review and conditioned acceptance of Biotic Report Review (REV221075)
- Review and acceptance of Archeological Report Review (REV221074)
- Review and conditioned acceptance of Arborist Report Review (REV221073)

DETAILED PROJECT DESCRIPTION:

The project proposes access off Mattison Lane, via a new road. The proposal would demolish two existing residential dwellings and related outbuildings to construct 24 semi-detached townhomes and one detached townhome ranging from approximately 1,300 square feet to 2,100 square feet in size. Due to limitations within the Rodeo Gulch Sewer Moratorium area in which the project site is located, the project is proposed to be constructed in two phases. The first phase would construct 16-units, and the second phase would construct the remaining nine units if the sewer moratorium is lifted in the future. As shown on the preliminary tentative map, dwellings would each be located on individual lots, for a total of 25 residential townhome lots. All common areas would be located within one common area lot identified as 'Parcel A'.

As proposed, the project would provide four moderate-income units for sale, thus is eligible for a Density Bonus of 40 percent pursuant to California Government Code sections 65615-65918 and SCCC Chapter 17.12, referred to herein collectively as Density Bonus Law. The applicant is proposing to construct one of the bonus units earned, for a total of 25 units.

A formal development permit application for this project was submitted to the County on May 23, 2022, and after review by applicable agencies, the application was deemed complete on February 23rd, 2024, in conformance with the Permit Streamlining Act. On December 13th, 2022, the Santa Cruz County Board of Supervisors adopted the Sustainability Policy and Regulatory Update ("Sustainability Update") after certifying an Environmental Impact Report ("EIR") prepared for the Update. The Sustainability Update was a comprehensive update to the County's General Plan/Local Coastal Program (LCP) and consists of amendments to the County's General Plan/LCP, including four updated General Plan elements, amendments to sections of the Santa Cruz County Code, adoption of County Design Guidelines, and land use and zoning map amendments. On March 15th, 2024, the California Coastal Commission certified the Sustainability Update LCP Amendment. With Coastal Commission certification, the Sustainability Update became effective on March 15th, 2024.

Under the provisions of the Permit Streamlining Act, the Applicant is subject to the version of the County Code in effect when the application was deemed complete; however, the Applicant also has the option to proceed under the provisions of the Sustainability Update. The Application was deemed complete on February 23rd, 2024, predating the Sustainability Update

becoming effective on March 15th, 2024; therefore, the project was originally analyzed under the version of County Code predating the Sustainability Update.

This project requires approval of a Subdivision, Planned Unit Development, Residential Development Permit with Density Bonus, Park Site Review, Roadway/Roadside Exception, and Preliminary Grading Review.

III. ENVIRONMENTAL REVIEW CHECKLIST

A. AESTHETICS AND VISUAL RESOURCES

Except as provided in Public Resources Code section 21099, would the project:

1.	*Have a substantial adverse effect on a scenic vista?*	☐	☐	☐	☒

Discussion: The project is located within an existing developed residential neighborhood within the County's designated Urban Services Line (USL). The site is not located within a scenic vista, such as views from designated scenic roads, Coastal Special Scenic Areas, sites with unique geological areas, or areas with ocean views, agricultural fields, wooded forests, open meadows, ridgetops, or mountain hillside views that are identified as public scenic assets. While the project site is underdeveloped, it is generally surrounded by urban development and not within areas of scenic views. Thus, the project is not located in a scenic area and would not have an adverse effect on a scenic view as none have been identified, mapped or observed that include the project site. The project would not directly impact any public scenic vistas in the area.

2.	*Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?*	☐	☐	☐	☒

Discussion: The project site is not located along a designated state scenic highway, a County-designated scenic road, public viewshed area, scenic corridor, or scenic resource area. Therefore, no impact is anticipated.

3.	*Substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?*	☐	☐	☐	☒

Discussion: The project is designed to be consistent with County Code sections that regulate height, bulk, density, setback, landscaping, and design of new structures in the County, including County Code Chapter 13.11, Site, Architectural and Landscape Design Review, including all applicable design guidelines.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
4. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☒	☐	☐

Discussion: The project would create a potentially significant increase in night lighting. Mitigations have been included to reduce any impacts to less than significant. See Bio-1 in section D.1.

B. AGRICULTURE AND FORESTRY RESOURCES

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:

1. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒

Discussion: The project site does not contain any lands designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency. In addition, the project does not contain Farmland of Local Importance. Therefore, no Prime Farmland, Unique Farmland, Farmland of Statewide or Farmland of Local Importance would be converted to a non-agricultural use. No impact would occur from project implementation.

2. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒

Discussion: The property on which the project is proposed is zoned R-1-6-D, R-1-4, and PR which are not considered to be agricultural zones. Additionally, the project site's land is not under a Williamson Act contract. Therefore, the project does not conflict with existing zoning for agricultural use, or a Williamson Act contract. No impact is anticipated.

California Environmental Quality Act (CEQA) Initial Study/Environmental Checklist	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
3. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒

Discussion: The project is not located near land designated as Timber Resource. Therefore, the project would not affect the resource or access to harvest the resource in the future.

4. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒

Discussion: No forest land occurs on the project site or in the immediate vicinity. See discussion under B-3 above. No impact is anticipated.

5. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Discussion: The project site and surrounding area within a radius of 1.7 miles does not contain any lands designated as Prime Farmland, Unique Farmland, Farmland of Statewide Importance or Farmland of Local Importance as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency. Therefore, no Prime Farmland, Unique Farmland, Farmland of Statewide, or Farmland of Local Importance would be converted to a non-agricultural use. In addition, the project site contains no forest land, and no forest land occurs within 1.75 miles of the project site. Therefore, no impacts are anticipated.

C. AIR QUALITY

The significance criteria established by the Monterey Bay Air Resources District (MBARD)[1] has been relied upon to make the following determinations. Would the project:

1. Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐

[1] Formerly known as the Monterey Bay Unified Air Pollution Control District (MBUAPCD).

Discussion: The project would not conflict with or obstruct any long-range air quality plans of the MBARD. Because general construction activity related emissions (i.e., temporary sources) are accounted for in the emission inventories included in the air quality plans, impacts to air quality plan objectives are less than significant.

General estimated basin-wide construction-related emissions are included in the MBARD emission inventory (which, in part, form the basis for the air quality plans cited below) and are not expected to prevent long-term attainment or maintenance of the ozone and particulate matter standards within the North Central Coast Air Basin (NCCAB). Therefore, temporary construction impacts related to air quality plans for these pollutants from the project would be less than significant, and no mitigation would be required, since they are presently estimated and accounted for in the District's emission inventory, as described below. No stationary sources would be constructed that would be long-term permanent sources of emissions.

The project would result in new long-term operational emissions from vehicle trips (mobile emissions), the use of natural gas (energy source emissions), and consumer products, architectural coatings, and landscape maintenance equipment (area source emissions). Mobile source emissions constitute most operational emissions from this type of land use development project. However, emissions associated with buildout of this type of project is not expected to exceed any applicable MBARD thresholds. No stationary sources would be constructed that would be long-term permanent sources of emissions. Therefore, impacts to regional air quality as a result of long-term operation of the project would be less than significant.

Santa Cruz County is located within the NCCAB. The NCCAB does not meet state standards for ozone (reactive organic gases [ROGs] and nitrogen oxides [NOx]) and fine particulate matter (PM_{10}). Therefore, the regional pollutants of concern that would be emitted by the project are ozone precursors and PM_{10}.

The primary sources of ROG within the air basin are on- and off-road motor vehicles, petroleum production and marketing, solvent evaporation, and prescribed burning. The primary sources of NOx are on- and off-road motor vehicles, stationary source fuel combustion, and industrial processes. In 2010, daily emissions of ROGs were estimated at 63 tons per day. Of this, area-wide sources represented 49%, mobile sources represented 36%, and stationary sources represented 15%. Daily emissions of NOx were estimated at 54 tons per day with 69% from mobile sources, 22% from stationary sources, and 9% from area-wide sources. In addition, the region is "NOx sensitive," meaning that ozone formation due to local emissions is more limited by the availability of NOx as opposed to the availability of ROGs (MBUAPCD, 2013b).

PM_{10} is the other major pollutant of concern for the NCCAB. In the NCCAB, highest particulate levels and most frequent violations occur in the coastal corridor. In this area, fugitive dust from various geological and man-made sources combines to exceed the standard. The majority of NCCAB exceedances occur at coastal sites, where sea salt is often the main factor causing exceedance. In 2005 daily emissions of PM_{10} were estimated at 102 tons per day. Of this, entrained road dust represented 35% of all PM_{10} emission, windblown dust 20%, agricultural tilling operations 15%, waste burning 17%, construction 4%, and mobile sources, industrial processes, and other sources made up 9% (MBUAPCD, 2008).

Given the modest amount of new traffic that would be generated by the project there is no indication that new emissions of ROGs or NOx would exceed MBARD thresholds for these pollutants; and therefore, there would not be a significant contribution to an existing air quality violation.

Project construction may result in a short term, localized decrease in air quality due to generation of PM_{10}. However, standard dust control best management practices (BMPs), such as periodic watering, would be implemented during construction to avoid significant air quality impacts from the generation of PM_{10}.

Emissions from construction activities represent temporary impacts that are typically short in duration, depending on the size, phasing, and type of project. Air quality impacts can nevertheless be acute during construction periods, resulting in significant localized impacts to air quality. Table 1 summarizes the threshold of significance for construction activities.

Table 1: Construction Activity with Potentially Significant Impacts from Pollutant PM_{10}

Activity	Potential Threshold*
Construction site with minimal earthmoving	8.1 acres per day
Construction site with earthmoving (grading, excavation)	2.2 acres per day

*Based on Midwest Research Institute, Improvement of Specific Emission Factors (1995). Assumes 21.75 working weekdays per month and daily watering of site.

Note: Construction projects below the screening level thresholds shown above are assumed to be below the **82 lb/day threshold of significance**, while projects with activity levels higher than those above may have a significant impact on air quality. Additional mitigation and analysis of the project impact may be necessary for those construction activities.

Source: Monterey Bay Unified Air Pollution Control District, 2008.

Impacts

Construction

As required by the MBARD, construction activities (e.g., excavation, grading, on-site vehicles) which directly generate 82 pounds per day or more of PM_{10} would have a significant impact on local air quality when they are located nearby and upwind of sensitive receptors such as the community of Live Oak (Table 1). Construction projects below the screening level thresholds shown in Table 1 are assumed to be below the 82 lb/day threshold of

significance, while projects with activity levels higher than those thresholds may have a significant impact on air quality. The proposed project would require minimal grading. Although the project would produce PM_{10}, it would be far below the 82 pounds per day threshold. This would result in less than significant impacts on air quality from the generation of PM_{10}.

Construction projects using typical construction equipment such as dump trucks, scrapers, bulldozers, compactors, and front-end loaders that temporarily emit precursors of ozone (i.e., volatile organic compounds [VOC] or oxides of nitrogen [NOx]), are accommodated in the emission inventories of state- and federally-required air plans and would not have a significant impact on the attainment and maintenance of ozone ambient air quality standard (AAQS) (MBUAPCD 2008).

Although not a mitigation measure per se (i.e., required by law), California ultralow sulfur diesel fuel with a maximum sulfur content of 15 ppm by weight will be used in all diesel-powered equipment, which minimizes sulfur dioxide and particulate matter.

The following BMPs will be implemented during all site excavation and grading.

Operation

Recommended Measures

- No mitigation is required. However, MBARD recommends the use of the following BMPs for the control of short-term construction generated emissions: Water all active construction areas at least twice daily as necessary and indicated by soil and air conditions.
- Prohibit all grading during periods of high wind (over 15 mph).
- Apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction projects that are unused for at least four consecutive days)
- Apply non-toxic binders (e.g., latex acrylic copolymer) to exposed areas after cut and fill operations and hydroseed areas.
- Haul trucks shall maintain at least 2' 0" freeboard.
- Cover all trucks hauling soil, sand, and other loose materials.
- Plant tree windbreaks on the windward perimeter of construction projects if adjacent to open land.
- Plant vegetative ground cover in disturbed areas as quickly as possible.
- Cover inactive storage piles.
- Install wheel washers at the entrance to construction sites for all existing trucks.
- Pave all roads on construction sites.
- Sweep streets, if visible soil material is carried out from the construction site.

- Post a publicly visible sign which specifies the telephone number and person to contact regarding dust complaints. This person shall respond to complaints and corrective action within 48 hours. The phone number of the Monterey Bay Air Resources District shall be visible to ensure compliance with Rule 402 (Nuisance),
- Limit the area under construction at any one time.

Implementation of the above recommended BMPs for the control of construction-related emissions would further reduce construction-related particulate emissions. These measures are not required by MBARD or as mitigation measures, as the impact would be less than significant without mitigation. These types of measures are commonly included as conditions of approval associated with development permits approved by the County.

2.	*Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?*	☐	☐	☒	☐

Discussion: The primary pollutants of concern for the NCCAB are ozone and PM_{10}, as those are the pollutants for which the district is in nonattainment. Project construction would have a limited and temporary potential to contribute to existing violations of California air quality standards for ozone and PM_{10} primarily through diesel engine exhaust and fugitive dust. The criteria for assessing cumulative impacts on localized air quality are the same as those for assessing individual project impacts. Projects that do not exceed MBARD's construction or operational thresholds and are consistent with the AQMP would not have cumulatively considerable impacts on regional air quality (MBARD, 2008). Because the project would not exceed MBARD's thresholds and is consistent with the AQMP, there would not be cumulative impacts on regional air quality.

3.	*Expose sensitive receptors to substantial pollutant concentrations?*	☐	☐	☒	☐

Discussion: The project site is located within the Urban Services Line in an area of existing residential development.

The proposed residential subdivision project would not generate substantial pollutant concentrations. Emissions from construction activities represent temporary impacts that are typically short in duration. Impacts to sensitive receptors would be less than significant.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
4. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

Discussion: Land uses typically producing objectionable odors include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding. The proposed project does not include any uses that would be associated with objectionable odors. Odor emissions from the proposed project would be limited to odors associated with vehicle and engine exhaust and idling from cars entering, parking, and exiting the facility. The project does not include any known sources of objectionable odors associated with the long-term operations phase.

During construction activities, only short-term, temporary odors from vehicle exhaust and construction equipment engines would occur. California ultralow sulfur diesel fuel with a maximum sulfur content of 15 ppm by weight would be used in all diesel-powered equipment, which minimizes emissions of sulfurous gases (sulfur dioxide, hydrogen sulfide, carbon disulfide, and carbonyl sulfide). As the project site is in a coastal area that contains coastal breezes off of the Monterey Bay, construction-related odors would disperse and dissipate and would not cause substantial odors. Construction-related odors would be short-term and would cease upon completion. Therefore, no objectionable odors are anticipated from construction activities associated with the project.

The project would not create objectionable odors affecting a substantial number of people; therefore, the project is not expected to result in significant impacts related to objectionable odors during construction or operation.

D. BIOLOGICAL RESOURCES

Would the project:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, or U.S. Fish and Wildlife Service?	☐	☒	☐	☐

Discussion: The project site is located in an area of biotic concern. A biotic report was prepared for this project by Biotic Resources Group, dated October 25, 2023. This report has been reviewed and conditionally accepted by the Planning Department Environmental Section (Attachment 2).

Special-Status Species

Focused rare plant surveys were not conducted as part of this biotic review. The biotic report concludes that the project site lacks suitable habitat components (specialized plant communities, substrate and/or microhabitat) for most special-status plant species that occur in the region. However, the presence or absence of some species cannot be definitively determined without a survey conducted during the appropriate blooming period. Protective measures for rare plants are included in the mitigations below.

The eucalyptus trees on the parcel were evaluated for their potential to host overwintering monarchs. This grove has not been recorded as a monarch butterfly overwintering site. The grove is relatively small and lacks habitat components needed for monarch overwintering such as adequate shelter from winds and variable microclimates. The proposed project is not expected to negatively impact western monarchs.

Rodeo Gulch Creek and its riparian corridor support potential habitat for special-status wildlife including the following State Species of Special Concern: yellow warbler, western red bat, San Francisco dusky-footed woodrat, Santa Cruz black salamander, and California giant salamander. Woodrat houses were observed in the riparian woodland and may be present in/near the work area for the storm drain and energy dissipator. Ponded areas within the creek channel could provide habitat for western pond turtles, a Federal Candidate species, which may breed in suitable locations along the creek banks.

Protected bats may roost in the empty outbuildings by entering through cracks and openings observed on the outside of the structures. In addition, trees within and immediately adjacent to the Study Area provide potential roosting habitat for protected bats and nesting habitat for birds of prey, and migratory birds protected under the California Fish and Game Code, and the Federal Migratory Bird Treaty Act (MBTA). Under the MBTA, it is "unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill" a migratory bird unless and except as permitted by regulations.

Mitigations have been included below to ensure that proposed development will avoid and minimize impacts to special-status species during and after project construction.

Conclusion

There are sensitive habitat constraints on the project site associated with riparian woodland, oak woodland, and habitat for protected species that must be considered prior to and during project implementation and with ongoing use of the site. Mitigations have been included below to ensure that proposed development will avoid and minimize impacts to remaining sensitive habitats and special-status species and to compensate for permanent loss of oak woodland and riparian habitats resulting from the project.

The Mitigations below shall be incorporated as conditions of approval into all phases of development for this project and shall also apply to all future development activities engaged in on the property. Environmental Planning Staff will review all future development plans and building permit applications to ensure conformance with the mitigations and conditions of approval set forth in this biotic review.

The avoidance and minimization measures in the biotic report, and conditions of approval in the County biotic approval letter have been incorporated into the mitigation measures below to reduce project related impacts to less than significant.

Mitigation Measures

The following mitigation measures would reduce significant impacts to a less than significant level.

BIO-1: To reduce potential impacts to sensitive habitats and special-status species that may result from artificial light, the following shall be adhered to:

A. The project shall avoid the installation of any non-essential artificial lighting. If artificial lighting is necessary, the project shall avoid or limit the use of artificial lights during the hours of dawn and dusk, when many wildlife species are most active.
B. All essential outdoor lighting shall be limited through the use of timers and/or motion sensors.
C. All essential outdoor lighting shall be shielded, cast downward, and directed such that it does not shine off the property into surrounding areas, other parcels, or the night sky.

2. *Have a substantial adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies, regulations (e.g., wetland, native grassland, special forests, intertidal zone, etc.) or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?*	☐	☒	☐	☐

Elements of the proposed project overlap with existing and former Coast live oak woodland and the riparian corridor of Rodeo Gulch Creek. Coast live oak woodland, riparian corridors, aquatic habitats, and habitat for special-status species are considered sensitive under Santa Cruz County's Sensitive Habitat Protection Ordinance (Chapter 16.32). Biological Resources including special-status species and their habitats and other sensitive natural communities as identified by local policies, California Department of Fish and Wildlife (CDFW), or United States Fish and Wildlife Service (USFWS) are also protected under the California

Environmental Quality Act (CEQA), the California Endangered Species Act, the Federal Endangered Species Act.

Aquatic habitats and their riparian corridors (as defined by Santa Cruz County Code Section 16.30.030) are granted additional special protections under the County's Riparian Corridor and Wetlands Protection ordinance (Chapter 16.30). Development activities are prohibited within Riparian Corridors unless Riparian Exception Findings (SCCC 16.30.060) are met, and a Riparian Exception is approved by County Planning, or the activities are otherwise exempt.

Many aquatic habitats are also regulated under the Clean Water Act Section 404 by U. S. Army Corps of Engineers (USACE) below the ordinary high-water mark (OHWM), and Section 401 by the Regional Water Quality Control Board (RWQCB). The bed and banks are regulated under California Fish and Game Code Section 1602 and may be subject to regulation under the Porter-Cologne Water Quality Act as "Waters of the State".

Sensitive Habitats

The Project Site is currently dominated by non-native grassland and previously disturbed/developed areas where mature trees have already been removed. The project maintains a required 50-foot-wide riparian buffer between the residential houses and the riparian woodland/top-of-bank.

The proposed storm drainage system for the project will encroach into the riparian corridor of Rodeo Gulch Creek. Permanent impacts to existing riparian woodland will occur from installation of this system. Approximately 74 square feet (0.002 acre) of riparian vegetation will be permanently impacted, and an additional 440 square feet (0.01 acre) of riparian woodland will be temporarily impacted through removal and/or trimming of riparian vegetation for construction access.

Permanent impacts to riparian habitat must be mitigated through on-site restoration of riparian habitat at a 3:1 ratio of restoration to impacts. All temporarily impacted areas must be restored at a 1:1 ratio through active planting of riparian species.

During preliminary review of the proposed project in 2021 for Design Review Group (DRG) #211191, Environmental Planning (EP) Staff determined that the Project Site contains sensitive habitat as defined by the County's Sensitive Habitat Protection and Riparian Corridor and Wetlands Protection ordinances (Chapters 16.30 and 16.32). A Biotic Report dated December 13, 2013 and an Arborist Report dated March 16, 2021 were submitted as part of the 2021 DRG. The 2013 Biotic Report was submitted in 2022 with discretionary application #221077 and reviewed by the Planning Staff Biologist under REV221075. This report was expired, and an updated Biotic Report was required.

The 2013 report identifies oak groves within the project footprint and evaluates removal of 12 oak trees that would result from the proposed project. The Updated Biotic Report dated

December 8, 2022, discusses removal of oak trees that occurred on the property since the 2013 report was prepared. During a site visit made on July 18, 2023, Environmental Planning Staff observed evidence of tree removal on the property. Additional information about the details of this tree removal was requested in the August 1, 2023, Environmental Planning Request for Additional Information. The attached 2023 Updated Biotic Report and Arborist Addendum confirm that eleven oak trees ranging in size from 8" DBH to 40" DBH (approximately 0.25-acre oak woodland canopy) were removed from the proposed Project Site in early 2021.

The applicant was advised in Environmental Planning Comments prepared for Design Review Group (DRG) #211191 dated July 13, 2021, Environmental Planning Review Comments dated June 15, 2022, and April 27, 2023, and two Environmental Planning Requests for Additional Information related to this Biotic Report Review dated August 9, 2022, and August 1, 2023, that mature oak trees on the property must be preserved and protected in place. Because of the potential for alternative configurations for development that would avoid and/or minimize impacts to the remaining oak trees on the property, the project applicant was directed to design a project such that earthwork would not occur within the critical root zone of existing oak trees.

In 2023 the project design was re-configured to reduce impacts to one remaining 24" DBH oak tree (identified in the Arborist Report as T4). The Arborist Addendum includes a revised impact assessment including the eleven trees that were removed in 2021 and evaluates project impacts on the remaining trees on the property based on the latest project design. The report concludes that T4 can be preserved in place and that removal of one additional 8" DBH oak tree (T1) is required.

Eleven mature coast live oak trees were removed from the Project Site without permits in 2021. The project proposes to remove one additional oak tree. The Biotic Report estimates a total impact area of 0.31 acres of impact to oak woodland by calculating the canopy spread of 1) the extant woodland proposed for removal, 2) area of oak woodland previously removed in 2021, and 3) temporary impacts beneath the canopy of trees to be retained. In addition, construction activities and permanent development are proposed within the dripline of existing oak trees around the perimeter of the development and on adjacent parcels (including Trees T4 and T11). Grading or trenching could cause direct mortality or decline of these trees after construction is complete. Recommendations included in the Arborist Report for protection of existing oak trees must be adhered to.

To reduce impacts to less than significant, oak trees removed or otherwise permanently impacted as a result of the project, including the eleven oak trees removed from the Study Area in 2021, must be replaced in-kind at the following compensation ratios determined by

the Environmental Coordinator, based upon standards established by the California Department of Fish and Wildlife:

(1) trees less than 5 inches diameter at breast height (DBH) should be replaced at 2:1;

(2) trees between 5 and 11.5 inches DBH should be replaced at 3:1;

(3) trees between 12 and 23.5 inches DBH should be replaced at 5:1;

(4) trees 24 inches or greater DBH should be replaced at 10:1.

Based on review of the attached reports and current project plans, the Environmental Coordinator has estimated a total of 62 trees required to be planted (4 trees at the 3:1 ratio, 6 trees at 5:1, and 2 trees at 10:1). If there is not adequate room on site to plant all the required replacement oak trees in a configuration that creates a healthy oak woodland habitat, the restoration plan must identify an off-site location for these required plantings with property owner approval for a deed restricted mitigation site. As a last resort, the project may propose to pay into a County approved in-leu fee program if such a program is available.

Mitigations are included below to ensure protection of the remaining native oak trees during project construction and ongoing use of the site as well as to compensate for permanent loss of oak woodland and project inconsistencies with local policies and ordinances.

Mitigation Measures

The following mitigation measures would reduce significant impacts to a less than significant level.

BIO-2: The final plans shall include the following:

A. The development footprint shall be delineated on the final project plans with a thick bold solid line. All temporary and permanent disturbance associated with the project including all grading, vegetation removal, buildings, utilities, paving, landscaping, access routes, and deposition of refuse or debris shall be within the delineated development footprint. Everything outside of the development footprint shall be marked on the plans as sensitive habitat and fenced for avoidance during construction.
B. The final project plans shall clearly designate and label the entire portion of "Parcel A" east of the 50' riparian buffer line as "Protected Habitat Area".
C. A plan sheet showing protected trees plotted and tree protection specifications. Measures to reduce impacts to retained trees shall be included in the final project plans.
D. A plan sheet showing the mitigation planting areas as required in the Mitigations below. The 20' wide sanitation easement and the in the 25' storm drain easement shall be shown on this plan sheet where mitigation tree plantings may not occur.

BIO-3: To comply with Santa Cruz County General Plan Policy 5.1.12 (ARC-3.2.1) and SCCC Section 16.32.090 (B)(3), and to compensate for permanent loss of oak woodland habitat and riparian woodland habitat, the following shall be adhered to:

A. Oak trees removed as a result of this project (including the 11 trees removed prior to this biotic review) shall be mitigated through replacement plantings in kind either onsite or at an approved offsite location at the following ratios:
   1. Trees less than 5 inches diameter at breast height (DBH) shall be replaced at 2:1;
   2. Trees between 5 and 11.5 inches DBH shall be replaced at 3:1;
   3. Trees between 12 and 23.5 inches DBH shall be replaced at 5:1;
   4. Trees 24 inches or greater DBH shall be replaced at 10:1.

B. Based on review of the attached reports and current project plans, the Environmental Coordinator has estimated a minimum of 62 oak trees must be planted (4 trees at the 3:1 ratio, 6 trees at 5:1, and 2 trees at 10:1).

C. The project applicant may propose to pay into a County approved in-lieu fee program for oak tree removal compensation if such a program is available. This option must be considered only as a last resort and must be approved by the Environmental Coordinator. Alternative options considered and determined infeasible must be discussed in the Habitat Restoration and Mitigation Plan.

D. Permanent impacts to riparian habitat shall be mitigated through on-site restoration of riparian habitat at a 3:1 ratio of restoration to impacts. All temporarily impacted areas must be restored at a 1:1 ratio through active planting of riparian species. Riparian mitigation sites must be located within areas appropriate for riparian vegetation such as areas that are contiguous to and affected by the hydrology of the creek or another source of hydrology.

E. Riparian enhancement and/or restoration activities (i.e. removal and ongoing management of invasive species) commensurate with the proposed development shall occur within the existing riparian corridor located along the eastern portion of the Study Area.

<u>Prior to Recordation of the Final Subdivision Map</u>

BIO-4: All Portions of Parcel A east of the 50-foot riparian buffer line shall be identified as "Protected Habitat Area" on the final subdivision map where development shall not occur in the future. The final subdivision map shall include the following notes:

A. No development as defined in Chapter 16.32 of the County Code (including, without limitation, removal of trees and other vegetation, grading, paving, installation of structures such as signs, buildings, or other structures of similar impact) shall occur within the Protected Habitat Areas with the exception of the following, subject to the Planning Director's review and approval:

1. The removal of hazardous substances or conditions or non-native or diseased plants or trees provided that such activities have been reviewed and approved by the Planning Director and determined as not involving the unnecessary disturbance of indigenous ground cover or native wildlife;
2. Habitat restoration activities as outlined in the approved Habitat Restoration and Mitigation Plan including habitat management strategies to control re-establishment of invasive non-native species and maintain healthy native habitat.

BIO-5. A Habitat Restoration and Mitigation Plan prepared by a qualified biologist or restoration specialist shall be submitted for review and approval by Environmental Planning Staff prior to recordation of the final subdivision map. The establishment and planting of all restoration areas as outlined in this Plan must be completed prior to final inspection of the subdivision improvements for Phase I of the project. The Plan shall be focused on restoring and maintaining native plant structure and species composition of oak woodland and riparian habitats at the required ratios listed in BIO-3 above and must include the following minimum elements:

A. A map identifying Parcel A east of the 50' riparian buffer line as "Protected Habitat Area" where development shall not occur in the future.
B. A map of all designated restoration areas on site. Restoration areas shall include areas intended for oak woodland habitat restoration, riparian habitat restoration, and areas designated for riparian enhancement and/or restoration activities.
    1. Please note that plantings for mitigation cannot be located in the 25' drainage easement or the 20' sanitation easement. Both of these easements must be shown on the restoration maps and planting plans.
C. A planting plan with species, size, and locations of all restoration plantings that will occur on site. The sizes and distribution of restoration plantings shall be determined by the restoration specialist with the goal of establishing native plant structure and species composition of healthy habitat while maximizing plant health and survivability of individual plants.
    1. The planting plan shall include as many of the 62 replacement trees required under BIO-3A above as can be planted on-site while maintaining this goal. If there is not adequate room on site to plant all the required replacement oak trees in a configuration that creates a healthy oak woodland habitat, the remaining plantings shall occur at a designated off-site location.
D. Identification of any off-site location required for replacement oak tree plantings including a map of all designated restoration areas on that site and a planting plan with species, size, and locations of all restoration plantings.

1. Property owner approval for a deed restricted mitigation site must be provided for any off-site mitigation locations. An agreement for ongoing access to monitor and maintain the plantings for the required monitoring period must also be included.

E. If applicable as outlined in BIO-3C above, a proposal to pay into a County approved in-leu fee program for oak tree removal compensation including a discussion of the alternative options that were considered.

F. Plan for removal of non-native species on the parcel and a management strategy to control re-establishment of invasive non-native species.

G. Plan for riparian enhancement and/or restoration activities within the existing riparian corridor including methods for removal and ongoing management of invasive species and establishment or re-establishment of native habitat which may include specific treatments to promote natural re-establishment.

H. Information regarding the methods of irrigation for restoration plantings.

I. A plan showing the placement of split rail fencing and location of signs as needed to delineate the Protected Habitat Areas in the field and prevent trespassing. The location of fencing and number and location of protective signs shall be confirmed by the biologist based on site conditions and maximum protection of these habitat areas.

J. Any seed mix used for erosion control purposes on temporarily impacted areas and exposed soils shall be limited to seeds of native species common to the surrounding habitat and/or sterile seeds.

K. A 5-year Management Plan for maintenance and monitoring of restored areas, including a proposed mechanism for evaluating success.

BIO-6: Annual reports outlining the progress and success of the restoration and monitoring shall be submitted to the County Restoration Coordinator: restoration.coordinator@santacruzcountyca.gov by December 31 of each monitoring year.

BIO-7: In addition to the required 5-year annual monitoring and reporting, a 10-year monitoring report shall be prepared and submitted to the County Restoration Coordinator: restoration.coordinator@santacruzcounty.us outlining the continued implementation and results of Habitat Restoration and Mitigation Plan over the 10-year period.

Prior to Permit Issuance

BIO-8: A focused rare plant survey shall be completed during the identifiable period for all special-status plants with potential to occur and submitted with the permit application for subdivision improvements for Phase I of the project for review and approval by Environmental Planning.

A. If no special-status plants are found, no additional protective measures are required.

B. If any special-status plant is found present in the project impact area, the population shall be mapped and avoided as a sensitive habitat area as outlined in BIO-9 below.
   1. If avoidance is not possible, project construction may not commence until additional biotic approval from County Planning is received. Additional impact analysis (demonstrating adequate avoidance, minimization, and mitigation) shall be completed and reviewed by County Planning. Additional environmental analysis may be required based on the results of this review and analysis.

Construction Conditions

BIO-9: To protect sensitive habitats and special-status species during project related construction activities, the following shall be adhered to:

A. Prior to any site disturbance, a pre-construction meeting shall be conducted. The purpose of the meeting will be to ensure that the biotic Conditions of Approval are communicated to the various parties responsible for constructing the project. The meeting shall involve all relevant parties including the project proponent, construction supervisor, Environmental Planning Staff, the project biologist, and the project arborist.
B. Every individual working on the Project must attend biological awareness training prior to working on the job site. The training shall be delivered by a qualified biologist and shall include information regarding the location and identification of sensitive habitats and all special-status species with potential to occur in the project area, the importance of avoiding impacts to special-status species and sensitive habitats, and the steps necessary if any special-status species is encountered at any time.
C. Prior to commencement of construction, high visibility fencing and/or flagging shall be installed with the assistance of a qualified biologist around all sensitive habitat areas to indicate the limits of work and prevent inadvertent grading or other disturbance within the adjacent sensitive habitat.
   1. No work-related activity including equipment staging, vehicular access, grading and/or vegetation removal shall be allowed outside the designated limits of work.
   2. Native trees to be retained near or within the project impact area shall be identified, protected with high visibility fencing at or outside of the dripline, and avoided during construction as sensitive habitat unless additional protection measures, provided by a qualified arborist, have been reviewed and approval by Environmental Planning Staff.
   3. The fencing shall be inspected and maintained daily until project completion.
   4. A qualified biologist shall be on site to monitor vegetation removal and initial ground disturbance activities that occur within the riparian corridor (including

clearing and grubbing) to identify and recover any special-status species that may be found.

5. If a special-status animal is identified at any time prior to or during construction, work shall cease immediately in the vicinity of the individual. The animal shall either be allowed to move out of harm's way on its own or a qualified biologist shall move the animal out of harm's way to a safe relocation site. The biologist shall be allowed enough time to move any special-status species from the site before work activities begin. All sitings of special-status species shall be reported to the County Environmental Coordinator and submitted to the CNDDB.
6. If a western pond turtle egg clutch is discovered at any time prior to or during construction, work in the vicinity of the egg clutch shall be halted immediately. Unless otherwise advised by CDFW, the nest location shall be protected with high visibility fencing under the guidance of a qualified biologist and shall be avoided until the biologist determines that the clutch has hatched, and individuals are no longer likely to be injured by work activities.
7. The following Recommended Avoidance and Minimization measures BIO-1, BIO-2, BIO -5, and BIO-7 of the attached Biotic Report dated Updated October 25, 2023, prepared by Biotic Resources Group shall be adhered to. ***(Note: The recommended mitigation numbering from the report below does not conform with the initial study mitigation numbering presented in this document. They are provided here for reference to the attached biotic report).***
    a. BIO-1. Dusky-footed Woodrat. Retain all woodrat houses (middens) on the property. No earlier than two weeks prior to the start of project activities, a qualified biologist should perform a pre-construction survey for woodrat houses within the project work boundaries and a 25-foot buffer around the project site perimeter. Flag and establish buffers around each woodrat house observed. The buffer width will be determined by the qualified biologist, but will not be less than 5 feet. If a woodrat house is present and impacts cannot be avoided, then a qualified biologist shall contact CDFW for approval to implement a woodrat relocation plan. This could involve live trapping and the construction of alternate houses in adjacent suitable habitat. The woodrat relocation plan must be implemented by a qualified biologist possessing a Scientific Collection Permit authorizing the handling of woodrats. Authorization by CDFW must be obtained prior to the implementation of this measure. Post-relocation monitoring may be required by CDFW, as part of the plan.
    b. BIO-2. Bats. Removal of trees and abandoned buildings could result in the loss of roost sites or abandonment of bat roosts through noise or vibrations. Maternity roosts are most important as negative impacts can have broad, far-

reaching effects, since such roosts are critical for reproduction and can support multiple generations of bats. No more than 30 days prior to demolition/tree removal, the applicant should hire a bat ecologist to investigate the interior of the outbuildings to determine if any bats have been using the structures. The bat ecologist should also check the oak trees to determine if any have cavities suitable for bat roosts. If there is no evidence of bat use (e.g., guano or observation of individuals), then the openings shall be secured/covered to prevent bats from entering prior to demolition and no further mitigation will be required. If bat use is detected, then schedule outbuilding demolition and tree removal to occur between August 15 and February 1 of any given year to avoid the bat breeding season for this part of the central coast. In addition, the bat ecologist shall conduct a focused survey no more than two weeks (14 days) prior to structure demolition and tree removal to determine if bats are currently using either. If no bats are occupying the outbuildings or tree cavities, then demolition may proceed. If bats are observed using the outbuildings or tree cavities, then the bat ecologist, in coordination with CDFW, will recommend methods to either allow bats to leave the outbuildings and trees and not return (exclusion devices), or other methods specific to this demolition project to avoid harm to individual bats. Trees without cavities may have foliage roosting bats occasionally. To avoid harm to individual bats, trees shall be cut down and allowed to lie on the ground for 24 hours prior to chipping, to allow any foliage roosting bats to leave on their own.

c. BIO-5. Oak Trees. Avoid construction/development within the dripline of oak woodland vegetation that is to be retained. Implement protective measures around all retained oak trees, as directed by an arborist. Measures may include protective fencing, supervised pruning of limbs and roots, other measures as determined by the arborist.

d. BIO-7. Nesting Birds. To avoid impacting nesting birds, if present, schedule tree removal and construction to occur between August 1 and March 1 of any given year, which is outside the bird nesting season. If tree removal and/or construction is to occur within the bird breeding season (March 1 - July 31), perform pre-construction nesting bird surveys within one week before the scheduled start of the project. The nesting survey should be performed by a qualified biologist and cover the entire property, since potential nesting raptors may require buffers at a minimum of 300 feet. In the event active nests are observed, the nest site shall be flagged and a buffer shall be established, in an effort to prevent nest failure. The buffer widths shall be determined by the qualified biologist, based on species, site conditions and anticipated construction activities. Active nests should be monitored at a frequency

determined by the monitoring biologist, but at a minimum of once per week, until the nestlings have fledged. In the event that construction activities appear to be interfering with nest maintenance (e.g., feedings and incubation), then the buffers should be enlarged or construction activities postponed, until the young have fledged, as determined by the qualified biologist.

8. A brief memo summarizing the results of the preconstruction surveys outlined above in XII BIO-1, BIO-2 and BIO-7 shall be submitted to the Environmental Coordinator for review prior to start of construction.
9. Impacts to oak trees shall be avoided to the maximum extent possible. All Tree Protection Guidelines and Restrictions listed in the attached Arborist Report prepared by Kurt Fouts, shall be adhered to.

Prior to Final

BIO-10: Prior to final inspection of the subdivision improvements for Phase I of the project, the following shall occur:

A. Establishment and planting of all restoration areas as outlined in the final approved Habitat Restoration and Mitigation Plan and placement of protective fencing and signs around the Protected Habitat Area shall be inspected and approved by Environmental Planning staff.
B. Receipt of full payment into any approved in-lieu fee program must be provided to the County.

3.	*Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?*	☐	☐	☐	☒

Discussion: There are no mapped or designated federally protected wetlands on or adjacent to the project site. Therefore, no impacts would occur from project implementation.

4.	*Interfere substantially with the movement of any native resident or migratory fish or wildlife species or migratory wildlife corridors, or impede the use of native wildlife nursery sites?*	☐	☐	☐	☒

Discussion: The project does not involve any activities that would interfere with the movements or migrations of fish or wildlife or impede use of a known wildlife nursery site.

5. Conflict with any local policies or ordinances protecting biological resources (such as the Sensitive Habitat Ordinance, Riparian and Wetland Protection Ordinance, and the Significant Tree Protection Ordinance)?	☐	☒	☐	☐

Discussion: Removal of oak woodland without biotic approval is a violation of the rules and regulations set forth in Chapter 16.32 of the County Code to protect sensitive habitats [16.32.130(A)]. This project is therefore in conflict with local policies and ordinances protecting biological resources. To address this violation, mitigation measures as described above in Sections D.1 and D.2. are required to reduce impacts to a less than significant level.

6. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Discussion: The project would not conflict with the provisions of any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Therefore, no impact would occur.

E. CULTURAL RESOURCES

Would the project:

1. Cause a substantial adverse change in the significance of a historical resource pursuant to CEQA Guidelines Section 15064.5?	☐	☐	☐	☒

Discussion: The existing structures on the property are not designated as a historic resource on any federal, state or local inventory. As a result, no impacts to historical resources would occur from project implementation.

2. Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5?	☐	☐	☒	☐

Discussion: According to the Cultural Resource Assessment Report, dated April 2018 and the Extended Phase 1 Cultural Resource Inventory Report, dated August 2023 prepared by Albion Environmental, there is no evidence of pre-historic cultural resources. However, pursuant to section 16.40.040 of the SCCC, if archeological resources are uncovered during

construction, the responsible persons shall immediately cease and desist from all further site excavation and comply with the notification procedures given in SCCC Chapter 16.40.040.

Pursuant to section 16.40.040 of the SCCC, if archaeological resources are uncovered during construction, the responsible persons shall immediately cease and desist from all further site excavation and comply with the notification procedures given in SCCC Chapter 16.40.

3.	*Disturb any human remains, including those interred outside of dedicated cemeteries?*	☐	☐	☒	☐

Discussion: Impacts are expected to be less than significant. However, pursuant to section 16.40.040 of the SCCC, and California Health and Safety Code sections 7050.5-7054, if at any time during site preparation, excavation, or other ground disturbance associated with this project, human remains are discovered, the responsible persons shall immediately cease and desist from all further site excavation and notify the Sheriff-Coroner and the Planning Director. If the coroner determines that the remains are not of recent origin, a full archaeological report shall be prepared, and representatives of local Native American Indian groups shall be contacted. If it is determined that the remains are Native American, the Native American Heritage Commission will be notified as required by law. The Commission will designate a Most Likely Descendant who will be authorized to provide recommendations for management of the Native American human remains. Pursuant to Public Resources Code section 5097, the descendants shall complete their inspection and make recommendations or preferences for treatment within 48 hours of being granted access to the site. Disturbance shall not resume until the significance of the resource is determined and appropriate mitigations to preserve the resource on the site are established.

F. ENERGY

Would the project:

1.	*Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?*	☐	☐	☒	☐

Discussion: The project, like all development, would be responsible for an incremental increase in the consumption of energy resources during site grading and construction due to onsite construction equipment and materials processing during construction phases. All project construction equipment would be required to comply with the California Air Resources Board (CARB) emissions requirements for construction equipment, which includes

measures to reduce fuel-consumption, such as imposing limits on idling and requiring older engines and equipment to be retired, replaced, or repowered. In addition, the project would comply with General Plan policy 8.2.2, which requires all new development to be sited and designed to minimize site disturbance and grading. As a result, impacts associated with the small temporary increase in consumption of fuel during construction are expected to be less than significant.

In addition, the County has strategies to help reduce energy consumption and greenhouse gas (GHG) emissions. These strategies included in the *County of Santa Cruz Climate Action Strategy* (County of Santa Cruz, 2013) are outlined below.

Strategies for the Reduction of Energy Use and GHG Emissions

- Develop a Community Choice Aggregation (CCA) Program, if feasible.[2]
- Increase energy efficiency in new and existing buildings and facilities.
- Enhance and expand the Green Business Program.
- Increase local renewable energy generation.
- Public education about climate change and impacts of individual actions.
- Continue to improve the Green Building Program by exceeding the minimum standards of the state green building code (Cal Green).
- Form partnerships and cooperative agreements among local governments, educational institutions, nongovernmental organizations, and private businesses as a cost-effective way to facilitate mitigation and adaptation.
- Reduce energy use for water supply through water conservation strategies.

Strategies for the Reduction of Energy Consumption and GHG Emissions from Transportation

- Reduce vehicle miles traveled (VMT) through County and regional long-range planning efforts.
- Increase bicycle ridership and walking through incentive programs and investment in bicycle and pedestrian infrastructure and safety programs.
- Provide infrastructure to support zero and low emissions vehicles (plug in, hybrid plug-in vehicles).
- Increase employee use of alternative commute modes: bus transit, walking, bicycling, carpooling, etc.
- Increase the number of electric and alternative fuels vehicles in the County fleet.

[2] Monterey Bay Community Power (MBCP) was formed in 2017 to provide carbon-free electricity. All Pacific Gas & Electric Company (PG&E) customers in unincorporated Santa Cruz County were automatically enrolled in the MBCP in 2018.

Therefore, the project will not result in wasteful, inefficient, or unnecessary consumption of energy resources. Impacts are expected to be less than significant.

2.	*Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?*	☐	☐	☒	☐

Discussion: AMBAG's 2040 Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) recommends policies that achieve statewide goals established by CARB, the California Transportation Plan 2040, and other transportation-related policies and state senate bills. The SCS element of the MTP targets transportation-related greenhouse gas (GHG) emissions in particular, which can also serve to address energy use by coordinating land use and transportation planning decisions to create a more energy efficient transportation system.

The Santa Cruz County Regional Transportation Commission (SCCRTC) prepares a County-specific regional transportation plan (RTP) in conformance with the latest AMBAG MTP/SCS. The 2040 RTP establishes targets to implement statewide policies at the local level, such as reducing vehicle miles traveled and improving speed consistency to reduce fuel consumption.

In 2013, Santa Cruz County adopted a Climate Action Strategy (CAS) focused on reducing the emission of greenhouse gases, which is dependent on increasing energy efficiency and the use of renewable energy. The strategy intends to reduce energy consumption and greenhouse gas emissions by implementing a number of measures such as reducing vehicle miles traveled through County and regional long-range planning efforts, increasing energy efficiency in new and existing buildings and facilities, increasing local renewable energy generation, improving the Green Building Program by exceeding minimum state standards, reducing energy use for water supply through water conservation strategies, and providing infrastructure to support zero and low emission vehicles that reduce gasoline and diesel consumption, such as plug in electric and hybrid plug in vehicles.

In addition, the Santa Cruz County General Plan has historically placed a priority on "smart growth" by focusing growth in the urban areas through the creation and maintenance of an urban services line. Objective 2.1 (Urban/Rural Distinction) directs most residential development to the urban areas, limits growth, supports compact development, and helps reduce sprawl. The Circulation Element of the General Plan further establishes a more

efficient transportation system through goals that promote the wise use of energy resources, reducing vehicle miles traveled, and transit and active transportation options.

Energy efficiency is a major priority throughout the County's General Plan. Measure C was adopted by the voters of Santa Cruz County in 1990 and explicitly established energy conservation as one of the County's objectives. The initiative was implemented by Objective 5.17 (Energy Conservation) and includes policies that support energy efficiency, conservation, and encourage the development of renewable energy resources. Goal 6 of the Housing Element also promotes energy efficient building code standards for residential structures constructed in the County.

The project will be consistent with the AMBAG 2040 MTP/SCS and the SCCRTC 2040 RTP. The project would also be required to comply with the Santa Cruz County General Plan and any implemented policies and programs established through the CAS. In addition, the project design would be required to comply with CALGreen, the state of California's green building code, to meet all mandatory energy efficiency standards. Therefore, the project would not conflict with or obstruct any state or local plan for renewable energy or energy efficiency.

G. GEOLOGY AND SOILS

Would the project:

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
1.	*Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:*				
A.	*Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.*	☐	☐	☒	☐
B.	*Strong seismic ground shaking?*	☐	☐	☒	☐
C.	*Seismic-related ground failure, including liquefaction?*	☐	☐	☒	☐
D.	*Landslides?*	☐	☐	☒	☐

Discussion (A through D): All of Santa Cruz County is subject to some hazard from earthquakes, and there are several faults within the County. While the San Andreas fault is larger and considered more active, each fault is capable of generating moderate to severe ground shaking from a major earthquake. Consequently, large earthquakes can be expected in the future. The October 17, 1989 Loma Prieta earthquake (magnitude 7.1) was the second largest earthquake in central California history.

The project site is located outside of the limits of the State Alquist-Priolo Special Studies Zone or any County-mapped fault zone (County of Santa Cruz GIS Mapping, California Division of Mines and Geology, 2001). The closest faults to the project site are the San Andreas Fault (approximately 9 miles northeast), Zayante-Vergeles Fault (approximately 6 miles northeast), Monterey Bay-Tularcitos Fault (approximately 9 miles southwest), and San Gregorio Fault (approximately 12 miles west-southwest). An updated geotechnical investigation for the project was performed by Dees and Associates, dated February 7, 2024 (Attachment 3). The report concluded that potentially liquefiable soil layers are between 10 and 25 feet below the ground surface. Total seismic settlements are predicted to be on the order of 2.5 to 3 inches. The investigation provides seismic design and other recommendations. In accordance with County requirements, a project geotechnical investigation was performed, and implementation of recommendations would be considered application of a uniformly applied development standard. The project would be designed and constructed in accordance with the California Building Code and recommendations of the subject geotechnical investigation reports. There is no indication that landsliding is a significant hazard at this site. Therefore, impacts associated with geologic hazards will be less than significant.

2.	*Result in substantial soil erosion or the loss of topsoil?*	☐	☐	☒	☐

Discussion: Some potential for erosion exists during the construction phase of the project, however, this potential is minimal because the site is not steeply sloped and standard erosion controls are a required condition of the project. Prior to approval of a grading or building permit, the project must have an approved stormwater pollution control plan (SCCC Section 7.79.100), which would specify detailed erosion and sedimentation control measures. The plan would include provisions for disturbed areas to be planted with ground cover and to be maintained to minimize surface erosion. Impacts from soil erosion or loss of topsoil would be considered less than significant.

3.	*Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral*	☐	☐	☒	☐

spreading, subsidence, liquefaction, or collapse?

Discussion: The report cited above (see discussion under G-1) concluded that there is a potential risk from liquefaction. Liquefaction could cause ground settlement and sand boils to occur. There is a low potential for lateral spreading and soil strength loss due to the density of the soils. Sand boils are caused when water pressures are relieved at the ground surface and the upward movement of groundwater causes soil to rise to the ground surface creating a mound of soil at the surface. There is a potential for sand boils to develop at the ground surface. Sand boils will not adversely affect the proposed structure foundations but sand boils may cause movement and cracking in thin slab and pavement sections. The recommendations contained in the geotechnical report, including the use of mat slab foundations designs will be implemented to adequately reduce this potential hazard to a less than significant level.

4.	*Be located on expansive soil, as defined in section 1803.5.3 of the California Building Code (2016), creating substantial direct or indirect risks to life or property?*	☐	☐	☐	☒

Discussion: The geotechnical report for the project did not identify any elevated direct or indirect risks associated with expansive soils. Therefore, no impact is anticipated.

5.	*Have soils incapable of adequately supporting the use of septic tanks, leach fields, or alternative waste water disposal systems where sewers are not available for the disposal of waste water?*	☐	☐	☒	☐

Discussion: No septic systems are proposed. The project would connect to the Santa Cruz County Sanitation District, and the applicant would be required to pay standard sewer connection and service fees that fund sanitation improvements within the district as a Condition of Approval for the project.

6.	*Directly or indirectly destroy a unique paleontological resource or site of unique geologic feature?*	☐	☐	☒	☐

Discussion: No unique paleontological resources or sites or unique geologic features are known to occur in the vicinity of the project. A query was conducted of the mapping of identified geologic/paleontological resources maintained by the County of Santa Cruz Planning Department, and there are no records of paleontological or geological resources in the vicinity of the project parcel. No direct or indirect impacts are anticipated.

H. GREENHOUSE GAS EMISSIONS

Would the project:

1. *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?*	☐	☐	☒	☐

Discussion: The project, like all development, would be responsible for an incremental increase in greenhouse gas (GHG) emissions by usage of fossil fuels during the site grading and construction. In 2013, Santa Cruz County adopted a Climate Action Strategy (CAS) intended to establish specific emission reduction goals and necessary actions to reduce greenhouse gas levels to pre-1990 levels as required under Assembly Bill (AB) 32 legislation. The strategy intends to reduce GHG emissions and energy consumption by implementing measures such as reducing vehicle miles traveled through the County and regional long-range planning efforts and increasing energy efficiency in new and existing buildings and facilities. Implementing the CAS, the MBCP was formed in 2017 to provide carbon-free electricity. All PG&E customers in unincorporated Santa Cruz County were automatically enrolled in the MBCP in 2018. All project construction equipment would be required to comply with the CARB emissions requirements for construction equipment. Further, all new buildings are required to meet the State's CalGreen building code. As a result, impacts associated with the temporary increase in GHG emissions are expected to be less than significant.

2. *Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?*	☐	☐	☒	☐

Discussion: See the discussion under H-1 above. No significant impacts are anticipated.

I. HAZARDS AND HAZARDOUS MATERIALS

Would the project:

1. *Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?*	☐	☐	☒	☐

Discussion: The project would not create a significant hazard to the public or the environment. No routine transport or disposal of hazardous materials is proposed. However, during construction, fuel would be used at the project site. Best management practices would be used to ensure that no impacts would occur. Impacts are expected to be less than significant.

2. *Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?*	☐	☐	☒	☐

Discussion: See discussion under I-1 above. Project impacts would be considered less than significant.

3. *Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?*	☐	☐	☐	☒

Discussion: The Live Oak Elementary is located 1916 Capitola Road, approximately 0.4 miles to the west of the project site. Although fueling of equipment is likely to occur within the staging area, BMPs to contain spills would be implemented. No impacts are anticipated.

4. *Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?*	☐	☐	☐	☒

Discussion: The project site is not included on the list of hazardous sites in Santa Cruz County compiled pursuant to Government Code section 65962.5. No impacts are anticipated from project implementation.

5. *For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?*	☐	☐	☐	☒

Discussion: The project is not located within two miles of a public airport or public use airport. No impact is anticipated.

6. *Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?*	☐	☐	☐	☒

Discussion: The project would not conflict with implementation of the County of Santa Cruz Local Hazard Mitigation Plan 2015-2020 (County of Santa Cruz, 2020). Therefore, no impacts to an adopted emergency response plan or evacuation plan would occur from project implementation.

7.	*Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?*	☐	☐	☒	☐

Discussion: See discussion under Wildfire Question T-2. The project would not expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires. No impact would occur.

J. HYDROLOGY, WATER SUPPLY, AND WATER QUALITY

Would the project:

1.	*Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?*	☐	☐	☒	☐

Discussion: The project would not discharge runoff either directly or indirectly into a public or private water supply. However, runoff from this project may contain small amounts of chemicals and other household contaminants, such as pathogens, pesticides, trash, and nutrients. No commercial or industrial activities are proposed that would contribute contaminants. Potential siltation from the project would be addressed through implementation of erosion control BMPs. No water quality standards or waste discharge requirements would be violated and surface or ground water quality would not otherwise be substantially degraded. Impacts would be less than significant.

2.	*Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?*	☐	☐	☒	☐

Discussion: The project would obtain water from the City of Santa Cruz Water District and would not rely on private well water. Although the project would incrementally increase water demand, the City of Santa Cruz Water District has indicated that adequate supplies are available to serve the project (Attachment 4).

Although the project site is partially located within a mapped groundwater recharge area, the proposal would be consistent with General Plan policies 5.8.2 (Land Division and Density Requirements in Primary Groundwater Recharge Areas), 5.8.3 (Uses in Primary Groundwater Recharge Areas), and 5.8.4 (Drainage Design in Primary Groundwater Recharge Areas).

The project site is not located in a mapped water supply watershed. The project will not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin. Impacts would be less than significant.

3.	*Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:*	☐	☐	☒	☐
	A. *result in substantial erosion or siltation on- or off-site;*	☐	☐	☒	☐
	B. *substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;*	☐	☐	☒	☐
	C. *create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or;*	☐	☐	☒	☐
	D. *impede or redirect flood flows?*	☐	☐	☒	☐

Discussion: The County Department of Public Works Stormwater Management Section staff has reviewed and approved the proposed drainage plan prepared for the project. The project is consistent with SCCC section 7.79.070, which states, "No person shall make any unpermitted alterations to drainage patterns or modifications to the storm drain system or any channel that is part of receiving waters of the county. No person shall deposit fill, debris, or other material in the storm drain system, a drainage channel, or on the banks of a drainage channel where it might enter the storm drain system or receiving waters and divert or impede flow." The Project will not substantially alter the existing drainage pattern of the site in a

manner that would result in erosion or siltation, or an increase in runoff from the site. The stormwater runoff rate from the property would be controlled by a new collection pipe network and outfall structure after passing through an array of bioretention/detention facilities with outlet control structures. The project would be conditioned to ensure all requirements of the Department of Public Works Stormwater Management Section are met. Impacts would be less than significant.

4.	*In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?*	☐	☐	☐	☒

***Discussion*:**

Flood Hazards:

According to the Federal Emergency Management Agency (FEMA) National Flood Insurance Rate Map, dated May 16, 2012, no portion of the project site for which development is proposed lies within a flood hazard zone, and there would be no impact.

Tsunami and Seiche Zones:

There are two primary types of tsunami vulnerability in Santa Cruz County. The first is a teletsunami or distant source tsunami from elsewhere in the Pacific Ocean. This type of tsunami is capable of causing significant destruction in Santa Cruz County. However, this type of tsunami would usually allow time for the Tsunami Warning System for the Pacific Ocean to warn threatened coastal areas in time for evacuation (County of Santa Cruz 2010).

A greater risk to the County of Santa Cruz is a tsunami generated as the result of an earthquake along one of the many earthquake faults in the region. Even a moderate earthquake could cause a local source tsunami from submarine landsliding in Monterey Bay. A local source tsunami generated by an earthquake on any of the faults affecting Santa Cruz County would arrive just minutes after the initial shock. The lack of warning time from such a nearby event would result in higher causalities than if it were a distant tsunami (County of Santa Cruz 2010).

Seiches are recurrent waves oscillating back and forth in an enclosed or semi-enclosed body of water. They are typically caused by strong winds, storm fronts, or earthquakes.

The project site is located approximately 1.4 miles inland, approximately 0.3 to 1 mile beyond the effects of a tsunami. The project site is located approximately 1.25 miles from Corcoran Lagoon and would not be affected by a seiche. Therefore, there would be no impact.

5.	*Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?*	☐	☐	☐	☒

Discussion: All County water agencies are experiencing a lack of sustainable water supply due to groundwater overdraft and diminished availability of streamflow. Because of this, coordinated water resource management has been of primary concern to the County and to the various water agencies. As required by state law, each of the County's water agencies serving more than 3,000 connections must update their Urban Water Management Plans (UWMPs) every five years, with the most recent updates completed in 2016.

County staff are working with the water agencies on various integrated regional water management programs to provide for sustainable water supply and protection of the environment. Effective water conservation programs have reduced overall water demand in the past 15 years, despite continuing growth. In August 2014, the Board of Supervisors and other agencies adopted the Santa Cruz Integrated Regional Water Management (IRWM) Plan Update 2014, which identifies various strategies and projects to address the current water resource challenges of the region. Other efforts underway or under consideration are stormwater management, groundwater recharge enhancement, increased wastewater reuse, and transfer of water among agencies to provide for more efficient and reliable use.

The County is also working closely with water agencies to implement the Sustainable Groundwater Management Act (SGMA) of 2014. By January 2020, Groundwater Sustainability Plans will be developed for two basins in Santa Cruz County that are designated as critically overdrafted, Santa Cruz Mid-County and Corralitos - Pajaro Valley. These plans will require management actions by all users of each basin to reduce pumping, develop supplemental supplies, and take management actions to achieve groundwater sustainability by 2040. A management plan for the Santa Margarita Basin will be completed by 2022, with sustainability to be achieved by 2042.

The project is located in the Santa Cruz Mid-County Groundwater Basin.

In 2016, Soquel Creek Water District (SqCWD), Central Water District (CWD), County, and City of Santa Cruz adopted a Joint Powers Agreement to form the Santa Cruz Mid-County Groundwater Agency for management of the Mid-County Basin under SGMA. SqCWD developed its own Community Water Plan and has been actively evaluating supplemental supply and demand reduction options.

Since the sustainable groundwater management plan is still being developed, the project will comply with SCCC Chapters 13.13 (Water Conservation – Water Efficient Landscaping), 7.69 (Water Conservation) and 7.70 (Water Wells), as well as Chapter 7.71 (Water Systems) section 7.71.130 (Water use measurement and reporting), to ensure that it will not conflict with or obstruct implementation of current water quality control plans or sustainable groundwater management plans such as the Santa Cruz IRWMP and UWMP for the City of Santa Cruz Water District.

K. LAND USE AND PLANNING

Would the project:

1.	*Physically divide an established community?*	☐	☐	☐	☒

Discussion: The project does not include any element that would physically divide an established community. No impact would occur.

2.	*Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?*	☐	☐	☐	☒

Discussion: The project would not cause a significant environmental impact due to a conflict with any land use plan, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect. The project would also seek an overriding finding of public necessity and or benefit per General Plan Policy No. 3.12.1 for proposed Level of Service impacts. No impacts are anticipated.

L. MINERAL RESOURCES

Would the project:

1.	*Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?*	☐	☐	☐	☒

Discussion: The site does not contain any known mineral resources that would be of value to the region and the residents of the state. Therefore, no impact is anticipated from project implementation.

2.	*Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?*	☐	☐	☐	☒

Discussion: The project site is zoned R-1-6-D, PR, and R-1-4, which is not considered to be an Extractive Use Zone (M-3) nor does it have a land use designation with a Quarry Designation Overlay (Q) (County of Santa Cruz 1994). Therefore, no potentially significant loss of availability of a known mineral resource of locally important mineral resource recovery (extraction) site delineated on a local general plan, specific plan or other land use plan would occur as a result of this project.

M. NOISE

Would the project result in:

1.	*Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?*	☐	☐	☒	☐

***Discussion*:**

County of Santa Cruz General Plan

The County of Santa Cruz has not adopted noise thresholds for construction noise. The following applicable noise related policy is found in the Noise Element of the Santa Cruz County General Plan (Santa Cruz County 2020).

The General Plan contains the following tables, which specifies the acceptable range of noise exposure by land use type (Table 9-2) and maximum allowable noise exposure for stationary noise sources (Table 9-3).

Table 9-2
Acceptable through Unacceptable Ranges of Noise Exposure by Land Use*
**Outdoor noise exposure measured at the property line of receiving land use*

	LAND USE	COMMUNITY NOISE EXPOSURE DNL or CNEL, dB					
		55	60	65	70	75	80
A	Residential/Lodging – Single Family, Duplex, Mobile Home,					■	■
B	Schools, Libraries, Religious Institutions, Meeting Halls,					■	■
C	Outdoor Sports Arena or Facility, Playgrounds,						■
D	Office Buildings, Business Commercial and Professional						■
E	Industrial, Manufacturing, Utilities, Agriculture						
	NORMALLY ACCEPTABLE: Specific land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements, and can meet the indoor noise standards.						

	CONDITIONALLY ACCEPTABLE: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design to meet interior and exterior noise standards, where applicable.
	NORMALLY UNACCEPTABLE: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design to meet interior and exterior noise standards, where applicable.
■	**CLEARLY UNACCEPTABLE**: New construction or development should generally not be undertaken.

Based on Draft General Plan Guidelines published by the California State Office of Planning and Research, 2014.

Table 9-3 Maximum Allowable Noise Exposure
Stationary Noise Sources[1]

	Daytime[5] (7 AM to 10 PM)	Nighttime[2,5] (10 PM to 7 AM)
Hourly Leq – average hourly noise level, dB [3]	50	45
Maximum level, dB [3]	70	65
Maximum level dB – Impulsive Noise [4]	65	60

dB = decibel

(1) As determined at the property line of the receiving land use. When determining the effectiveness of noise mitigation measures, the standards may be applied on the receptor side of noise barriers or other property line noise mitigation measures
(2) Applies only where the receiving land use operate or is occupied during nighttime hours
(3) Sound level measurements shall be made with "slow" meter response
(4) Sound level measurements shall be made with "fast" meter response
(5) Allowable levels shall be raised to the ambient noise levels where the ambient levels exceed the allowable levels. Allowable levels shall be reduced 5 dB if the ambient hourly Leq is at least 10 dB lower than the allowable level.

County of Santa Cruz Code

There are no County of Santa Cruz ordinances that specifically regulate construction or operational noise levels. However, Section 13.15.050(A) (General noise regulation and unlawful noise) of the SCCC contains the following language regarding noise impacts:

(A) No use, except a temporary construction operation, shall be permitted which creates noise which is found by the Planning Commission not to conform to the noise parameters established by Table 9-2 and Table 9-3 of the Santa Cruz County General Plan beyond the boundaries of the project site at standard atmospheric pressure.

Further, SCCC 13.10.040(A) (Exceptions) limits construction hours as follows:

(A) Noise sources normally and reasonably associated with construction, repair, remodeling, or grading of any real property, provided a permit has been obtained from the County as required, and provided said activities take place between the hours of 8:00 a.m. and 5:00 p.m. on weekdays unless the Building Official has in advance authorized said activities to start at 7:00 a.m. and/or continue no later than 7:00 p.m. Such activities shall not take place on Saturdays unless the Building Official has in advance authorized said activities, and provided said activities take place between 9:00 a.m. and 5:00 p.m. and no more than three Saturdays per month. Such activities shall not take place on Sunday or a federal holiday unless the Building Official has in advance authorized such work on a Sunday or federal holiday, or during earlier morning or later evening hours of a weekday or Saturday.

Sensitive Receptors

Some land uses are generally regarded as being more sensitive to noise than others due to the type of population groups or activities involved. Sensitive population groups generally include children and the elderly. Noise sensitive land uses typically include all residential uses (single- and multi-family, mobile homes, dormitories, and similar uses), hospitals, nursing homes, schools, and parks.

The nearest sensitive receptors, neighboring dwellings, are located approximately 20 feet to the west of the project area.

Impacts

Potential Temporary Construction Noise Impacts

The use of construction equipment to accomplish the project would result in noise in the project area, i.e., construction zone. Table 3 shows typical noise levels for common construction equipment.

Table 3: Typical Noise Levels for Common Construction Equipment (at 50 feet)	
Equipment	**L_{max} (dBA)**
Air Compressor	80
Backhoe	80
Chain Saw	85
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Saw	90
Crane	83
Dozer	85
Dump Truck	84
Excavator	85
Flat Bed Truck	84
Fork Lift	75
Generator	82
Grader	85
Hoe-ram	90
Jack Hammer	88
Loader	80
Paver	85
Pick-up Truck	55
Pneumatic Tool	85
Roller	85
Tree Chipper	87
Truck	84
Source: Federal Transit Authority, 2006, 2018.	

The sources of noise that are normally measured at 50 feet, are used to determine the noise levels at nearby sensitive receptors by attenuating 6 dB for each doubling of distance for point sources of noise such as operating construction equipment. Noise levels at the nearest sensitive receptors for each site were analyzed on a worst-case basis, using the equipment with the highest noise level expected to be used.

Although construction activities would likely occur during daytime hours, noise may be audible to nearby residents. However, periods of noise exposure would be temporary. Noise from construction activity may vary substantially on a day-to-day basis.

Construction activity would be expected to use equipment listed in Table 3. Based on the activities proposed for the project, the equipment with the loudest operating noise level that would be used often during activity would be an excavator or cement mixer, which would produce noise levels of 85 dBA at a distance of 50 feet. The nearest sensitive receptor is located approximately 20 feet from the construction site. At that distance, the decibel level will not be reduced. However, these impacts would be temporary (24 weeks) and short in duration due to time restrictions on building and grading permits issued by the County of Santa Cruz. All construction activities would be restricted to the hours of 8am to 5pm Monday through Friday.

Noise generated during project construction would increase the ambient noise levels in adjacent areas. Construction would be temporary and given the limited duration of this impact it is considered to be less than significant.

2.	*Generation of excessive groundborne vibration or groundborne noise levels?*	☐	☐	☒	☐

Discussion: The use of construction and grading equipment would potentially generate periodic vibration in the project area. This impact would be temporary and periodic and is not expected to cause damage; therefore, impacts are not expected to be significant.

3.	*For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?*	☐	☐	☐	☒

Discussion: The project is not in the vicinity of a private airstrip or within two miles of a public airport. Therefore, the project would not expose people residing or working in the project area. No impact is anticipated.

N. POPULATION AND HOUSING

Would the project:

1.	*Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?*	☐	☐	☒	☐

Discussion: The project is designed at the density and intensity of development allowed by Density Bonus Law and the General Plan and zoning designations for the project site. The project site is located within the Urban Services Line and would be served by existing utility districts. The property is adjacent to other parcels that are connected to an urban level of services. Consequently, the project is not expected to have a significant growth-inducing effect. Impacts would be less than significant.

2.	*Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?*	☐	☐	☒	☐

Discussion: Although the project includes the demolition of two housing units, the project's purpose is to construct 25 townhomes including four affordable units. The project would not displace a substantial number of people, and impacts would be less than significant.

O. PUBLIC SERVICES

Would the project:

1.	*Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:*				
	a. *Fire protection?*	☐	☐	☒	☐
	b. *Police protection?*	☐	☐	☒	☐
	c. *Schools?*	☐	☐	☒	☐
	d. *Parks?*	☐	☐	☒	☐
	e. *Other public facilities; including the maintenance of roads?*	☐	☐	☒	☐

Discussion (a through e): While the project represents an incremental contribution to the need for services, the increase would be minimal. Moreover, the project meets all of the standards and requirements identified by the local fire agency or California Department of Forestry, as applicable, and school, park, and transportation fees to be paid by the applicant would be used to offset the incremental increase in demand for school and recreational facilities and public roads. Impacts would be considered less than significant.

P. RECREATION

Would the project:

1.	*Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?*	☐	☐	☒	☐

Discussion: The project would not substantially increase the use of existing neighborhood and regional parks or other recreational facilities. Impacts would be considered less than significant.

2. *Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?*	☐	☐	☒	☐

Discussion: The project does not propose the expansion or require the construction of additional recreational facilities. No impact would occur.

Q. TRANSPORTATION

Would the project:

1. *Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?*	☐	☐	☒	☐

Discussion:

Senate Bill (SB) 743, signed by Governor Jerry Brown in 2013, changed the way transportation impacts are identified under CEQA. Specifically, the legislation directed the State of California's Office of Planning and Research (OPR) to look at different metrics for identifying transportation impacts. OPR issued its "Technical Advisory on Evaluating Transportation Impacts in CEQA" (December 2018) to assist practitioners in implementing the CEQA Guidelines revisions to use vehicle miles traveled (VMT) as the preferred metric for assessing passenger vehicle related impacts. The CEQA Guidelines were also updated in December 2018, such that vehicle level of service (LOS) will no longer be used as a determinant of significant environmental impacts, and an analysis of Vehicle Miles Traveled (VMT) will be required as of July 2020. A discussion of consistency with the Santa Cruz County General Plan LOS policy is provide below for informational purposes only.

Santa Cruz County General Plan Policy 3.12.1 establishes a desired LOS of C and a minimum LOS of D. A transportation study for the project was prepared by Hexagon Transportation Consultants, Inc., dated October 4, 2022 (Attachment 5). As described in the transportation study, the project would generate approximately 166 net new daily trips and 12 p.m. peak trips. The added project trips to the southbound approach at the Maciel Avenue/Capitola Road intersection would increase the critical movement by more than one percent under project conditions, which would create an operational deficiency. However, the intersection would not meet signal warrant requirements, and no other feasible improvements are available. The project would seek an overriding finding of public necessity and or benefit per General Plan Policy No. 3.12.1 for proposed Level of Service impacts. The Department of Public Works has reviewed the transportation study and has established the following fees/improvements to address operations and design of the project: the development is subject

Live Oak Transportation Improvement (TIA) fees at the current rate within the County Unified Fee Schedule, currently $6,000 for each dwelling unit. The subdivision proposes 25 lots and there are two existing houses, therefore, the fee is calculated as 23 multiplied by $6000 per lot for a total of $138,000. The total TIA fee payment of $138,000 is to be split evenly between Transportation Improvement fees and Roadside Improvement fees would be required. This information is provided for background discussion only and not for determination of impacts.

The project design would comply with current road requirements, including the regulations under section 13.11.074 of the County Code, "Access, circulation and parking" to prevent potential hazards to motorists, bicyclists, and/or pedestrians, as well as the County of Santa Cruz Department of Public Works Design Criteria. In addition, the site plan shows that the project is proposing to implement a sidewalk that would connect the townhouses to the existing sidewalks on Mattison Lane. The sidewalk would run along the east side of the new road within the project site. The site plan also shows a proposed pedestrian and bicycle access lane would be provided on the west side of the project site that allows for a connection to an adjacent development that fronts Maciel Avenue. This connection would set in place a pedestrian and bicycle connection to Maciel Avenue when the adjacent property develops, which would provide continuous sidewalk access to the bus stop on Capitola Road, which is about 1,000 feet away. Therefore, impacts would be less than significant.

2.	*Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)(1) (Vehicle Miles Traveled)?*	☐	☒	☐	☐

Discussion: In response to the passage of Senate Bill 743 in 2013 and other climate change strategies, OPR amended the CEQA Guidelines to replace LOS with VMT as the measurement for transportation impacts. The "Technical Advisory on Evaluating Transportation Impacts in CEQA," prepared by OPR (2018) provides recommended thresholds and methodologies for assessing impacts of new developments on VMT. There are also a number of screening criteria recommended by OPR that can be used to determine whether a project will have a less-than-significant impact. The screening criteria include projects that generate less than 110 net new trips, map-based screening, projects within a ½ mile of high quality transit, affordable housing projects, and local serving retail. Since Santa Cruz County has a Regional Transportation Planning Authority and generally conducts transportation planning activities countywide, the county inclusive of the cities is considered a region.

In June of 2020, the County of Santa Cruz adopted a threshold of 15% below the existing countywide average per capita VMT levels for residential projects, 15% below the existing

countywide average per employee VMT for office and other employee-based projects, no net increase in the countywide average VMT for retail projects, and no net increase in VMT for other projects. Based on the countywide travel demand model the current countywide average per capita VMT for residential uses is 10.2 miles. The current countywide per employee average VMT for the service sector (including office land uses) is 8.9 miles, for the agricultural sector is 15.4, for the industrial sector is 13.9, and for the public sector is 8.2. Therefore, the current VMT thresholds for land use projects are 8.7 miles per capita for residential projects. For employee-based land uses the current thresholds are: 7.6 miles per employee for office and services projects, 13.1 miles per employee for agricultural projects, 11.8 miles per employee for industrial projects, and 7 miles per employee for public sector land use projects. The threshold for retail projects and all other land uses is no net increase in VMT. For mixed-use projects, each land use is evaluated separately unless they are determined to be insignificant to the total VMT.

A transportation study for the project was prepared by Hexagon Transportation Consultants, Inc., dated October 4, 2022 (Attachment 5), which included a VMT analysis. A project may indicate a significant transportation impact if the anticipated VMT exceeds 85 percent of existing County-wide average VMT per capita. The VMT threshold for Santa Cruz County is 8.7 daily VMT per capita, which is 15 percent below the existing County-side average VMT level. Based on trip generation and map-based screening, the project requires a VMT analysis. The project proposes to implement the following TDM measures that would reduce the VMT impact.

Mitigation Measures:

TR-1 The following measures will be required to reduce VMT by encouraging active transportation in the project area with improvements to pedestrian and bicycle networks and facilities, including:

- Construction of a new sidewalk within the project site that would connect the townhouses to the existing sidewalks on Mattison Lane.
- A pedestrian and bicycle access lane would be provided on the west side of the project site that allows for connection to an adjacent development that fronts on Maciel Avenue. This connection would set in place a pedestrian and bicycle connection to Maciel Avenue when the adjacent property develops, which would then provide a continuous sidewalk access to the bus stops on Capitola Road, which is about 1,000 feet away.
- Currently, Maciel Avenue does not have bicycle infrastructure to encourage bicycling to various points of interest. The project would contribute to

implementing bike sharrows along Mattison Lane and Maciel Avenue to provide access to bicycle lanes and transit on Capitola Road.

- The project would implement bike facility measures to reduce VMT of the project. A bicycle repair station would be installed in the parklet on the project site to reduce VMT of the project. The bicycle repair station can provide repair tools and space to use them and would support the continual use of bicycles for transportation in and out of the project site.
- A 20-foot wide pedestrian and bicycle easement would be established to provide access to a future pedestrian and bicycle bridge that would span across Rodeo Creek Gulch to Coffee Lane Park. This would result in increased bicycle and pedestrian connectivity from the project site to the regional multimodal network, along with access to the regional transit network and commercial/activity centers such as Capitola Mall.

3.	*Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?*	☐	☐	☐	☒

Discussion: The proposed development would result in 25 parcels and the construction of 25 townhomes in a residential neighborhood. The project would take access from Mattison Lane, which meets all County standards. No impacts would occur with project implementation.

4.	*Result in inadequate emergency access?*	☐	☐	☒	☐

Discussion: The project's road access meets County standards and has been approved by the local fire agency or California Department of Forestry, as appropriate.

A temporary lane closure may be required for short periods of time during project construction. A traffic control plan would be prepared. However, the project would not restrict emergency access for police, fire, or other emergency vehicles. Impacts would be less than significant from project implementation.

R. TRIBAL CULTURAL RESOURCES

1. *Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:*

A.	*Listed or eligible for listing in the California Register of Historical Resources, or in a local register of*	☐	☐	☒	☐

historical resources Code section 5020.1(k), or

B. *A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.* ☐ ☐ ☒ ☐

Discussion: The project proposes to establish a 25-unit townhouse development. Section 21080.3.1(b) of the California Public Resources Code (AB 52) requires a lead agency formally notify a California Native American tribe that is traditionally and culturally affiliated within the geographic area of the discretionary project when formally requested. As of this writing, no California Native American tribes traditionally and culturally affiliated with the Santa Cruz County region have formally requested a consultation with the County of Santa Cruz (as Lead Agency under CEQA) regarding Tribal Cultural Resources. However, no Tribal Cultural Resources are known to occur in or near the project area. Therefore, no impact to the significance of a Tribal Cultural Resource is anticipated from project implementation.

Per the Native American Outreach Summary Report, prepared by Albion and dated March 7, 2024, between December 2023 and February 2024, Albion conducted Tribal Outreach efforts. These Outreach efforts included a NAHC SLF search, and letters sent via certified mail and follow up email correspondence to all Tribal Representatives identified by the NAHC contact information for Tribal stakeholders. The Amah Mutsun Tribal Band were the only Tribe to respond to Outreach efforts. They requested more information about known cultural surveys in the vicinity and recommended that a Tribal Monitor be present for all ground disturbance associated with the Project. The Amah Mutsun Tribal Band sent an email response on February 28, 2024. In their email, they noted that they (Amah Mutsun Tribal Band) have interest in the site because of its general location and requested more information about known cultural surveys in the vicinity. They noted that soil maps from their records indicate the Project site to be on Elkhorn Sandy loam, which is a soil type that is known to have Indigenous archaeological sites. Chairman Lopez expressed that areas like this would be best to have a Tribal Monitor as part of subsurface undertakings; however no tribal consultation was requested.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
S. UTILITIES AND SERVICE SYSTEMS Would the project:				
1. *Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?*	☐	☐	☒	☐

***Discussion*:**

Water

The project would connect to an existing municipal water supply. The City of Santa Cruz Water District has determined that adequate supplies are available to serve the project (Attachment 4), and no new facilities are required to serve the project. No impact would occur from project implementation.

Wastewater

Municipal wastewater treatment facilities are available and have capacity to serve the project. The project site is located in the Rodeo Basin Sewer Moratorium Area. As such, a maximum of four residential sanitary sewer connections are allowed per existing parcel. The proposed development is located over four existing parcels, thus the project is proposed as a phased project. The first phase would construct 16 units, and the second phase would construct the remaining nine units when the sewer moratorium is lifted in the future. No new wastewater facilities are required to serve the project. No impact would occur from project implementation.

Stormwater

The drainage analysis for the project Preliminary Stormwater Control Plan, prepared by Ifland Engineers, dated January 2023 concluded that the project will meet Public Works Design Criteria through installation of bioretention/detention facilities with outlet control structures (Attachment 6). The County Department of Public Works Stormwater Management staff have reviewed the drainage information and have determined that the drainage system improvements are adequate to handle runoff from project. Substantial environmental impacts associated with the improvements are not anticipated; therefore, impacts would be less than significant.

Electric Power

Pacific Gas and Electric Company (PG&E)_provides power to existing and new developments in the Santa Cruz County area. As of 2018, residents and businesses in the County were

automatically enrolled in MBCP's community choice energy program, which provides locally controlled, carbon-free electricity delivered on PGE's existing lines.

The proposed site is already served by electric power, but additional improvements are necessary to serve the site. However, no substantial environmental impacts will result from the additional improvements; impacts will be less than significant.

Natural Gas

PG&E serves the urbanized portions of Santa Cruz County with natural gas.

The proposed site is already served by natural gas, but additional improvements are necessary to serve the site. However, no environmental impacts will result from the additional improvements; impacts will be less than significant.

Telecommunications

Telecommunications, including telephone, wireless telephone, internet, and cable, are provided by a variety of organizations. AT&T is the major telephone provider, and its subsidiary, DirectTV provides television and internet services. Cable television services in Santa Cruz County are provided by Charter Communications in Watsonville and Comcast in other areas of the county. Wireless services are also provided by AT&T, as well as other service providers, such as Verizon.

The following improvements related to telecommunications are required: Extension of telecommunications throughout the proposed subdivision. However, no substantial environmental impacts from this work are anticipated, and impacts will be less than significant.

2.	*Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?*	☐	☐	☒	☐

Discussion: All the main aquifers in this County, the primary sources of the County's potable water, are in some degree of overdraft. Overdraft is manifested in several ways including 1) declining groundwater levels, 2) degradation of water quality, 3) diminished stream base flow, and/or 4) seawater intrusion. Surface water supplies, which are the primary source of supply for the northern third of the County, are inadequate during drought periods and will be further diminished as a result of the need to increase stream baseflows to restore habitat for endangered salmonid populations. In addition to overdraft, the use of water resources is further constrained by various water quality issues.

The City of Santa Cruz Water District has indicated that adequate water supplies are available to serve the project and has issued a will-serve letter for the project, subject to the payment

of fees and charges in effect at the time of service (Attachment 4). The development would also be subject to the water conservation requirements in Chapter 7.69 (Water Conservation) and 13.13 (Water Conservation—Water Efficient Landscaping) of the County Code and the policies of section 7.18c (Water Conservation) of the General Plan. Therefore, existing water supplies would be sufficient to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years. Impacts would be less than significant.

3.	*Result in determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?*	☐	☐	☒	☐

Discussion: Due to limitations within the Rodeo Gulch Sewer Moratorium area in which the project site is located, the project is proposed to be constructed in two phases. The first phase would construct 16-units, and the second phase would construct the remaining nine units if the sewer moratorium is lifted in the future. The Santa Cruz County Sanitation District has indicated that adequate capacity in the sewer collection system is available to serve the project and has issued a sewer service availability letter for 16-units to be constructed as part of the first phase of the project, subject to the payment of fees and charges in effect at the time of service (Attachment 7). The second phase to construct the remaining nine units would be contingent upon issuance of a sewer will serve letter for the remaining units by the Santa Cruz County Sanitation District and completion of the improvements necessary to lift the sewer moratorium in the future. Therefore, existing wastewater collection/treatment capacity would be sufficient to serve the phased project. No impact would occur from project implementation.

4.	*Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?*	☐	☐	☒	☐

Discussion: Due to the small incremental increase in solid waste generation by the project during construction and operations, the impact would not be significant.

5.	*Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?*	☐	☐	☐	☒

Discussion: The project would comply with all federal, state, and local statutes and regulations related to solid waste disposal. No impact would occur.

T. WILDFIRE

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

1.	*Substantially impair an adopted emergency response plan or emergency evacuation plan?*	☐	☐	☐	☒

Discussion: The project is not located in a State Responsibility Area, a Very High Fire Hazard Severity Zone, or a County-mapped Critical Fire Hazard Area and will not conflict with emergency response or evacuation plans. Therefore, no impact would occur.

2.	*Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?*	☐	☐	☒	☐

Discussion: The project is not located in a State Responsibility Areas, a Very High Fire Hazard Severity Zone, or a County-mapped Critical Fire Hazard Area. However, the project design incorporates all applicable fire safety code requirements and includes fire protection devices as required by the local fire agency and is unlikely to exacerbate wildfire risks. Impacts would be less than significant.

3.	*Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?*	☐	☐	☒	☐

Discussion: The project is not located in a State Responsibility Areas, a Very High Fire Hazard Severity Zone, or a County-mapped Critical Fire Hazard Area. Improvements associated with the project are unlikely to exacerbate wildfire risks. Impacts would be less than significant.

4.	*Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?*	☐	☐	☒	☐

Discussion: The project is not located within a State Responsibility Areas, a Very High Fire Hazard Severity Zone, or a County-mapped Critical Fire Hazard Area. Downslope and downstream impacts associated with wildfires are unlikely to result from the project. Regardless, the project design incorporates all applicable fire safety code requirements and includes fire protection devices as required by the local fire agency. Impacts would be less than significant.

U. MANDATORY FINDINGS OF SIGNIFICANCE

1.	*Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal community or eliminate important examples of the major periods of California history or prehistory?*	☐	☒	☐	☐

Discussion: The potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory were considered in the response to each question in Section III (A through T) of this Initial Study. As a result of this evaluation, there is substantial evidence that significant effects associated with this project could result. Mitigations have been incorporated to reduce those impacts to less than significant. Therefore, this project has been determined not to meet this Mandatory Finding of Significance.

2.	*Does the project have impacts that are individually limited, but cumulatively considerable? ("cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?*	☐	☐	☒	☐

Discussion: In addition to project specific impacts, this evaluation considered the project's potential for incremental effects that are cumulatively considerable. As a result of this evaluation, there were determined to be no potentially significant cumulative effects associated with this project. Additionally, the Sustainability Update EIR evaluated cumulative impacts for each environmental resource topic based on future and cumulative projects identified on Table 4.0-1 in the Sustainability Update EIR. Therefore, this project has been determined not to meet this Mandatory Finding of Significance.

3.	*Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?*	☐	☐	☒	☐

Discussion: In the evaluation of environmental impacts in this Initial Study, the potential for adverse direct or indirect impacts to human beings were considered in the response to specific questions in Section III (A through T). As a result of this evaluation, there is substantial evidence that significant effects associated with this project could result. Mitigations have been incorporated to reduce those impacts to less than significant. Therefore, this project has been determined not to meet this Mandatory Finding of Significance.

IV. REFERENCES USED IN THE COMPLETION OF THIS INITIAL STUDY

California Department of Conservation, 1980

Farmland Mapping and Monitoring Program Soil Candidate Listing for Prime Farmland and Farmland of Statewide Importance Santa Cruz County U.S. Department of Agriculture, Natural Resources Conservation Service, soil surveys for Santa Cruz County, California, August 1980.

California Department of Fish and Wildlife, 2019

California Natural Diversity Database SOQUEL USGS 7.5 minute quadrangle; queried July 2022.

CalFIRE, 2010

Santa Cruz County-San Mateo County Community Wildfire Protection Plan. May 2010.

Caltrans, 2018

California Public Road Data 2017: Statistical Information Derived from the Highway Performance Monitoring System. Released by the State of California Department of Transportation November 2018.

County of Santa Cruz, 1994

1994 General Plan and Local Coastal Program for the County of Santa Cruz, California. Adopted by the Board of Supervisors on May 24, 1994, and certified by the California Coastal Commission on December 15, 1994.

County of Santa Cruz, 2013

County of Santa Cruz Climate Action Strategy. Approved by the Board of Supervisors on February 26, 2013.

County of Santa Cruz, 2015

County of Santa Cruz Local Hazard Mitigation Plan 2015-2020. Prepared by the County of Santa Cruz Office of Emergency Services.

DOF, 2018

E-5 Population and Housing Estimates for Cities, Counties and the State—January 1, 2011-2018. Released by the State of California Department of Finance May 2018.

Federal Transit Administration, 2006

Transit Noise and Vibration Impact Assessment Manual.

Federal Transit Administration, 2018

Transit Noise and Vibration Impact Assessment Manual. September 2018.

FEMA, 2012

Flood Insurance Rate Map 06087C. Federal Emergency Management Agency. Effective on May 16, 2012.

MBUAPCD, 2008

Monterey Bay Unified Air Pollution Control District (MBUAPCD), CEQA Air Quality Guidelines. Prepared by the MBUAPCD, Adopted October 1995, Revised: February 1997, August 1998, December 1999, September 2000, September 2002, June 2004 and February 2008.

MBUAPCD, 2013a

Monterey Bay Unified Air Pollution Control District, NCCAB (NCCAB) Area Designations and Attainment Status – January 2013. Available online at http://www.mbuapcd.org/mbuapcd/pdf/Planning/Attainment_Status_January_2013_2.pdf

MBUAPCD, 2013b

Triennial Plan Revision 2009-2011. Monterey Bay Unified Air Pollution Control District. Adopted April 17, 2013.

OPR, 2018

"Technical Advisory on Evaluating Transportation Impacts in CEQA." Available online at http://www.opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf.

This page intentionally left blank.

Attachment 1

Mitigation Monitoring and Reporting Program

This page intentionally left blank.

No.	Environmental Impacts	Mitigation Measures	Responsibility for Compliance	Method of Compliance	Timing of Compliance
Biological Resources					
BIO-1	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, or U.S. Fish and Wildlife Service?	To reduce potential impacts to sensitive habitats and special-status species that may result from artificial light, the following shall be adhered to: A. The project shall avoid the installation of any non-essential artificial lighting. If artificial lighting is necessary, the project shall avoid or limit the use of artificial lights during the hours of dawn and dusk, when many wildlife species are most active. B. All essential outdoor lighting shall be limited through the use of timers and/or motion sensors. C. All essential outdoor lighting shall be shielded, cast downward, and directed such that it does not shine off the property into surrounding areas, other parcels, or the night sky.	Applicant	Compliance monitored by the County Planning Division	During construction, site grading operations, and ongoing
BIO-2	Have a substantial adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies, regulations (e.g., wetland, native grassland, special forests, intertidal zone, etc.) or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	The final plans shall include the following: A. The development footprint shall be delineated on the final project plans with a thick bold solid line. All temporary and permanent disturbance associated with the project including all grading, vegetation removal, buildings, utilities, paving, landscaping, access routes, and deposition of refuse or debris shall be within the delineated development footprint. Everything outside of the development footprint shall be marked on the plans as sensitive habitat and fenced for avoidance during construction. B. The final project plans shall clearly designate and label the entire portion of "Parcel A" east of the 50' riparian buffer line as "Protected Habitat Area". C. A plan sheet showing protected trees plotted and tree protection specifications. Measures to reduce impacts to retained trees shall be included in the final project plans. D. A plan sheet showing the mitigation planting areas as required in the Mitigations below. The 20' wide sanitation easement and the in the 25' storm drain easement shall be shown on this plan sheet where mitigation tree plantings may not occur.	Applicant	Compliance monitored by the County Planning Division	Prior to site disturbance, during construction, site grading operations, and ongoing

No.	Environmental Impacts	Mitigation Measures	Responsibility for Compliance	Method of Compliance	Timing of Compliance
BIO-3	Have a substantial adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies, regulations (e.g., wetland, native grassland, special forests, intertidal zone, etc.) or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	To comply with Santa Cruz County General Plan Policy 5.1.12 (ARC-3.2.1) and SCCC Section 16.32.090 (B)(3), and to compensate for permanent loss of oak woodland habitat and riparian woodland habitat, the following shall be adhered to: A. Oak trees removed as a result of this project (including the 11 trees removed prior to this biotic review) shall be mitigated through replacement plantings in kind either onsite or at an approved offsite location at the following ratios: 1. Trees less than 5 inches diameter at breast height (DBH) shall be replaced at 2:1; 2. Trees between 5 and 11.5 inches DBH shall be replaced at 3:1; 3. Trees between 12 and 23.5 inches DBH shall be replaced at 5:1; 4. Trees 24 inches or greater DBH shall be replaced at 10:1. B. Based on review of the attached reports and current project plans, the Environmental Coordinator has estimated a minimum of 62 oak trees must be planted (4 trees at the 3:1 ratio, 6 trees at 5:1, and 2 trees at 10:1). C. The project applicant may propose to pay into a County approved in-lieu fee program for oak tree removal compensation if such a program is available. This option must be considered only as a last resort and must be approved by the Environmental Coordinator. Alternative options considered and determined infeasible must be discussed in the Habitat Restoration and Mitigation Plan. D. Permanent impacts to riparian habitat shall be mitigated through on-site restoration of riparian habitat at a 3:1 ratio of restoration to impacts. All temporarily impacted areas must be restored at a 1:1 ratio through active planting of riparian species. Riparian mitigation sites must be located within areas appropriate for riparian vegetation such as areas that are contiguous to and affected by the hydrology of the creek or another source of hydrology. E. Riparian enhancement and/or restoration activities (i.e. removal and ongoing management of invasive species) commensurate with the proposed development shall occur within the existing riparian corridor located along the eastern portion of the Study Area.	Applicant	Compliance monitored by the County Planning Division	Prior to site disturbance, during construction, site grading operations, and ongoing
BIO-4	Have a substantial adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies, regulations (e.g., wetland, native grassland, special forests, intertidal	All Portions of Parcel A east of the 50-foot riparian buffer line shall be identified as "Protected Habitat Area" on the final subdivision map where development shall not occur in the future. The final subdivision map shall include the following notes: A. No development as defined in Chapter 16.32 of the County Code (including, without limitation, removal of trees and other vegetation, grading, paving, installation of structures such as signs, buildings, or other structures of similar impact) shall occur within the Protected Habitat Areas with the exception of the following, subject to the Planning Director's review and approval: 1. The removal of hazardous substances or conditions or non-native or diseased plants or trees provided that such activities have been	Applicant	Compliance monitored by the County Planning Division	Prior to Recordation of the Final Subdivision Map, prior to site disturbance, during construction, site grading operations, and ongoing

No.	Environmental Impacts	Mitigation Measures	Responsibility for Compliance	Method of Compliance	Timing of Compliance
	zone, etc.) or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	reviewed and approved by the Planning Director and determined as not involving the unnecessary disturbance of indigenous ground cover or native wildlife; 2. Habitat restoration activities as outlined in the approved Habitat Restoration and Mitigation Plan including habitat management strategies to control re-establishment of invasive non-native species and maintain healthy native habitat.			
BIO-5	Have a substantial adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies, regulations (e.g., wetland, native grassland, special forests, intertidal zone, etc.) or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	A Habitat Restoration and Mitigation Plan prepared by a qualified biologist or restoration specialist shall be submitted for review and approval by Environmental Planning Staff prior to recordation of the final subdivision map. The establishment and planting of all restoration areas as outlined in this Plan must be completed prior to final inspection of the subdivision improvements for Phase I of the project. The Plan shall be focused on restoring and maintaining native plant structure and species composition of oak woodland and riparian habitats at the required ratios listed in BIO-3 above and must include the following minimum elements: A. A map identifying Parcel A east of the 50' riparian buffer line as "Protected Habitat Area" where development shall not occur in the future. B. A map of all designated restoration areas on site. Restoration areas shall include areas intended for oak woodland habitat restoration, riparian habitat restoration, and areas designated for riparian enhancement and/or restoration activities. 1. Please note that plantings for mitigation cannot be located in the 25' drainage easement or the 20' sanitation easement. Both of these easements must be shown on the restoration maps and planting plans. C. A planting plan with species, size, and locations of all restoration plantings that will occur on site. The sizes and distribution of restoration plantings shall be determined by the restoration specialist with the goal of establishing native plant structure and species composition of healthy habitat while maximizing plant health and survivability of individual plants. 1. The planting plan shall include as many of the 62 replacement trees required under BIO-3A above as can be planted on-site while maintaining this goal. If there is not adequate room on site to plant all the required replacement oak trees in a configuration that creates a healthy oak woodland habitat, the remaining plantings shall occur at a designated off-site location. D. Identification of any off-site location required for replacement oak tree plantings including a map of all designated restoration areas on that site and a planting plan with species, size, and locations of all restoration plantings. 1. Property owner approval for a deed restricted mitigation site must be provided for any off-site mitigation locations. An agreement for ongoing access to monitor and maintain the plantings for the required monitoring period must also be included.	Applicant	Compliance monitored by the County Planning Division	Prior to Recordation of the Final Subdivision Map, prior to site disturbance, during construction, site grading operations, and ongoing

No.	Environmental Impacts	Mitigation Measures	Responsibility for Compliance	Method of Compliance	Timing of Compliance
		E. If applicable as outlined in BIO-3C above, a proposal to pay into a County approved in-leu fee program for oak tree removal compensation including a discussion of the alternative options that were considered. F. Plan for removal of non-native species on the parcel and a management strategy to control re-establishment of invasive non-native species. G. Plan for riparian enhancement and/or restoration activities within the existing riparian corridor including methods for removal and ongoing management of invasive species and establishment or re-establishment of native habitat which may include specific treatments to promote natural re-establishment. H. Information regarding the methods of irrigation for restoration plantings. I. A plan showing the placement of split rail fencing and location of signs as needed to delineate the Protected Habitat Areas in the field and prevent trespassing. The location of fencing and number and location of protective signs shall be confirmed by the biologist based on site conditions and maximum protection of these habitat areas. J. Any seed mix used for erosion control purposes on temporarily impacted areas and exposed soils shall be limited to seeds of native species common to the surrounding habitat and/or sterile seeds. K. A 5-year Management Plan for maintenance and monitoring of restored areas, including a proposed mechanism for evaluating success.			
BIO-6	Have a substantial adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies, regulations (e.g., wetland, native grassland, special forests, intertidal zone, etc.) or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	Annual reports outlining the progress and success of the restoration and monitoring shall be submitted to the County Restoration Coordinator: restoration.coordinator@santacruzcountyca.gov by December 31 of each monitoring year.	Applicant	Compliance monitored by the County Planning Division	Ongoing
BIO-7	Have a substantial adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies,	In addition to the required 5-year annual monitoring and reporting, a 10-year monitoring report shall be prepared and submitted to the County Restoration Coordinator: restoration.coordinator@santacruzcounty.us outlining the continued implementation and results of Habitat Restoration and Mitigation Plan over the 10-year period.	Applicant	Compliance monitored by the County Planning Division	Ongoing

No.	Environmental Impacts	Mitigation Measures	Responsibility for Compliance	Method of Compliance	Timing of Compliance
	regulations (e.g., wetland, native grassland, special forests, intertidal zone, etc.) or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?				
BIO-8	Have a substantial adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies, regulations (e.g., wetland, native grassland, special forests, intertidal zone, etc.) or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	A focused rare plant survey shall be completed during the identifiable period for all special-status plants with potential to occur and submitted with the permit application for subdivision improvements for Phase I of the project for review and approval by Environmental Planning. A. If no special-status plants are found, no additional protective measures are required. B. If any special-status plant is found present in the project impact area, the population shall be mapped and avoided as a sensitive habitat area as outlined in BIO-9 below. 1. If avoidance is not possible, project construction may not commence until additional biotic approval from County Planning is received. Additional impact analysis (demonstrating adequate avoidance, minimization, and mitigation) shall be completed and reviewed by County Planning. Additional environmental analysis may be required based on the results of this review and analysis.	Applicant	Compliance monitored by the County Planning Division	Prior to Permit Issuance. Prior to site disturbance, during construction, site grading operations, and ongoing
BIO-9	Have a substantial adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies, regulations (e.g., wetland, native grassland, special forests, intertidal zone, etc.) or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	To protect sensitive habitats and special-status species during project related construction activities, the following shall be adhered to: A. Prior to any site disturbance, a pre-construction meeting shall be conducted. The purpose of the meeting will be to ensure that the biotic Conditions of Approval are communicated to the various parties responsible for constructing the project. The meeting shall involve all relevant parties including the project proponent, construction supervisor, Environmental Planning Staff, the project biologist, and the project arborist. B. Every individual working on the Project must attend biological awareness training prior to working on the job site. The training shall be delivered by a qualified biologist and shall include information regarding the location and identification of sensitive habitats and all special-status species with potential to occur in the project area, the importance of avoiding impacts to special-status species and sensitive habitats, and the steps necessary if any special-status species is encountered at any time. C. Prior to commencement of construction, high visibility fencing and/or flagging shall be installed with the assistance of a qualified biologist around all sensitive habitat areas to indicate the limits of work and prevent inadvertent grading or other disturbance within the adjacent sensitive	Applicant	Compliance monitored by the County Planning Division	Prior to site disturbance, during construction, site grading operations, and ongoing

No.	Environmental Impacts	Mitigation Measures	Responsibility for Compliance	Method of Compliance	Timing of Compliance
		habitat. 1. No work-related activity including equipment staging, vehicular access, grading and/or vegetation removal shall be allowed outside the designated limits of work. 2. Native trees to be retained near or within the project impact area shall be identified, protected with high visibility fencing at or outside of the dripline, and avoided during construction as sensitive habitat unless additional protection measures, provided by a qualified arborist, have been reviewed and approval by Environmental Planning Staff. 3. The fencing shall be inspected and maintained daily until project completion. 4. A qualified biologist shall be on site to monitor vegetation removal and initial ground disturbance activities that occur within the riparian corridor (including clearing and grubbing) to identify and recover any special-status species that may be found. 5. If a special-status animal is identified at any time prior to or during construction, work shall cease immediately in the vicinity of the individual. The animal shall either be allowed to move out of harm's way on its own or a qualified biologist shall move the animal out of harm's way to a safe relocation site. The biologist shall be allowed enough time to move any special-status species from the site before work activities begin. All sitings of special-status species shall be reported to the County Environmental Coordinator and submitted to the CNDDB. 6. If a western pond turtle egg clutch is discovered at any time prior to or during construction, work in the vicinity of the egg clutch shall be halted immediately. Unless otherwise advised by CDFW, the nest location shall be protected with high visibility fencing under the guidance of a qualified biologist and shall be avoided until the biologist determines that the clutch has hatched, and individuals are no longer likely to be injured by work activities. **7.** The following Recommended Avoidance and Minimization measures BIO-1, BIO-2, BIO -5, and BIO-7 of the attached Biotic Report dated Updated October 25, 2023, prepared by Biotic Resources Group shall be adhered to. ***(Note: The recommended mitigation numbering from the report below does not conform with the initial study mitigation numbering presented in this document. They are provided here for reference to the attached biotic report).*** a. BIO-1. Dusky-footed Woodrat. Retain all woodrat houses (middens) on the property. No earlier than two weeks prior to the start of project activities, a qualified biologist should perform a pre-construction survey for woodrat houses within the project work boundaries and a 25-foot buffer around the project site perimeter. Flag and establish buffers around each woodrat house observed. The buffer width will be determined by the qualified biologist, but			

No.	Environmental Impacts	Mitigation Measures	Responsibility for Compliance	Method of Compliance	Timing of Compliance
		will not be less than 5 feet. If a woodrat house is present and impacts cannot be avoided, then a qualified biologist shall contact CDFW for approval to implement a woodrat relocation plan. This could involve live trapping and the construction of alternate houses in adjacent suitable habitat. The woodrat relocation plan must be implemented by a qualified biologist possessing a Scientific Collection Permit authorizing the handling of woodrats. Authorization by CDFW must be obtained prior to the implementation of this measure. Post-relocation monitoring may be required by CDFW, as part of the plan. b. BIO-2. Bats. Removal of trees and abandoned buildings could result in the loss of roost sites or abandonment of bat roosts through noise or vibrations. Maternity roosts are most important as negative impacts can have broad, far-reaching effects, since such roosts are critical for reproduction and can support multiple generations of bats. No more than 30 days prior to demolition/tree removal, the applicant should hire a bat ecologist to investigate the interior of the outbuildings to determine if any bats have been using the structures. The bat ecologist should also check the oak trees to determine if any have cavities suitable for bat roosts. If there is no evidence of bat use (e.g., guano or observation of individuals), then the openings shall be secured/covered to prevent bats from entering prior to demolition and no further mitigation will be required. If bat use is detected, then schedule outbuilding demolition and tree removal to occur between August 15 and February 1 of any given year to avoid the bat breeding season for this part of the central coast. In addition, the bat ecologist shall conduct a focused survey no more than two weeks (14 days) prior to structure demolition and tree removal to determine if bats are currently using either. If no bats are occupying the outbuildings or tree cavities, then demolition may proceed. If bats are observed using the outbuildings or tree cavities, then the bat ecologist, in coordination with CDFW, will recommend methods to either allow bats to leave the outbuildings and trees and not return (exclusion devices), or other methods specific to this demolition project to avoid harm to individual bats. Trees without cavities may have foliage roosting bats occasionally. To avoid harm to individual bats, trees shall be cut down and allowed to lie on the ground for 24 hours prior to chipping, to allow any foliage roosting bats to leave on their own. c. BIO-5. Oak Trees. Avoid construction/development within the dripline of oak woodland vegetation that is to be retained. Implement protective measures around all retained oak trees, as directed by an arborist. Measures may include protective fencing, supervised pruning of limbs and roots, other measures as determined by the arborist.			

No.	Environmental Impacts	Mitigation Measures	Responsibility for Compliance	Method of Compliance	Timing of Compliance
		d. BIO-7. Nesting Birds. To avoid impacting nesting birds, if present, schedule tree removal and construction to occur between August 1 and March 1 of any given year, which is outside the bird nesting season. If tree removal and/or construction is to occur within the bird breeding season (March 1 - July 31), perform pre-construction nesting bird surveys within one week before the scheduled start of the project. The nesting survey should be performed by a qualified biologist and cover the entire property, since potential nesting raptors may require buffers at a minimum of 300 feet. In the event active nests are observed, the nest site shall be flagged and a buffer shall be established, in an effort to prevent nest failure. The buffer widths shall be determined by the qualified biologist, based on species, site conditions and anticipated construction activities. Active nests should be monitored at a frequency determined by the monitoring biologist, but at a minimum of once per week, until the nestlings have fledged. In the event that construction activities appear to be interfering with nest maintenance (e.g., feedings and incubation), then the buffers should be enlarged or construction activities postponed, until the young have fledged, as determined by the qualified biologist. 8. A brief memo summarizing the results of the preconstruction surveys outlined above in XII BIO-1, BIO-2 and BIO-7 shall be submitted to the Environmental Coordinator for review prior to start of construction. 9. Impacts to oak trees shall be avoided to the maximum extent possible. All Tree Protection Guidelines and Restrictions listed in the attached Arborist Report prepared by Kurt Fouts, shall be adhered to.			
BIO-10	Have a substantial adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies, regulations (e.g., wetland, native grassland, special forests, intertidal zone, etc.) or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	Prior to final inspection of the subdivision improvements for Phase I of the project, the following shall occur: A. Establishment and planting of all restoration areas as outlined in the final approved Habitat Restoration and Mitigation Plan and placement of protective fencing and signs around the Protected Habitat Area shall be inspected and approved by Environmental Planning staff. B. Receipt of full payment into any approved in-lieu fee program must be provided to the County.	Applicant	Compliance monitored by the County Planning Division	Prior to Permit Final
Transportation					

No.	Environmental Impacts	Mitigation Measures	Responsibility for Compliance	Method of Compliance	Timing of Compliance
TR-1	*Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)(1) (Vehicle Miles Traveled)?*	The following measures will be required to reduce VMT by encouraging active transportation in the project area with improvements to pedestrian and bicycle networks and facilities, including: • Construction of a new sidewalk within the project site that would connect the townhouses to the existing sidewalks on Mattison Lane. • A pedestrian and bicycle access lane would be provided on the west side of the project site that allows for connection to an adjacent development that fronts on Maciel Avenue. This connection would set in place a pedestrian and bicycle connection to Maciel Avenue when the adjacent property develops, which would then provide a continuous sidewalk access to the bus stops on Capitola Road, which is about 1,000 feet away. • Currently, Maciel Avenue does not have bicycle infrastructure to encourage bicycling to various points of interest. The project would contribute to implementing bike sharrows along Mattison Lane and Maciel Avenue to provide access to bicycle lanes and transit on Capitola Road. • The project would implement bike facility measures to reduce VMT of the project. A bicycle repair station would be installed in the parklet on the project site to reduce VMT of the project. The bicycle repair station can provide repair tools and space to use them and would support the continual use of bicycles for transportation in and out of the project site. • A 20-foot wide pedestrian and bicycle easement would be established to provide access to a future pedestrian and bicycle bridge that would span across Rodeo Creek Gulch to Coffee Lane Park. This would result in increased bicycle and pedestrian connectivity from the project site to the regional multimodal network, along with access to the regional transit network and commercial/activity centers such as Capitola Mall.	Applicant	Compliance monitored by the County Planning Division	Prior to Recordation of the Final Subdivision Map, ongoing

County of Santa Cruz

DEPARTMENT OF COMMUNITY DEVELOPMENT AND INFRASTRUCTURE

701 OCEAN STREET, FOURTH FLOOR, SANTA CRUZ, CA 95060-4070
Planning (831) 454-2580 Public Works (831) 454-2160

Matt Machado, Deputy CAO, Director of Community Development and Infrastructure

August 6, 2024

Swift Consulting Services
Attn: Ken Hart
500 Chestnut Street, Suite 100
ken@swiftconsultingservice.com

Subject: Mattison Lane Subdivision Biotic Report Review and Conditioned Biotic Approval
APN: 029-391-01, 029-391-02, 029-391-03, and 029-061-19
Application #: REV221075; 221077

Attachment 1. Biotic Report
Attachment 2. Arborist Report and Addendum
Attachment 3: Proposed Riparian Woodland and Oak Woodland Mitigation and Monitoring Plan

Dear Mr. Hart,

The Planning Division received and reviewed a Biotic Report dated October 25, 2023 (updated from a previous report) prepared by Biotic Resources Group, an Arborist Report dated March 16, 2021, and an Arborist Addendum Dated October 10, 2023 prepared by Kurt Fouts for a proposed subdivision on APNs 029-391-01, 029-391-02, 029-391-03, and 029-061-19. These reports are included in Attachments 1 and 2.

A Biotic Report Review is required because of the presence of sensitive habitats and the potential for protected species on this parcel where establishment of a 25-lot subdivision and construction of 25 new single-family residences and associated infrastructure is proposed. The Biotic Report evaluates sensitive habitats and habitat conditions on the parcel for special-status species with potential to occur in this portion of Santa Cruz County. The Arborist Report and Addendum identify and evaluate trees on the property and adjacent properties and assess potential impacts resulting from the proposed project.

The project is located at 2450 Mattison Lane spanning four contiguous parcels (029-391-01, -02, -03 & 029-061-19). The proposed project would subdivide these parcels to accommodate 25 new lots and a common area identified on the plans and Tentative Subdivision Map as "Parcel A". The project involves demolition of two existing residential homes and several existing outbuildings and construction of 25 new townhomes, a 30-foot-wide road with a cul-de-sac, and a storm drainage system. The storm drainage system includes dispersed stormwater detention/rain gardens on each parcel and a 39-foot long, 12-inch diameter above-ground drainage pipe that will outlet into Rodeo Gulch Creek onto a 35 square foot rock dissipater at the outfall. The project is proposed to be constructed in two phases; the first to construct 16 units, and the second to construct the remaining 9 units in the future. A Site Plan showing the overall project footprint is included in Figure 15 of the attached Biotic Report.

The project also proposes oak woodland and riparian woodland restoration within the 50-foot required riparian buffer that abuts the eastern edge of the development. A proposed Riparian Woodland and Oak Woodland Mitigation and Monitoring Plan prepared by Biotic Resources Group was also submitted and considered as part of this biotic review (Attachment 3).

The summary and evaluation below are based on information obtained through review of the attached reports and confirmed through field observations made by County Environmental Planning Staff on July 18, 2023. Other sources consulted during report review include the California Natural Diversity Data Base (CNDDB), the United States Fish and Wildlife Service (USFWS) Environmental Online Conservation System (ECOS), Santa Cruz County GIS Maps, and aerial imagery of the Study Area.

Project Background

During preliminary review of the proposed project in 2021, Environmental Planning Staff determined that the Project Site contains sensitive habitat as defined by the County's Sensitive Habitat Protection and Riparian Corridor and Wetlands Protection ordinances (Chapters 16.30 and 16.32) including Riparian Woodland and Oak Woodland.

The applicant was advised in Environmental Planning Comments prepared for Design Review Group (DRG) #211191 dated July 13, 2021, Environmental Planning Review Comments dated June 15, 2022 and April 27, 2023, and two Environmental Planning Requests for Additional Information related to this Biotic Report Review dated August 9, 2022 and August 1, 2023 that mature oak trees on the property must be preserved and protected in place. Because of the potential for alternative configurations for development that would avoid and/or minimize impacts to oak trees on the property, the project applicant was advised to design a project such that earthwork would not occur within the critical root zone of existing oak trees.

During a site visit made on July 18, 2023, Environmental Planning Staff observed that a significant amount of tree removal had occurred on the property since the 2021 DRG comments were issued. Additional information about this tree removal was requested in the August 1, 2023 Environmental Planning Request for Additional Information. The attached 2023 Updated Biotic Report and Arborist Addendum confirm that eleven oak trees ranging in size from 8" DBH to 40" DBH (approximately 0.25-acre oak woodland canopy) were removed without permits from the proposed Project Site between 2021 and the date of this review.

In 2023 the project design was slightly re-configured to reduce impacts to one remaining 24" DBH oak (identified in the Arborist Report as T4). The Arborist Addendum includes a revised impact assessment including the eleven trees that were removed in 2021 and the remaining trees on the property based on the latest project design. The report concludes that T4 can be preserved in place and that removal of one additional 8" DBH oak tree (T1) is required.

Baseline Environmental Conditions

The Study Area covered in the Biotic Report includes approximately 4.7 acres that encompasses four separate contiguous parcels. Within the Study Area, the "Project Site" consists of the approximate location where proposed development would occur. The Arborist Report evaluates trees on the Project Site and trees on adjacent parcels with canopies overhanging the proposed project limits. The parcel is currently developed with two single-family residences, associated infrastructure, several dilapidated outbuildings, and remnants of a former commercial nursery.

The Biotic Report identifies four distinct habitat types in the Study Area: riparian woodland, oak woodland, annual grassland, and urban landscaping.

Rodeo Gulch Creek (a mapped perennial stream) runs along the eastern parcel boundaries at the bottom of a large arroyo. A wide band of riparian woodland associated with the creek occurs along the entire eastern portion of the Study Area. This riparian habitat extends westward up the slope of the arroyo to the top of bank and is dominated by an overstory of arroyo willow with some coast live oaks and a dense understory of native and nonnative shrubs and herbaceous species. A grove of non-native blue gum eucalyptus also occurs in the riparian woodland in the Study Area.

Two existing residences with associated infrastructure and landscaping occur in the northern portion of the Study Area. The central and western portions of the Study Area were maintained as open/developed for many years as part of a commercial nursery business and are heavily disturbed in certain areas.

Non-native Grassland occurs interspersed throughout these disturbed areas and on the remaining flat terrace outward of the top-of-bank of the Rodeo Gulch Creek riparian corridor. A 20-foot-wide public sewer easement occurs on this grassy terrace which is maintained by the Santa Cruz County Sanitation District for access to the sewer main.

A remaining area of coast live oak woodland occurs in the southwestern portion of the Study Area abutting the riparian woodland. This area is comprised of six mature oaks, identified in the Arborist Report as trees T4-T9. These trees are growing on the flat terrace outward of the top-of-bank and create a contiguous canopy with the adjacent riparian corridor. The eleven oak trees that were previously removed were located throughout the Project Site, but most were concentrated in the northern part of the Study Area. Figure 2 of the attached Biotic Report shows the locations of the different habitat types.

Analysis

Elements of the proposed project overlap with existing and former Coast live oak woodland and the riparian corridor of Rodeo Gulch Creek. Coast live oak woodland, riparian corridors, aquatic habitats, and habitat for special-status species are considered sensitive under Santa Cruz County's Sensitive Habitat Protection Ordinance (Chapter 16.32). Biological Resources including special-status species and their habitats and other sensitive natural communities as identified by local policies, California Department of Fish and Wildlife (CDFW), or United States Fish and Wildlife Service (USFWS) are also protected under the California Environmental Quality Act (CEQA), the California Endangered Species Act, the Federal Endangered Species Act.

Aquatic habitats and their riparian corridors (as defined by Santa Cruz County Code Section 16.30.030) are granted additional special protections under the County's Riparian Corridor and Wetlands Protection ordinance (Chapter 16.30). Development activities are prohibited within Riparian Corridors unless Riparian Exception Findings (SCCC 16.30.060) are met, and a Riparian Exception is approved by County Planning, or the activities are otherwise exempt.

Many aquatic habitats are also regulated under the Clean Water Act Section 404 by U. S. Army Corps of Engineers (USACE) below the ordinary high water mark (OHWM), and Section 401 by the Regional Water Quality Control Board (RWQCB). The bed and banks are regulated under California Fish and Game Code Section 1602 and may be subject to regulation under the Porter-Cologne Water Quality Act as "Waters of the State".

<u>Sensitive Habitats</u>

The Project Site is currently dominated by non-native grassland and previously disturbed/developed areas where mature trees have already been removed. The project maintains a required 50-foot-wide riparian buffer between the residential houses and the riparian woodland/top-of-bank.

The proposed storm drainage system for the project will encroach into the riparian corridor of Rodeo Gulch Creek. Permanent impacts to existing riparian woodland will occur from installation of this system. Approximately 74 square feet (0.002 acre) of riparian vegetation will be permanently impacted, and an additional 440 square feet (0.01 acre) of riparian woodland will be temporarily impacted through removal and/or trimming of riparian vegetation for construction access.

Permanent impacts to riparian habitat must be mitigated through on-site restoration of riparian habitat at a 3:1 ratio of restoration to impacts. All temporarily impacted areas must be restored at a 1:1 ratio through active planting of riparian species.

Eleven mature coast live oak trees were removed from the Project Site without permits in 2021. The project proposes to remove one additional oak tree. The Biotic Report estimates a total impact area of 0.31 impacts to oak woodland by calculating the canopy spread of 1) the extant woodland proposed for removal, 2) area of oak woodland previously removed in 2021, and 3) temporary impacts beneath the canopy of trees to be retained. In addition, construction activities and permanent development are proposed within the dripline of existing oak trees around the perimeter of the development and on adjacent parcels (including Trees T4 and T11). Grading or trenching could cause direct mortality or decline of these trees after construction is complete. Recommendations included in the Arborist Report for protection of existing oak trees must be adhered to.

Although one minor change was made to the project design in 2023 to reduce impacts to tree T4, the current project plans, including impacts to oak woodland and proposed compensation for these impacts, largely remain the same as originally proposed at the 2021 DRG. The project applicant has not demonstrated that any efforts were made through design to avoid impacts to the oak woodland that formerly occurred on the property.

Removal of oak woodland without biotic approval is a violation of the rules and regulations set forth in Chapter 16.32 of the County Code to protect sensitive habitats [16.32.130(A)]. This project is therefore in conflict with local policies and ordinances protecting biological resources.

To reduce impacts to less than significant, oak trees removed or otherwise permanently impacted as a result of the project, including the eleven oak trees removed from the Study Area in 2021, must be replaced in-kind at the following compensation ratios determined by the Environmental Coordinator:

(1) trees less than 5 inches diameter at breast height (DBH) should be replaced at 2:1;
(2) trees between 5 and 11.5 inches DBH should be replaced at 3:1;
(3) trees between 12 and 23.5 inches DBH should be replaced at 5:1;
(4) trees 24 inches or greater DBH should be replaced at 10:1.

Based on review of the attached reports and current project plans, the Environmental Coordinator has estimated a total of 62 trees required to be planted (4 trees at the 3:1 ratio, 6 trees at 5:1, and 2 trees at 10:1). If there is not adequate room on site to plant all the required replacement oak trees in a configuration that creates a healthy oak woodland habitat, the restoration plan must identify an off-site location for these required plantings with property owner approval for a deed restricted mitigation site. As a last resort, the project may propose to pay into a County approved in-leu fee program if such a program is available.

Conditions are included below to ensure protection of the remaining native oak trees during project construction and ongoing use of the site as well as to compensate for permanent loss of oak woodland and project inconsistencies with local policies and ordinances.

Special-Status Species

Focused rare plant surveys were not conducted as part of this biotic review. The biotic report concludes that the project site lacks suitable habitat components (specialized plant communities, substrate and/or microhabitat) for most special-status plant species that occur in the region. However, the presence or absence of some species cannot be definitively determined without a survey conducted during the appropriate blooming period. Protective measures for rare plants are included in the conditions below.

The eucalyptus trees on the parcel were evaluated for their potential to host overwintering monarchs. This grove has not been recorded as a monarch butterfly overwintering site. The grove is relatively small and lacks habitat components needed for monarch overwintering such as adequate shelter from winds and variable microclimates. The proposed project is not expected to negatively impact western monarchs.

Rodeo Gulch Creek and its riparian corridor support potential habitat for special-status wildlife including the following State Species of Special Concern: yellow warbler, western red bat, San Francisco dusky-footed woodrat, Santa Cruz black salamander, and California giant salamander. Woodrat houses were observed in the riparian woodland and may be present in/near the work area for the storm drain and energy dissipator. Ponded areas within the creek channel could provide habitat for western pond turtles, a Federal Candidate species, which may breed in suitable locations along the creek banks.

Protected bats may roost in the empty outbuildings by entering through cracks and openings observed on the outside of the structures. In addition, trees within and immediately adjacent to the Study Area provide potential roosting habitat for protected bats and nesting habitat for birds of prey, and migratory birds protected under the California Fish and Game Code, and the Federal Migratory Bird Treaty Act (MBTA). Under the MBTA, it is "unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill" a migratory bird unless and except as permitted by regulations.

Conditions have been included below to ensure that proposed development will avoid and minimize impacts to special-status species during and after project construction.

Conclusion

There are sensitive habitat constraints on the project site associated with riparian woodland, oak woodland, and habitat for protected species that must be considered prior to and during project implementation and with ongoing use of the site. Conditions have been included below to ensure that proposed development will avoid and minimize impacts to remaining sensitive habitats and special-status species and to compensate for permanent loss of oak woodland and riparian habitats resulting from the project.

The Conditions of Approval below shall be incorporated into all phases of development for this project and shall also apply to all future development activities engaged in on the property. Environmental Planning Staff will review all future development plans and building permit applications to ensure conformance with the Conditions of Approval set forth in this biotic review.

A copy of this biotic approval, including attachments, must be submitted with any future permit applications.

If you have any questions regarding this letter, please feel free to contact me via email at Juliette.Robinson@santacruzcounty.us.

Sincerely,

Juliette Robinson
Resource Planner IV, Biologist

CC: Leah MacCarter, Area Resource Planner
Jonathan DiSalvo, Project Planner
Matt Johnston, Environmental Coordinator

Conditions of Approval

In order to conduct development activities on APNs 029-391-01, 029-391-02, 029-391-03, and 029-061-19, the Conditions of Approval I - X below shall be adhered to. These Conditions shall be incorporated into all phases of development for this project (221077) and shall also apply to all future development activities proposed on these properties. Adherence to these conditions will ensure that the proposed project will avoid and minimize impacts to sensitive habitats and special-status species and provide adequate compensation for permanent loss of oak woodland and riparian habitats.

Environmental Planning Staff shall review all future development plans and building permit applications to ensure conformance with the Conditions below.

General Conditions

I. To reduce potential impacts to sensitive habitats and special-status species that may result from artificial light, the following shall be adhered to:

   A. The project shall avoid the installation of any non-essential artificial lighting. If artificial lighting is necessary, the project shall avoid or limit the use of artificial lights during the hours of dawn and dusk, when many wildlife species are most active.

   B. All essential outdoor lighting shall be limited through the use of timers and/or motion sensors.

   C. All essential outdoor lighting shall be shielded, cast downward, and directed such that it does not shine off the property into surrounding areas, other parcels, or the night sky.

II. The final plans shall include the following:

   D. The development footprint shall be delineated on the final project plans with a thick bold **solid** line. All temporary and permanent disturbance associated with the project including all grading, vegetation removal, buildings, utilities, paving, landscaping, access routes, and deposition of refuse or debris shall be within the delineated development footprint. Everything outside of the development footprint shall be marked on the plans as sensitive habitat and fenced for avoidance during construction.

   E. The final project plans shall clearly designate and label the entire portion of "Parcel A" east of the 50' riparian buffer line as "Protected Habitat Area".

   F. A plan sheet showing protected trees plotted and tree protection specifications. Measures to reduce impacts to retained trees shall be included in the final project plans.

   G. A plan sheet showing the mitigation planting areas as required in the Conditions below. The 20' wide sanitation easement and the in the 25' storm drain easement shall be shown on this plan sheet where mitigation tree plantings may not occur.

III. To comply with Santa Cruz County General Plan Policy ARC-3.2.1 and SCCC Section 16.32.090 (B)(3), and to compensate for permanent loss of oak woodland habitat and riparian woodland habitat, the following shall be adhered to:

   A. Oak trees removed as a result of this project (including the 11 trees removed prior to this biotic review) shall be mitigated through replacement plantings in kind either onsite or at an approved offsite location at the following ratios:

      - Trees less than 5 inches diameter at breast height (DBH) shall be replaced at 2:1;
      - Trees between 5 and 11.5 inches DBH shall be replaced at 3:1;

- Trees between 12 and 23.5 inches DBH shall be replaced at 5:1;
- Trees 24 inches or greater DBH shall be replaced at 10:1.

1. Based on review of the attached reports and current project plans, the Environmental Coordinator has estimated a minimum of 62 oak trees must be planted (4 trees at the 3:1 ratio, 6 trees at 5:1, and 2 trees at 10:1).

B. The project applicant may propose to pay into a County approved in-leu fee program for oak tree removal compensation if such a program is available. This option must be considered only as a last resort and must be approved by the Environmental Coordinator. Alternative options considered and determined infeasible must be discussed in the Habitat Restoration and Mitigation Plan.

C. Permanent impacts to riparian habitat shall be mitigated through on-site restoration of riparian habitat at a 3:1 ratio of restoration to impacts. All temporarily impacted areas must be restored at a 1:1 ratio through active planting of riparian species. Riparian mitigation sites must be located within areas appropriate for riparian vegetation such as areas that are contiguous to and affected by the hydrology of the creek or another source of hydrology.

D. Riparian enhancement and/or restoration activities (i.e. removal and ongoing management of invasive species) commensurate with the proposed development shall occur within the existing riparian corridor located along the eastern portion of the Study Area.

Prior to Recordation of the Final Subdivision Map

IV. All Portions of Parcel A east of the 50-foot riparian buffer line shall be identified as "Protected Habitat Area" on the final subdivision map where development shall not occur in the future. The final subdivision map shall include the following notes:

A. No development as defined in Chapter 16.32 of the County Code (including, without limitation, removal of trees and other vegetation, grading, paving, installation of structures such as signs, buildings, or other structures of similar impact) shall occur within the Protected Habitat Areas with the exception of the following, subject to the Planning Director's review and approval:

1. The removal of hazardous substances or conditions or non-native or diseased plants or trees provided that such activities have been reviewed and approved by the Planning Director and determined as not involving the unnecessary disturbance of indigenous ground cover or native wildlife;

2. Habitat restoration activities as outlined in the approved Habitat Restoration and Mitigation Plan including habitat management strategies to control re-establishment of invasive non-native species and maintain healthy native habitat.

V. A Habitat Restoration and Mitigation Plan prepared by a qualified biologist or restoration specialist shall be submitted for review and approval by Environmental Planning Staff prior to recordation of the final subdivision map. The establishment and planting of all restoration areas as outlined in this Plan must be completed prior to final inspection of the subdivision improvements for Phase I of the project. The Plan shall be focused on restoring and maintaining native plant structure and species composition of oak woodland and riparian habitats at the required ratios listed in Condition III above and must include the following minimum elements:

A. A map identifying Parcel A east of the 50' riparian buffer line as "Protected Habitat Area" where development shall not occur in the future.

B. A map of all designated restoration areas on site. Restoration areas shall include areas intended for oak woodland habitat restoration, riparian habitat restoration, and areas designated for riparian enhancement and/or restoration activities.

    3. Please note that plantings for mitigation cannot be located in the 25' drainage easement or the 20' sanitation easement. Both of these easements must be shown on the restoration maps and planting plans.

C. A planting plan with species, size, and locations of all restoration plantings that will occur on site. The sizes and distribution of restoration plantings shall be determined by the restoration specialist with the goal of establishing native plant structure and species composition of healthy habitat while maximizing plant health and survivability of individual plants.

    1. The planting plan shall include as many of the 62 replacement trees required under Condition III.A above as can be planted on-site while maintaining this goal. If there is not adequate room on site to plant all the required replacement oak trees in a configuration that creates a healthy oak woodland habitat, the remaining plantings shall occur at a designated off-site location.

D. Identification of any off-site location required for replacement oak tree plantings including a map of all designated restoration areas on that site and a planting plan with species, size, and locations of all restoration plantings.

    1. Property owner approval for a deed restricted mitigation site must be provided for any off-site mitigation locations. An agreement for ongoing access to monitor and maintain the plantings for the required monitoring period must also be included.

E. If applicable as outlined in Condition III.B above, a proposal to pay into a County approved in-leu fee program for oak tree removal compensation including a discussion of the alternative options that were considered.

F. Plan for removal of non-native species on the parcel and a management strategy to control re-establishment of invasive non-native species.

G. Plan for riparian enhancement and/or restoration activities within the existing riparian corridor including methods for removal and ongoing management of invasive species and establishment or re-establishment of native habitat which may include specific treatments to promote natural re-establishment.

H. Information regarding the methods of irrigation for restoration plantings.

I. A plan showing the placement of split rail fencing and location of signs as needed to delineate the Protected Habitat Areas in the field and prevent trespassing. The location of fencing and number and location of protective signs shall be confirmed by the biologist based on site conditions and maximum protection of these habitat areas.

J. Any seed mix used for erosion control purposes on temporarily impacted areas and exposed soils shall be limited to seeds of native species common to the surrounding habitat and/or sterile seeds.

K. A 5-year Management Plan for maintenance and monitoring of restored areas, including a proposed mechanism for evaluating success.

VI. Annual reports outlining the progress and success of the restoration and monitoring shall be submitted to the County Restoration Coordinator: restoration.coordinator@santacruzcountyca.gov by December 31 of each monitoring year.

VII. In addition to the required 5-year annual monitoring and reporting, a 10-year monitoring report shall be prepared and submitted to the County Restoration Coordinator: restoration.coordinator@santacruzcounty.us outlining the continued implementation and results of Habitat Restoration and Mitigation Plan over the 10-year period.

Prior to Permit Issuance

VIII. A focused rare plant survey shall be completed during the identifiable period for all special-status plants with potential to occur and submitted with the permit application for subdivision improvements for Phase I of the project for review and approval by Environmental Planning.

A. If no special-status plants are found, no additional protective measures are required.

B. If any special-status plant is found present in the project impact area, the population shall be mapped and avoided as a sensitive habitat area as outlined in Condition VIII below.

1. If avoidance is not possible, project construction may not commence until additional biotic approval from County Planning is received. Additional impact analysis (demonstrating adequate avoidance, minimization, and mitigation) shall be completed and reviewed by County Planning. Additional environmental analysis may be required based on the results of this review and analysis.

Construction Conditions

IX. To protect sensitive habitats and special-status species during project related construction activities, the following shall be adhered to:

A. Prior to any site disturbance, a pre-construction meeting shall be conducted. The purpose of the meeting will be to ensure that the biotic Conditions of Approval are communicated to the various parties responsible for constructing the project. The meeting shall involve all relevant parties including the project proponent, construction supervisor, Environmental Planning Staff, the project biologist, and the project arborist.

B. Every individual working on the Project must attend biological awareness training prior to working on the job site. The training shall be delivered by a qualified biologist and shall include information regarding the location and identification of sensitive habitats and all special-status species with potential to occur in the project area, the importance of avoiding impacts to special-status species and sensitive habitats, and the steps necessary if any special-status species is encountered at any time.

C. Prior to commencement of construction, high visibility fencing and/or flagging shall be installed with the assistance of a qualified biologist around all sensitive habitat areas to indicate the limits of work and prevent inadvertent grading or other disturbance within the adjacent sensitive habitat.

A. No work-related activity including equipment staging, vehicular access, grading and/or vegetation removal shall be allowed outside the designated limits of work.

B. Native trees to be retained near or within the project impact area shall be identified, protected with high visibility fencing at or outside of the dripline, and avoided during construction as sensitive habitat unless additional protection measures, provided by a qualified arborist, have been reviewed and approval by Environmental Planning Staff.

C. The fencing shall be inspected and maintained daily until project completion.

D. A qualified biologist shall be on site to monitor vegetation removal and initial ground disturbance activities that occur within the riparian corridor (including clearing and grubbing) to identify and recover any special-status species that may be found.

E. If a special-status animal is identified at any time prior to or during construction, work shall cease immediately in the vicinity of the individual. The animal shall either be allowed to move out of harm's way on its own or a qualified biologist shall move the animal out of harm's way to a safe relocation site. The biologist shall be allowed enough time to move any special-status species from the site before work activities begin. All sitings of special-status species shall be reported to the County Environmental Coordinator and submitted to the CNDDB.

F. If a western pond turtle egg clutch is discovered at any time prior to or during construction, work in the vicinity of the egg clutch shall be halted immediately. Unless otherwise advised by CDFW, the nest location shall be protected with high visibility fencing under the guidance of a qualified biologist and shall be avoided until the biologist determines that the clutch has hatched and individuals are no longer likely to be injured by work activities.

G. The following Recommended Avoidance and Minimization measures BIO-1, BIO-2, BIO -5, and BIO-7 of the attached Biotic Report dated Updated October 25, 2023 prepared by Biotic Resources Group shall be adhered to.

BIO-1. Dusky-footed Woodrat. Retain all woodrat houses (middens) on the property. No earlier than two weeks prior to the start of project activities, a qualified biologist should perform a pre-construction survey for woodrat houses within the project work boundaries and a 25-foot buffer around the project site perimeter. Flag and establish buffers around each woodrat house observed. The buffer width will be determined by the qualified biologist, but will not be less than 5 feet. If a woodrat house is present and impacts cannot be avoided, then a qualified biologist shall contact CDFW for approval to implement a woodrat relocation plan. This could involve live trapping and the construction of alternate houses in adjacent suitable habitat. The woodrat relocation plan must be implemented by a qualified biologist possessing a Scientific Collection Permit authorizing the handling of woodrats. Authorization by CDFW must be obtained prior to the implementation of this measure. Post-relocation monitoring may be required by CDFW, as part of the plan.

BIO-2. Bats. Removal of trees and abandoned buildings could result in the loss of roost sites or abandonment of bat roosts through noise or vibrations. Maternity roosts are most important as negative impacts can have broad, far reaching effects, since such roosts are critical for reproduction and can support multiple generations of bats. No more than 30 days prior to demolition/tree removal, the applicant should hire a bat ecologist to investigate the interior of the outbuildings to determine if any bats have been using the structures. The bat ecologist should also check the oak trees to determine if any have cavities suitable for bat roosts. If there is no evidence of bat use (e.g., guano or observation of individuals), then the openings shall be secured/covered to prevent bats from entering prior to demolition and no further mitigation will be required. If bat use is detected, then schedule outbuilding demolition and tree removal to occur between August 15 and February 1 of any given year to avoid the bat breeding season for this part of the central coast. In addition, the bat ecologist shall conduct a focused survey no more than two weeks (14 days) prior to structure demolition and tree removal to determine if bats are currently using either. If no bats are occupying the outbuildings or tree cavities, then demolition may proceed. If bats are observed using the outbuildings or tree cavities, then the bat ecologist, in coordination with CDFW, will recommend methods to either allow bats to leave the outbuildings and trees and not return (exclusion devices), or other methods specific to this demolition project to avoid harm to individual bats. Trees without cavities may have foliage roosting bats occasionally. To avoid harm to individual bats, trees shall be cut down and

allowed to lie on the ground for 24 hours prior to chipping, to allow any foliage roosting bats to leave on their own.

BIO-5. Oak Trees. Avoid construction/development within the dripline of oak woodland vegetation that is to be retained. Implement protective measures around all retained oak trees, as directed by an arborist. Measures may include protective fencing, supervised pruning of limbs and roots, other measures as determined by the arborist.

BIO-7. Nesting Birds. To avoid impacting nesting birds, if present, schedule tree removal and construction to occur between August 1 and March 1 of any given year, which is outside the bird nesting season. If tree removal and/or construction is to occur within the bird breeding season (March 1 - July 31), perform pre-construction nesting bird surveys within one week before the scheduled start of the project. The nesting survey should be performed by a qualified biologist and cover the entire property, since potential nesting raptors may require buffers at a minimum of 300 feet. In the event active nests are observed, the nest site shall be flagged and a buffer shall be established, in an effort to prevent nest failure. The buffer widths shall be determined by the qualified biologist, based on species, site conditions and anticipated construction activities. Active nests should be monitored at a frequency determined by the monitoring biologist, but at a minimum of once per week, until the nestlings have fledged. In the event that construction activities appear to be interfering with nest maintenance (e.g., feedings and incubation), then the buffers should be enlarged or construction activities postponed, until the young have fledged, as determined by the qualified biologist.

H. A brief memo summarizing the results of the preconstruction surveys outlined above in XII BIO-1, BIO-2 and BIO-7 shall be submitted to the Environmental Coordinator for review prior to start of construction.

I. Impacts to oak trees shall be avoided to the maximum extent possible. All Tree Protection Guidelines and Restrictions listed in the attached Arborist Report prepared by Kurt Fouts, shall be adhered to.

Prior to Final

X. Prior to final inspection of the subdivision improvements for Phase I of the project, the following shall occur:

A. Establishment and planting of all restoration areas as outlined in the final approved Habitat Restoration and Mitigation Plan and placement of protective fencing and signs around the Protected Habitat Area shall be inspected and approved by Environmental Planning staff.

B. Receipt of full payment into any approved in-lieu fee program must be provided to the County.

APN 029-391-01, 02, 03 and APN 029-064-19
MATTISON LANE, SANTA CRUZ

Locatelli Subdivision Project

Biotic Report

Updated October 25, 2023

Biotic Resources Group

Biotic Assessments ◆ Resource Management ◆ Permitting

Biotic Resources Group
Biotic Assessments ◆ Resource Management ◆ Permitting

APN 029-391-01, 02, 03 and APN 029-064-19
MATTISON LANE, SANTA CRUZ

Locatelli Subdivision Project

Biotic Report

Prepared for
Claudio Locatelli
c/o Swift Consulting Services
Attn: Ken Hart

Prepared by:
Biotic Resources Group
Kathleen Lyons, Plant Ecologist

Original Report: December 13, 2013

Updated Report October 25, 2023

2551 South Rodeo Gulch Road #12 ◆ Soquel, California 95073 ◆ (831) 476-4803 ◆ brg@cruzio.com

BIOTIC REPORT

EXECUTIVE SUMMARY

The proposed project is a 25-lot residential subdivision, with access road to the lots from Mattison Lane. The configuration of the proposed subdivision is depicted on the *Preliminary Grading and Drainage Plan Locatelli Subdivision,* (Ifland Engineers, plans dated 9/27/2023). Project features include creation of the 25 lots (parcels A1-A10, B1-4, C1-2, D1-2, and E1-8), a 24-foot wide road right-of-way for a 30-foot wide access road/cul-de-sac, a 10-foot wide storm drain easement to Rodeo Creek for a 12-inch diameter above-ground drainage pipe with rock energy dissipater, a 12-foot wide sewer line easement, and dispersed stormwater detention/rain gardens. The project also includes a 50-foot wide riparian corridor buffer, pursuant to the County Riparian Corridor Protection Ordinance. Due to the sewer moratorium affecting the area of Live Oak, the project is proposed to be developed in two phases. Phase 1 will be limited to the development of 16 units based on the moratorium allowing up to four new connections per parcel. The common roadway and utilities would be part of Phase 1. The water and sanitary sewer connections will also be part of Phase 1.

The project includes demolition of two existing residences, several outbuildings, removal of native and non-native trees, site grading, utility construction, and residential construction.

Botanical

A botanical assessment was conducted in winter 2013, November 2016, and September/October 2022 to document plant resources on the property, with a focus given to areas proposed for residential development. The parcel was found to support the following vegetation types: oak woodland, riparian woodland, annual grassland, and residential/commercial landscaped areas. The oak woodland and riparian woodland are considered to be sensitive habitats under County Code. No rare or locally unique plant species were observed on site based on surveys and none are expected due to the disturbed ruderal (weedy) condition of the site.

The project will permanently impact 0.01 acre of extant oak woodland (canopy) which is the removal of one oak tree located along the eastern property line. Indirect impacts to oak woodland will occur by grading and residential construction beneath the canopy of one mature oak tree (24" diameter) that is to be retained. In addition, approximately 0.25 acre of oak woodland (canopy) that was previously on-site yet recently removed, comprised of 11 oak trees, is considered a project impact. The project will also impact riparian woodland along Rodeo Creek. A new 12"-diameter storm drain, with energy dissipater, will permanently impact 74 square feet (0.002 acre) of riparian woodland along into Rodeo Creek. Construction access will temporarily affect 440 square feet (0.01 acre) of the woodland for placement of the outfall and an above-ground drainage pipe. Placement of the storm drain to Rodeo Creek will be done when the creek is dry; no dewatering will be required for placement of the drainage pipe or rocked energy dissipater.

With the exception of the storm drain to the creek, the project maintains a 50-foot wide riparian buffer between the residential development and the riparian woodland/ top-of-bank. The buffer, encompassing 0.85 acre, will be retained as open space. The buffer area will include 0.18 acre of extant oak woodland and 0.67 acre of grassland that will be revegetated with native oak woodland and riparian trees and shrubs. The plantings will provide compensation for the removal of oak woodland and riparian woodland from the development. All equipment staging and access will be from the adjacent roads, located outside the riparian corridor (including the 50-foot riparian setback); however, project construction (and long-term maintenance) will occur within the 10-foot wide riparian buffer for the dispersed stormwater detention/rain gardens that are located at the rear of several residential units.

Wildlife

The project site is not located in any County-defined sensitive wildlife zones. The project site was determined to support nesting birds within the riparian woodland and oak woodland trees. The San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), a state species of special concern, occurs in the riparian woodland; and other special-status wildlife were considered potential inhabitants. Measures to protect wildlife were prepared and are included in this report, including pre-construction surveys for nesting birds (trees adjacent to construction) and dusky-footed woodrat (storm drain area).

Intended Use of this Report

The findings presented in this biological report are intended for the sole use of the current property owner (Claudio Locatelli) and Santa Cruz County in evaluating the proposed project. The findings presented by the Biotic Resources Group in this report are for information purposes only; they are not intended to represent the interpretation of any State, Federal or County law or ordinance pertaining to permitting actions within sensitive habitat or endangered species. The interpretation of such laws and/or ordinances is the responsibility of the applicable governing body.

1.0 INTRODUCTION

The proposed residential subdivision property (2450 Mattison Lane) encompasses approximately 5 acres on four parcels (APN 029-391-01, 02, 03, and 029-061-19). The property is located southwest of Mattison Lane, east of the intersection of Mattison Lane and Maciel Avenue, within the Live Oak area of Santa Cruz County (**Figure 1**). The property currently supports two single-family residences, outbuildings and remnants of a former commercial nursery (nursery closed circa 2013). The property also has storm drain and sanitary sewer easements.

1.1 PROPOSED PROJECT

The proposed project is a 25-lot residential subdivision, with access road to the lots from Mattison Lane. The configuration of the proposed subdivision is depicted on the *Preliminary Grading and Drainage Plan Locatelli Subdivision,* (Ifland Engineers, plans dated 9/27/2023). Project features include creation of the 25 lots (parcels A1-A10, B1-4, C1-2, D1-2, and E1-8), a 24-foot wide road right-of-way for a 30-foot wide access road/cul-de-sac, a 10-foot wide storm drain easement to Rodeo Creek (above-ground drainage pipe with rock energy dissipater), a 12-foot wide sewer line easement, and dispersed stormwater detention/rain gardens. The project also includes a 50-foot wide riparian corridor buffer, pursuant to the County Riparian Corridor Protection Ordinance. Due to the sewer moratorium affecting the area of Live Oak, the project is proposed to be developed in two phases. Phase 1 will be limited to the development of 16 units based on the moratorium allowing up to four new connections per parcel. The common roadway and utilities would be part of Phase 1. The water and sanitary sewer connections will also be part of Phase 1.

The project includes demolition of two existing residences, several outbuildings, removal of native and non-native trees, site grading, utility construction, and residential construction.

The Biotic Resources Group assessed the biotic resources of the property. The focus of the assessment was to identify sensitive biotic resources within the project area and evaluate the proposed activities relative to such resources.

Specific tasks conducted for this study include:

- Characterize and map the major plant communities on the property;
- Identify sensitive biotic resources, including plant and wildlife species of concern, within areas

proposed for development activities,

- Evaluate the potential effects of the proposed project on sensitive biotic resources and recommend measures to avoid or reduce such impacts. A landscape plan prepared for the project (Gregory Lewis Landscape Architect, dated 10/10/2023) was reviewed. A mitigation plan has also prepared. The mitigation plan outlines riparian restoration to provide compensation for impacts to riparian woodland from the storm drain and oak woodland restoration to provide compensation for impacts to oak woodland from the development.

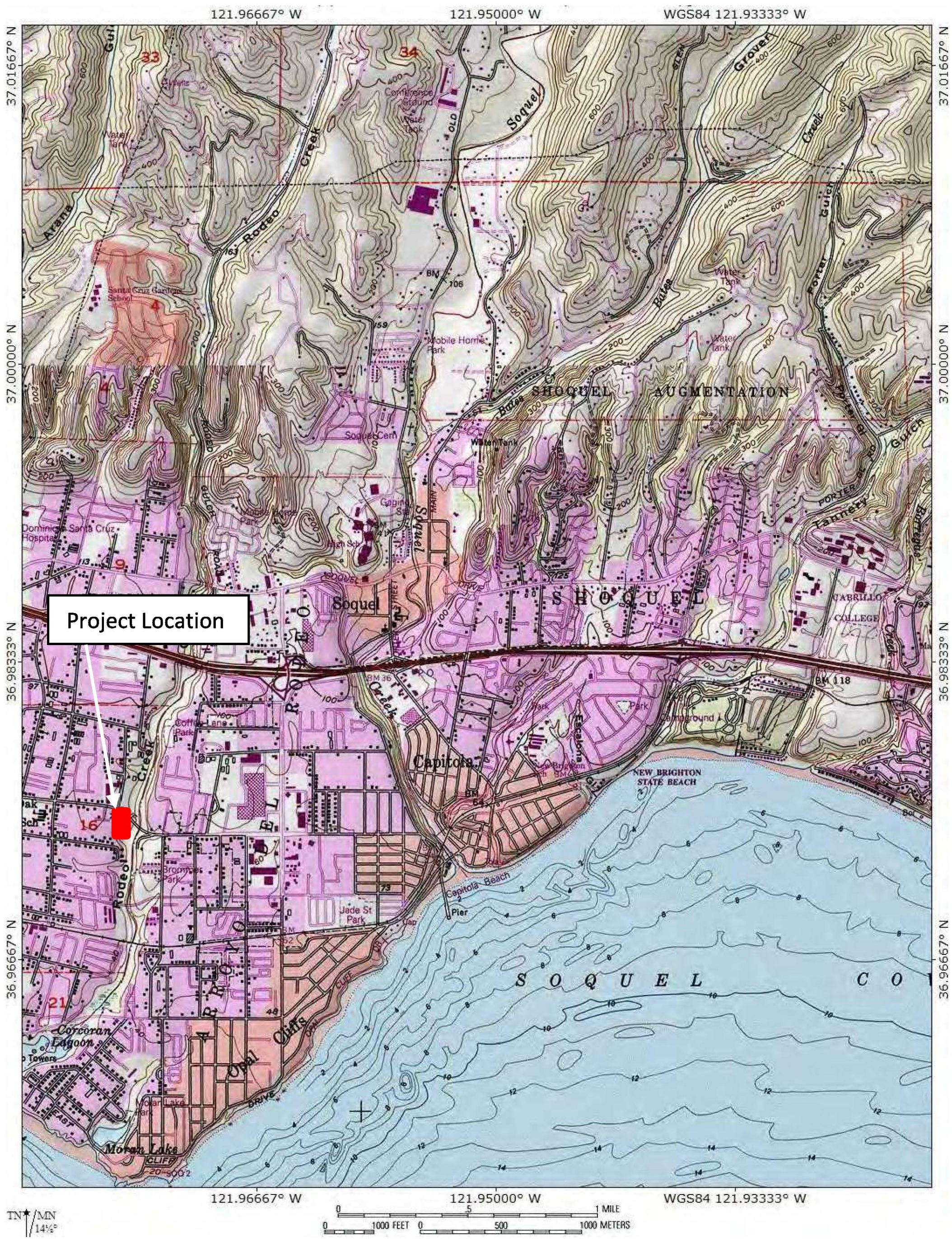


Figure 1. Project Location on USGS Soquel Quad Topographic Map

Project History

A biotic report was prepared for an 11-lot subdivision in December 2013 (2450 Mattison Lane – Proposed Subdivision, Biotic Resources Group, 2013) and was submitted to the County for review. In 2016, the County requested a re-evaluation of the limits of the riparian corridor and a review of the riparian area was conducted (Letter to Jon Ifland, Biotic Resources Group, letter dated November 2016). With concurrence with County Planning personnel, the review found that this portion of Rodeo Creek has intermittent flow, meets the definition of an arroyo under County Code and is subject to a 50-foot wide buffer/setback, measured from the top-of-bank/edge of riparian vegetation.

In 2022, comments were received from County Environmental Planning personnel (letter from Juliette Robinson, dated August 9, 2022) requesting an updated biotic report. In addition, the County required that "areas identified in the 2013 biotic report as 'oak groves' must be evaluated as oak woodland habitat. The County considers these groves to be remnant oak woodlands, even if the understory or surrounding areas have been disturbed by human activity". The letter also requested the biotic report identify the oak woodlands and riparian woodland as sensitive habitats under the County's Sensitive Habitat Protection Ordinance and evaluate the resources for potential habitat for special status species. The letter also requires the report to identify avoidance and minimization measures and project impact map(s).

Revisions were made to project plans in 2023, including retaining a mature oak tree, as requested County Environmental Planning personnel. This report reflects the currently proposed updated project.

2.0 METHODOLOGY

Botanical

A survey to document site conditions and botanical resources on the property was conducted in December 2013, November 2016, and October 2022. Study methodology included field reconnaissance surveys, aerial photograph interpretation, and accessing electronic databases.

Prior to conducting the field surveys, a potential list of special status or sensitive species was reviewed, utilizing species recognized by California Department of Fish and Wildlife (CDFW) and US Fish and Wildlife Service. The proposed residential development area was walked. The major plant community types on the property, based on the classification system developed by CNDDB's *California Terrestrial Natural Communities (*CDFG 2022) and *A Manual of California Vegetation* (Sawyer and Keeler-Wolf 1995) and as amended to reflect site conditions, were mapped during the field survey. Plant community types as recognized by CDFW were used to the greatest extent feasible, however, modifications to the classification system's nomenclature were made, as necessary, to accurately describe the sites resources, particularly for areas that the CDFG system provides no suitable classification. The plant communities were mapped onto an aerial image of the property (**Figure 2**). The *Jepson Manual* (2012) and *An Annotated Checklist of the Vascular Plants of Santa Cruz County, California* (CNPS, 2013) were the principal taxonomic references used for the botanical work. was the principal taxonomic reference used for the botanical work.

To assess the potential occurrence of special status botanical resources, two electronic databases were accessed to determine recorded occurrences of sensitive plant communities and sensitive species. Information was obtained from the California Native Plant Society's (CNPS) Electronic Inventory (2022), and California Department of Fish & Wildlife (CDFW) RareFind database (CDFW, 2022) for the Soquel USGS quadrangle and surrounding quadrangles. As spring season surveys were not conducted, the suitability of the site to support special status species was determined based on a review of soil

conditions, compaction, condition of existing vegetation, and the plant ecologist's knowledge of the field conditions required for special status species.

Wildlife

The existing habitat conditions of the project site and surrounding landscape were evaluated based on reconnaissance-level surveys and interpretations of Google Earth images. The project site was walked and photographed in December 2013 and November 2016 (Dana Bland, wildlife biologist) and re-evaluated in October 2022 (Garvin Hoefler, wildlife biologist). The principal habitats were identified and general characteristics were recorded in a field notebook. In addition to the field survey, several resources were reviewed, including the California Natural Diversity Data Base (CNDDB). A background literature review was conducted to identify special-status species occurrences in the surrounding project vicinity. These included State Species of Special Concern, State Fully Protected Species, and State and Federal Endangered and Threatened Species or candidates for listing. Sources for the literature search included the Soquel 7.5' USGS quad of the CNDDB (2022), Xerces Society Western Monarch Count (https://www.westernmonarchcount.org/data/), and other regional species reports. Habitat suitability of the property for special-status species was evaluated during the assessment.

3.0 ENVIRONMENTAL SETTING

The Mattison Lane property lies at the mid-portion of the geographic area known as the Central Coast Range and extends eastward to the San Francisco Bay Area Range (Hickman, 1993). The study area has coastal influences as it occurs near the Pacific Ocean. Presently, the property supports two single-family residences and several outbuildings, landscaping associated with the existing residences, buildings and landscaping associated with former commercial nursery, riparian woodland along Rodeo Creek, and oak tree groves that are identified by the County as oak woodland.

The project area supports four habitat types: riparian woodland, oak woodland, annual grassland, and urban landscaping. Each habitat type, its CDFW natural community alliance, California vegetation code (CaCode), and state ranking (rarity) are listed in **Table 1**. The location of these habitat types, as of October 2022, is depicted on **Figure 2**.

The soils on the property are mapped as Elkhorn sandy loam, 2 to 9 percent slopes (133) and Aquents (flooded areas along Rodeo Creek) (103).

Table 1. Habitat Types and Natural Community Vegetation Types, October 2022

CaCode[1]	Habitat Type	CDFW Natural Community Alliance	State Ranking[2]	Sensitive?
61.202.02	Riparian Woodland	*Salix lasiolepis – Salix laevigata - Rubus ursinus -Urtica doicea*	S4	CDFW – Yes County - Yes
32.220.00		*Eucalyptus* globulus *–Pinus radiata*[3] *– Rubus armeniacus*	None	CDFW – No County - Yes
71.060.09	Oak Woodland	*Quercus agrifolia / grasses*	S4	CDFW – No County - Yes
44.150.03	Annual Grassland	*Avena sp. – Panicum sp. Raphanus sativa – Plantago lanceolata – Scabiosa sp. / Rubus armeniacus*	None-	CDFW – No County - No
None	Urban Landscaping	Landscape Trees and Shrubs	None	CDFW – No County - No

[1] – California vegetation code as per CDFW (July, 2022); [2]- Vegetation types are ranked between S1 and S5. For vegetation types with ranks of S1-S3, all associations within the type are considered to be highly imperiled. [3] Non-native Monterey pines

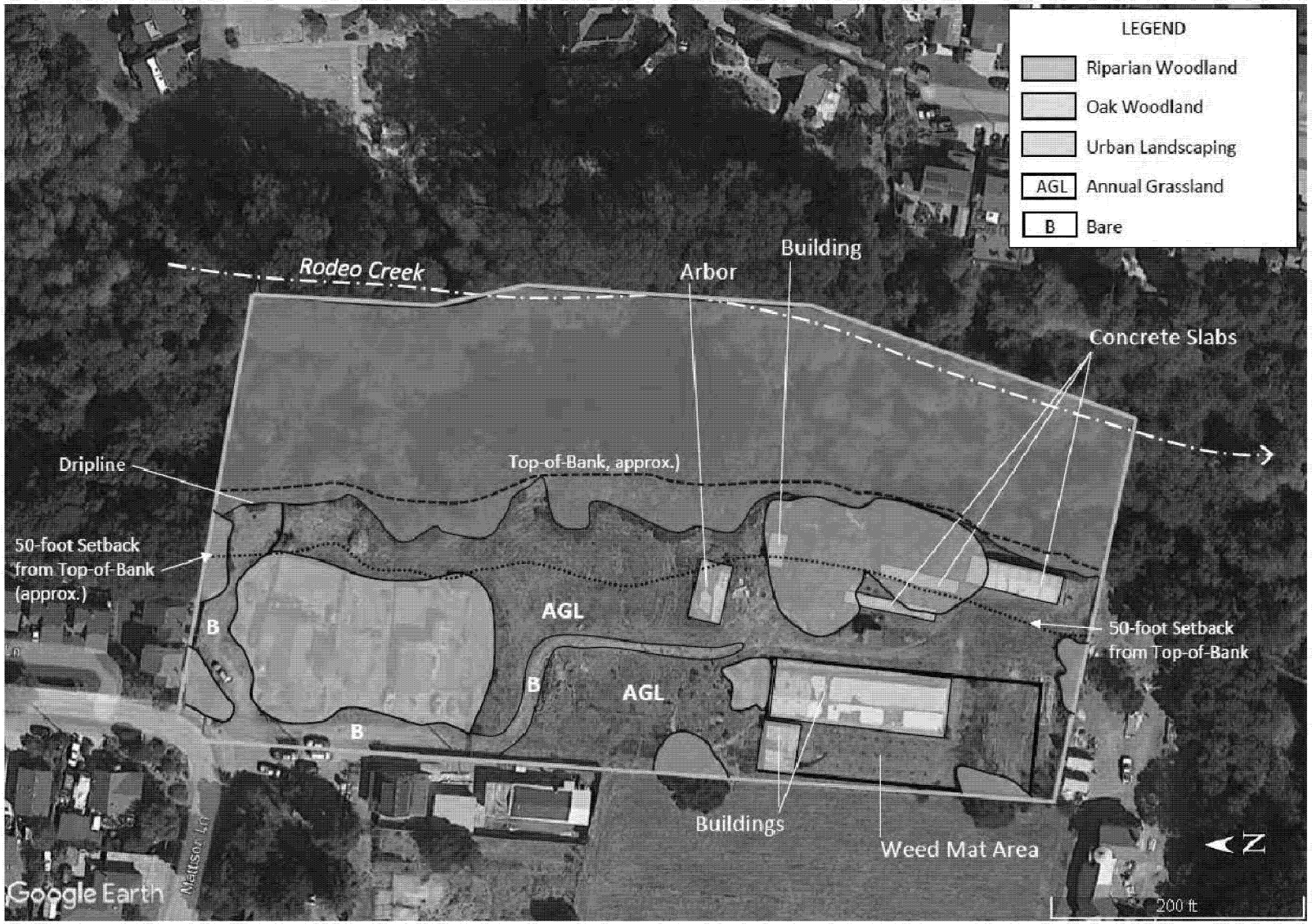


Figure 2. Habitat Types on Property, October 2022

3.1 Riparian Woodland

The property supports a portion of Rodeo Creek. The creek supports a wide band of riparian woodland; this woodland is located along the eastern property line and extends westward up the slope of the arroyo to the top of bank. The vegetation is dominated by arroyo willow (*Salix lasiolepis)*, yet supports a large grove of blue gum eucalyptus (*Eucalyptus globulus)*, with non-native Monterey pines (*Pinus radiata)*. The southwestern portion of the riparian woodland abuts a grove of coast live oak trees (oak woodland) that grow on the flat terrace outward of the top-of-bank. The riparian woodland understory is dense with young willows as well as common understory plants of California blackberry (*Rubus ursinus)*, poison oak (*Toxicodendron diversilobum)*, bracken fern (*Pteridium aquilinum)*, stinging nettle (*Urtica dioica)*, as well as non-native Himalaya berry (*Rubus procerus),* Cape ivy (*Delairea odorata)* and English ivy (*Hedera helix)*. The character if the vegetation is depicted in **Figure 3** and **Figure 4**.

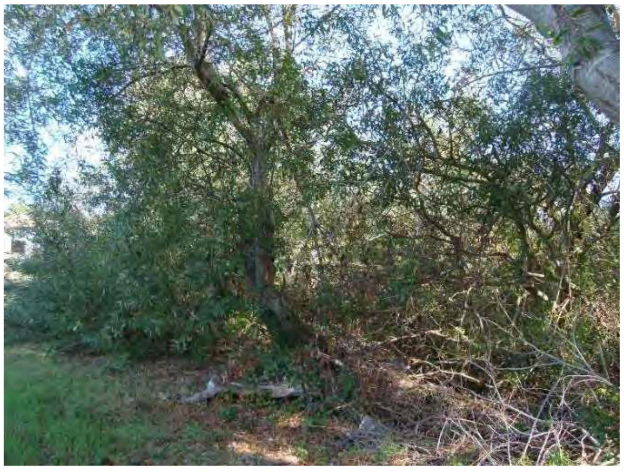


Figure 3. Willow-dominated riparian woodland on subject property, October 2022

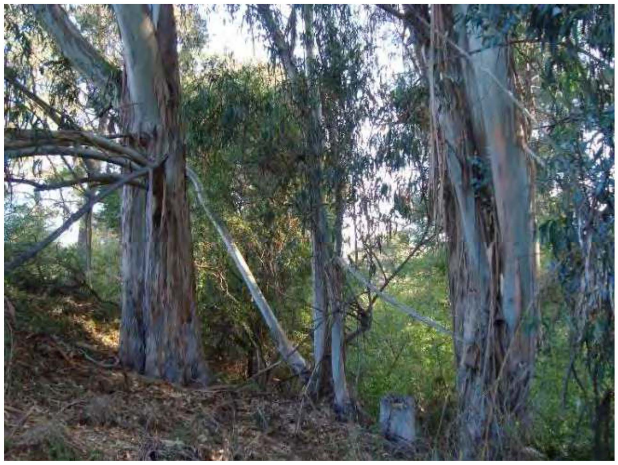


Figure 4. Eucalyptus-dominated riparian woodland on subject property, October 2022

The value to native wildlife of the riparian habitat along this portion of Rodeo Creek is moderated by the presence of areas of dense non-native plant cover, such as ivy and eucalyptus. Rodeo Creek is shown as an intermittent creek on the USGS topo map (Soquel Quad). Rodeo Creek flows into Corcoran Lagoon approximately 1.25 miles downstream of this project site, and the lagoon flows into Monterey Bay. Common wildlife species that are expected to inhabit the Rodeo Creek riparian at this site include Pacific chorus frog (*Pseudacris regilla*), red-shouldered hawk (*Buteo lineatus*), Pacific-slope flycatcher (*Empidonax difficilis*), black phoebe (*Sayornis nigricans*), Wilson's warbler *(Wilsonia pusilla),* Bewick's

wren (*Thryomanes bewickii*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), and California myotis (*Myotis californicus*).

3.2 Oak Woodland

This habitat type is currently located amid the former nursery structures, abutting the riparian woodland, as well as scattered oak trees/tree groups along the south and west property lines, as depicted on **Figure 2**. Within the oak woodland, the trees are dominated by coast live oaks (*Quercus agrifolia)*, with a few nearby non-native trees associated with the former nursery, such as magnolia (*Magnolia sp.)* and *Prunus*. The understory is comprised of herbaceous species typical to the adjacent annual grassland, yet young oak trees have naturally colonized the edges of the former nursery structures. **Figure 5** and **Figure 6** depict the character of the extant oak woodland on the property.

The value of the oak woodland (tree groves) on this property to wildlife is moderated by its location in an urbanized area and the paucity of native understory plants. Common wildlife, particularly those that can tolerate human presence, are expected to utilize these oak trees for cover, nesting, and roosting, including western fence lizard (*Sceloporus occidentalis*), rock dove (*Columba livia*), acorn woodpecker (*Melanerpes formicivorus*), scrub jay (*Aphelocoma californica*), chestnut-backed chickadee (*Poecile rufescens*), and western gray squirrel (*Sciurus griseus*). The oak woodland lacks woody understory vegetation or downed woody debris, and thus has limited niches for wildlife.

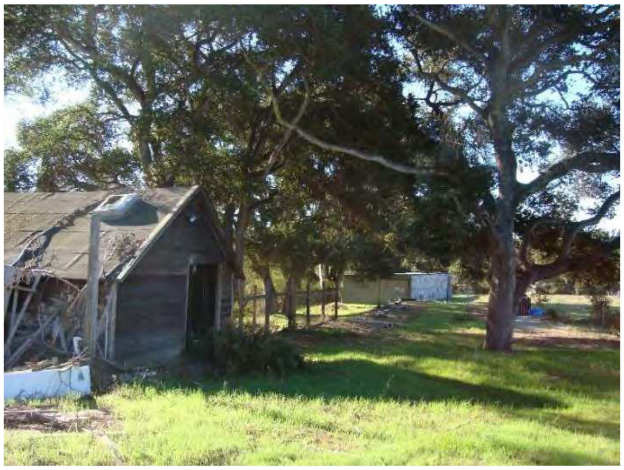


Figure 5. Oak woodland amid the former nursery structures, October 2022

Figure 6. Oak woodland that straddles the western property line, October 2022

The woodland is considered sparse, due to the spacing of the trees and degraded understory (i.e., lack of shrubs or small trees typical to dense oak woodland and presence of concrete slabs). The County's Sustainability Policy and Regulatory Update DEIR describes oak woodland on drier sites as having widely-spaced trees, forming an open woodland or savannah. When trees are scattered and form an open woodland, the understory is grassland, sometimes with scattered shrubs. The 2013 biotic report mapped these trees as oak groves; this mapping is depicted in **Figure 7**. However, the County asserted the oaks on the subject property fit the description of oak woodland (letter from Juliette Robinson, dated August 9, 2022) and the tree groves would be considered oak woodland, a sensitive habitat, under County Code. A revised vegetation map, dated October 2022, shows the extant oak trees as oak woodland (**Figure 2).** In 2013, the property was found to support 22 oak trees (*Preliminary Existing Site Conditions and Demolition Plan,* Ifland Engineers, dated 10/25/13), which included oak trees around the two existing residences; however, by October 2022 several of these trees had been cut, as noted on **Figure 7**. A review of aerial images found the trees were cut in 2021. The tree stumps, with a little brushy re-growth, are present amid the residential/urban landscaping. Appendix A of the arborists report has documented 11 trees that were removed.

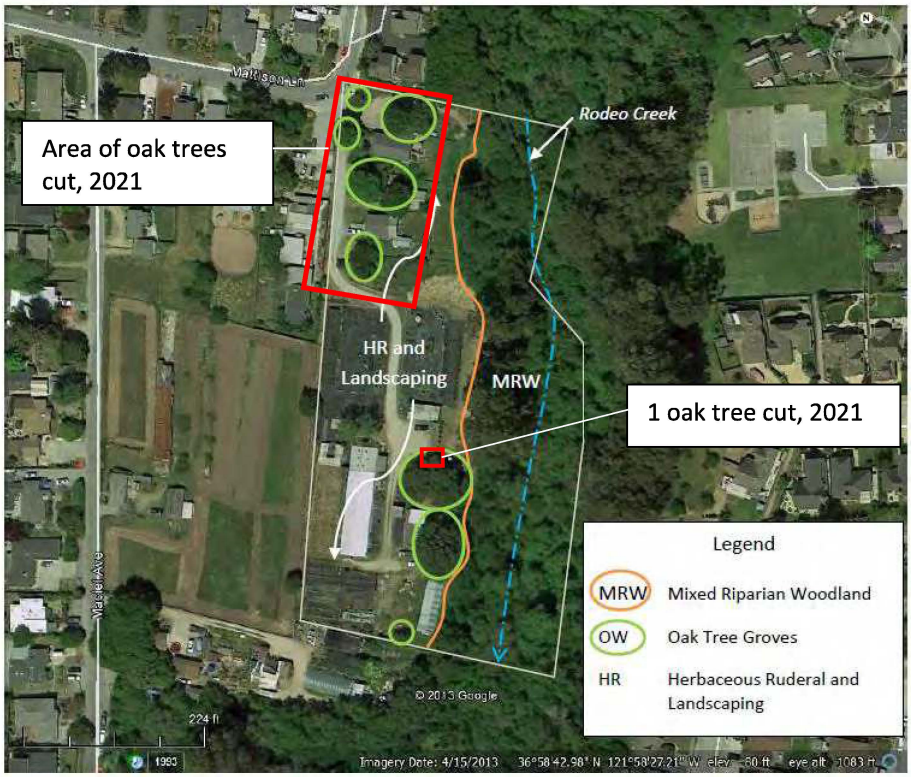


Figure 7. Vegetation types mapped in 2013. NOTE: Highlighted oak trees cut in 2021

3.3 Annual Grassland

The majority of the property supports annual grassland. This habitat type is ruderal (weedy) and occurs around the existing residences and the former nursery structures; most of the grassland areas were former plant growing-grounds. The vegetation is dominated by non-native species that are typical to previously disturbed areas; the most prevalent vegetation is wild oat (*Avena sp.)*, annual ryegrass (*Lolium multiflorum),* English plantain (*Plantago lanceolata)*, wild lettuce (*Lactuca spp.)*, mallow (*Malva sp.)*, horehound (*Marrubium vulgare)*, wild radish (*Raphanus sativa)*, bristly ox-tongue (*Picric echioides)*, pincushion flower (*Scabiosa sp.)*, and scattered California poppy (*Eschscholzia californica)*. The

character of the grassland is depicted in **Figure 8**.

The dominance of non-native plants in this habitat on the property reduces its value to native wildlife. Common seed-eating birds such as California towhee (*Pipilo crissalis*) and American goldfinch (*Carduelis tristis*) may occasionally forage in this habitat.

Figure 8. Annual grassland amid former nursery structures, October 2022

3.4 Urban Landscaping

The property supports residential/urban landscaping, most of which is concentrated around the existing residences and the former nursery structures (**Figure 9** and **Figure 10**). Typical non-native landscape species were observed, such as cotoneaster (*Cotoneaster sp.)*, hopseed bush (*Dodonaea sp.)*, persimmon (*Diospyros kaki)*, *Prunus,* acacia (*Acacia sp.)*, ash (*Fraxinus sp.)*, privet (*Ligustrum sp.)*, lemonade berry (*Rhus integrifolia)*, *Escallonia sp.* and sage (*Salvia spp.)*. Planted landscape trees include magnolia, *Populus,* and *Prunus*. The non-native landscape plants are generally of low value to native wildlife; however, some common species that may occasionally forage on these plants includes Anna's hummingbird (*Calypte anna*).

Figure 9. Urban landscaping amid former nursery structures, October 2022

Figure 10. Urban landscaping around existing residences, October 2022

4.0 REGULATED AND SENSITIVE HABITATS

4.1 Federal and State Regulated Habitats

California Department of Fish and Wildlife (CDFW) is a trustee agency that has jurisdiction under Section 1600 et seq. of the California Fish and Game Code. CDFW regulates all diversions, obstructions, or changes to the natural flow or bed, channel or bank of any river, stream or lake which supports fish or wildlife. Along watercourses, CDFW's jurisdictional limit typically extends to the top of bank or to the edge of riparian habitat if such habitat extends beyond top of bank (outer drip line), whichever is greater. Rodeo Creek on the subject property is within the regulatory jurisdiction of CDFW. In a few areas on the property the willow canopy extends outward of the top-of bank. Any activity in this area, including placing fill/altering the channel and/or vegetation removal, would occur in CDFW's regulatory jurisdiction and would likely be subject to a Streambed Alteration Agreement with CDFW under Code 1600 (Streambed Alteration Agreement) (pending confirmation by this agency). As the storm drain work will impact riparian woodland, compensatory mitigation is typically required by this agency.

Water quality in California is governed by the Porter-Cologne Water Quality Control Act and certification authority under Section 401 of the Clean Water Act, as administered by the Regional Water Quality Control Board (RWQCB). The Section 401 water quality certification program allows the State to ensure that activities requiring a Federal permit or license comply with State water quality standards. Water quality certification must be based on a finding that the proposed discharge will comply with water quality standards which are in the regional board's basin plans. The Porter-Cologne Act requires any person discharging waste or proposing to discharge waste in any region that could affect the quality of the waters of the state to file a report of waste discharge. The RWQCB issues a permit or waiver that includes implementing water quality control plans that take into account the beneficial uses to be protected. Waters of the State subject to RWQCB regulation extend to the top of bank, as well as isolated water/wetland features and saline waters. Should there be no Section 404 nexus (i.e., isolated feature not subject to USACE jurisdiction); a report of waste discharge (ROWD) should be filed with the RWQCB. The RWQCB interprets waste to include fill placed into water bodies. Rodeo Creek on the subject property is within the regulatory jurisdiction of RWQCB; RWQCB jurisdiction extends to the top-of-bank. Any activity in these areas, such as placing fill in the channel and/or vegetation removal, would occur in RWQCB's regulatory jurisdiction; this work would likely require a permit from RWQCB under Section 401 (Water Quality Certification) or a ROWD (pending confirmation by this agency). As the storm drain and energy dissipater will occur within RWQCB jurisdiction and work will impact riparian woodland,

compensatory mitigation is typically required by this agency.

The US Army Corps of Engineers (USACE) regulates activities within waters of the United States pursuant to congressional acts: Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (1977, as amended). Section 10 of the Rivers and Harbors Act requires a permit for any work in, over, or under navigable waters of the United States. Navigable waters are defined as those waters subject to the ebb and flow of the tide to the Mean High Water mark (tidal areas) or below the Ordinary High Water mark (freshwater areas). Rodeo Creek up to the Ordinary High Water Mark is within the regulatory jurisdiction of USACE. The proposed above-ground storm drain and energy dissipater will be placed above the flow line of Rodeo Creek (above OHWM), which will be outside USACE; therefore, no permits are expected from this agency.

4.2 State and County Regulated Sensitive Habitats

Sensitive habitats are defined by local, State, or Federal agencies as those habitats that support special status species, provide important habitat values for wildlife, represent areas of unusual or regionally restricted habitat types, and/or provide high biological diversity (Santa Cruz County Code and CDFW). The riparian woodland of the subject property is considered sensitive and activities within the corridor are regulated by the County as per the Riparian Corridor and Wetlands Protection Ordinance (16.30). The County conducted a riparian pre-site inspection of the property and determined the Rodeo Creek ravine meets the definition of an arroyo. The buffer distance for this arroyo is 50-feet, measured outward from the edge of the arroyo. An additional 10-foot setback, measured outward from the 50-foot buffer, is also required for all structures to allow for construction equipment access and use of the yard area. No structures are allowed within the riparian corridor and its setback area unless an exception permit is granted per the Riparian Corridor and Wetlands Protection Ordinance. Compliance with applicable permits or review requirements of USACE, CDFW, and other federal or state agencies is also required. If impacts cannot be avoided, compensatory mitigation is required, which typically involves habitat replacement. The project proposes project construction (and long-term maintenance) of dispersed stormwater detention/rain gardens within the 10-foot wide riparian buffer. In addition, placement of the storm drain will occur within the riparian woodland. A riparian exception permit from the County is required per the Riparian Corridor and Wetlands Protection Ordinance. As the work will impact riparian woodland, compensatory mitigation is typically required, which may involve habitat/tree replacement.

Another County-defined sensitive habitat on the property is oak woodland. The oak woodland on the subject property meets the definition of a sensitive habitat under County Code (pending confirmation by this agency). As per the County's Sensitive Habitat Ordinance, the project is required to avoid impacts to such resources. If impacts cannot be avoided, compensatory mitigation is required, which may involve habitat/tree replacement. Oak woodland that is currently extant on the property is depicted on **Figure 2**. **Figure 7** depicts the oak woodland removed (11 oak trees) from the site in 2021. The property has been subject to intensive land uses for many years. The historic photo record shows residential and commercial nursery operations on site for over 30 years. The nursery ceased operation circa 2013. Presently, the property supports a mosaic of native and non-native woody plant species within the riparian woodland and oak woodland, as presented in **Figure 11**.

CDFW classifies and ranks the State's natural communities to assist in the determining the level of rarity and imperilment. Vegetation types are ranked between S1 and S5. For vegetation types with ranks of S1-S3, all associations within the type are considered to be highly imperiled. If a vegetation alliance is ranked as S4 or S5, these alliances are generally considered common enough to not be of concern; however, it does not mean that certain associations contained within them are not rare (CDFW, 2022). The willow alliance on the subject property are ranked as sensitive (i.e., S1-S3) by CDFW.

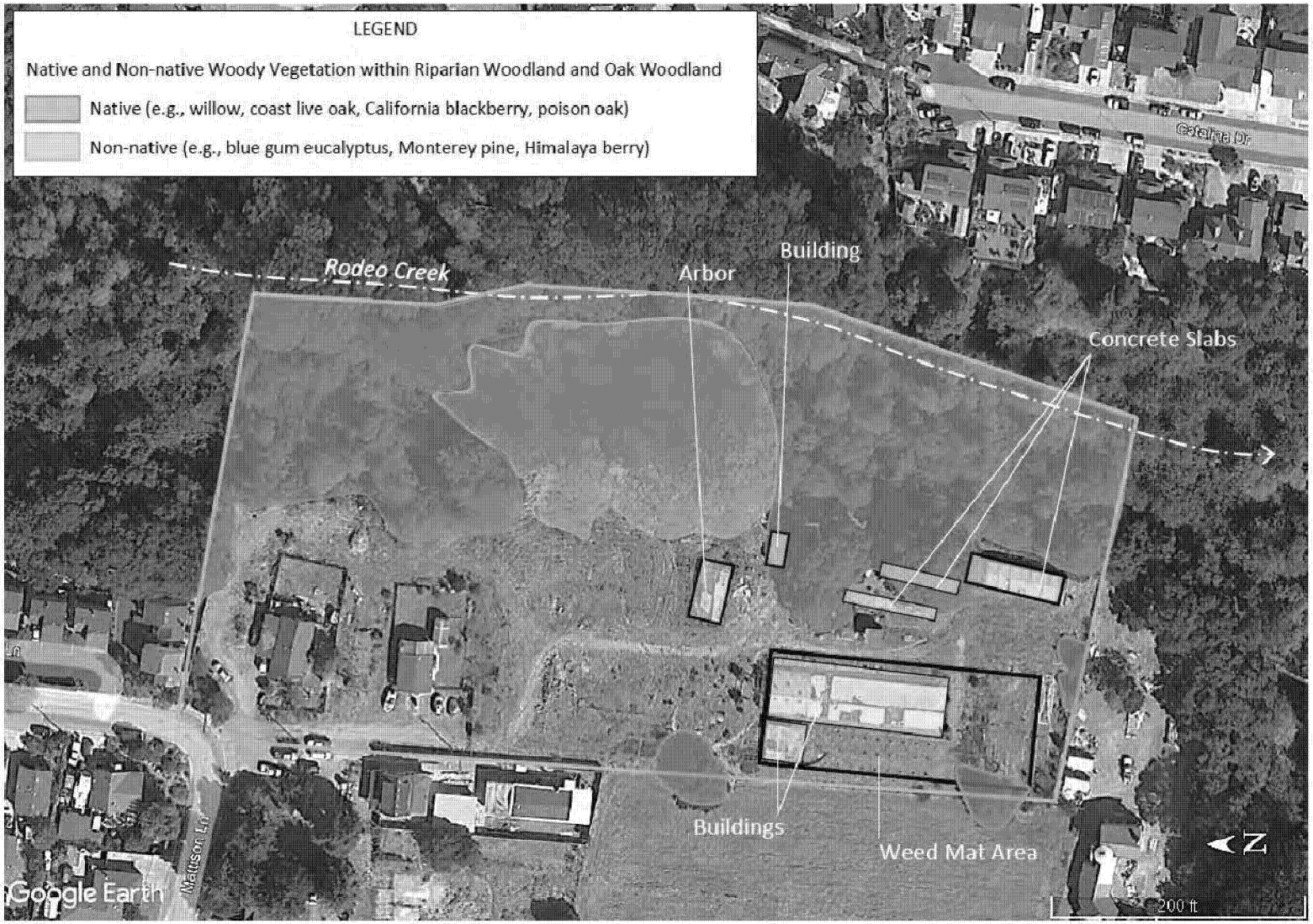


Figure 11. Distribution of native and non-native trees in riparian woodland and oak woodland, October 2022

5.0 SPECIAL STATUS SPECIES

5.1 Special Status Plants

The biotic review focused on special status plant species that are officially listed by the State and/or Federal government and CNPS List 1B. No special status plant species have been recorded for this property as per the CNDDB. The species evaluated for potential occurrence on the property, as per CNDDB records, are listed on **Table 2**.

Of the special status plant species evaluated for their potential to occur on the property (see Table 2), only two species, have been documented in the greater project vicinity. The Santa Cruz tarplant (*Holocarpha macradenia)* is known from the Soquel Hills and from inland portions of Twin Lakes State Beach. These occurrences are located approximately two miles to the northeast and southwest of the subject property, respectively, where the species occupies coastal prairie grassland. Although the biotic review was conducted outside the blooming period of this species (typically blooms June-August), the potential presence of this species is considered low due to the existing residential and commercial nursery land uses on the property.

The Santa Cruz clover (*Trifolium buckwestiorum)* is known from the SeaCrest Development in Soquel. This occurrence is located approximately 2.5 miles to the northeast of the subject property, where the species occupies mesic areas in coastal prairie grassland. Although the biotic review was conducted outside the blooming period of this species (typically blooms March - April), the potential presence of this species is considered low due to the existing residential and commercial nursery land uses on the property and the lack of mesic microhabitat conditions, needed for the species growth.

The site does not support suitable habitat for special status plant species and none were observed, or are predicted, to occur on the property. The CDNNB BIOS has no record of plant species on the subject property, yet there is an historic records of Santa Cruz tarplant to the south; he CNDDB considers this historic occurrence extirpated. Records in the project vicinity are depicted on **Figure 12**.

Table 2. Special Status Plant Species Evaluated for Mattison Lane Parcels

Species	CNPS Ranking	State Status	Federal Status	Habitat Preference; Closest Known Occurrences
Anderson's manzanita (*Arctostaphylos andersonii)*	List 1B.2	None	None	**NOT PRESENT**. Chaparral and forests; recorded from UCSC area and Bonny Doon; not observed
Hooker's manzanita *(Arctostaphylos hookeri ssp. hookeri*)	List 1B.2	None	None	**NOT PRESENT**. Sandy slopes, often intermixed with oak woodland; known from East bel Mar area, Calabasas area and Fiesta Way area; not observed
Pajaro manzanita *(Arctostaphylos pajaroensis*)	List 1B.1	None	None	**NOT PRESENT**. Sandy slopes, often intermixed with oak woodland; 1935 collection from Calabasas area; known from Prunedale area; not observed
Congdon's tarplant (*Centromadia parryi ssp. congdonii)*	List 1B.2	None	None	**NOT PRESENT**. Mesic grassland, heavy clay, alkaline; recorded from Ellicott Slough NWR; no suitable habitat
Monterey spineflower *(Chorizanthe pungens var. pungens)*	List 1B.2	None	Threatened	**UNLIKLEY**. Sandy slopes, can be intermixed with oak woodland/maritime chaparral; recorded from East Bel Mar, Fiesta Way

Table 2. Special Status Plant Species Evaluated for Mattison Lane Parcels

Species	CNPS Ranking	State Status	Federal Status	Habitat Preference; Closest Known Occurrences
				area, Day Valley area; Pajaro Dunes; not observed.
Robust spineflower *(Chorizanthe robusta var. robusta)*	List 1B.1	None	Endangered	**UNLIKLEY**. Sandy slopes, often intermixed with oak woodland/maritime chaparral; recorded from Market Street and Paul Sweet Road areas as well as Freedom area, Manresa State Beach; NE of Ellicott Pond.
Sand-loving wallflower *(Erysimum ammophilum)*	List 1B.2	None	None	**UNLIKLEY**. Coastal dunes; recorded from Sunset State Beach, along Shell Road; not observed; unlikely to occur due to lack of sand dunes
Sand gilia *(Gilia tenuiflora ssp. arenaria)*	List 1B.2	Threatened	Endangered	**UNLIKLEY**. Coastal dunes; recorded from Sunset State Beach; not observed; unlikely to occur due to lack of sand dunes
Santa Cruz tarplant *(Holocarpha macradenia)*	List 1B.1	Endangered	Threatened	**NOT PRESENT**. Grasslands, often on coastal terrace deposits; 1936 collection from Larking Valley and Hwy 1 area; known from Santa Cruz Gardens area, Arana Gulch, Twins Lake State Park, SC Armory; no suitable habitat due to current and previous land uses; not observed.
Kellogg's horkelia *(Horkelia cuneata ssp. sericea)*	List 1B.1	None	None	**UNLIKLEY**. Oak woodland and edges of grasslands; recorded from NW of Watsonville at Ellicott NWR; marginal habitat in oak woodland; not observed
Woodland woollythreads *(Monolopia gracilens)*	List 1B.2	None	None	**UNLIKLEY**. Chaparral; serpentine grassland; sandy/rocky areas; 1958 collection from Corralitos area; unlikely habitat
Dudley's lousewort *(Pedicularis dudleyi)*	List 1B.2	None	None	**UNLIKLEY**. Woodlands; historic (1884) occurrence from Aptos; unlikely habitat; not observed
Choris's popcorn flower *(Plagiobothrys chorisianus var. chorisianus)*	List 1B.2	None	None	**UNLIKLEY**. Mesic grasslands, often on coastal terrace deposits; recorded from north end of Watsonville Airport; unlikely habitat
San Francisco popcorn flower (*Plagiobothrys diffusus)*	List 1B.2	Endangered	None	**UNLIKLEY**. Mesic grasslands, often on coastal terrace deposits; unlikely habitat

CNPS Status: List 1B: These plants (predominately endemic) are rare through their range and are currently vulnerable or have a high potential for vulnerability due to limited or threatened habitat, few individuals per population, or a limited number of populations. List 1B plants meet the definitions of Section 1901, Chapter 10 of the CDFG Code.

Figure 12. CNDDB BIOS Map for Plant Species

5.2 Special Status Wildlife

Special status wildlife species include those listed, proposed or candidate species by either the Federal or the State resource agencies, as well as those identified as State species of special concern. In addition, all raptor nests are protected by Fish and Game Code, and all migratory bird nests are protected by the Federal Migratory Bird Treaty Act. Special status wildlife species were evaluated for their potential presence in the project area as described in **Table 3** below.

No special status wildlife species are expected to occur at this property. However, birds may nest in the trees, and bats may roost in the empty outbuilding by entering through cracks and openings observed on the outside of the structures. In addition, the dusky-footed woodrat likely occurs in the riparian woodland and may occur in/near the proposed storm drain pipe and dissipator. Measures are discussed below to avoid impacts to birds, bats, and the woodrat.

There are no recorded occurrences of California red-legged frog within five miles of this project site (CDFW 2022); however, yellow-legged frogs are known from the upper reaches of Soquel Creek. There are no potential breeding areas that may serve as a source population within at least one mile of the project site. There will be no project work within the channel of Rodeo Creek. The work area is ruderal and landscape vegetation and with the high human use, this area is not suitable habitat for these species. The storm drain pipe and dissipator will require disturbance to a small area of riparian vegetation; however, no impacts to these species are expected from this project. **Figure 13** shows the CNDDB BIOS map of occurrences of special status species recorded from the project vicinity. The eucalyptus trees on the parcel have not been recorded as a monarch butterfly overwintering site; **Figure 14** shows the location of nearby Monarch butterfly overwintering sites as per the Western Monarch Count (Xerces, 2022).

Table 3. List of Special Status Wildlife Species with Potential to Occur at Mattison Lane Parcels

SPECIES	STATUS[1]	HABITAT	POTENTIAL OCCURRENCE ON SITE
Invertebrates			
Ohlone tiger beetle *Cicindela ohlone*	FE	Coastal terrace prairie with sparse vegetation and openings, Watsonville loam soils	**UNLIKELY.** No suitable habitat.
Zayante band-winged grasshopper *Trimerotropis infantilis*	FE	Openings in sand hills parkland habitat with Zayante sandy soils	**UNLIKELY.** No suitable habitat.
Monarch butterfly *Danaus plexippus*	FC	Eucalyptus, acacia and pine trees groves provide winter habitat when they have adequate protection from wind and nearby source of water	**UNLIKELY.** No recorded occurrences from vicinity of Rodeo Gulch. Eucalyptus along upper banks of creek may provide occasional autumnal roosts.
Fish			
Steelhead *Oncorhynchus mykiss*	FT	Perennial creeks and rivers with gravels for spawning.	**NOT PRESENT.** Not known from Rodeo Gulch, intermittent creek and downstream barriers limit habitat for steelhead.
Tidewater goby *Eucyclogobius newberryi*	FE, SSC	Coastal lagoons and associated creeks up to 1 mile inland	**NOT PRESENT**. May occur in downstream, but not along portion of Rodeo Creek adjacent to project site.
Amphibians			
Santa Cruz long-toed salamander *Ambystoma macrodactylum croceum*	FE, SE	Ponds for breeding with water at least into June. Riparian, oak woodland, coastal scrub for upland habitat.	**NOT PRESENT**. No suitable habitat on site; outside known range of the species.
California red-legged frog *Rana draytonii*	FT, SSC	Riparian, marshes, estuaries and ponds with still water at least into June.	**NOT PRESENT**. No recorded occurrences in Rodeo Gulch; creek not suitable for breeding; no potential breeding ponds within 1 mile. Unlikely to occur.
California giant salamander *Dicamptodon ensatus*	SSC	Riparian, and wet coastal forests near streams and seeps.	**UNLIKELY.** No recorded occurrences in Rodeo Gulch. Unlikely to occur.
Foothill yellow-legged frog	SE	Perennial creeks with cobble	**NOT PRESENT**. No suitable habitat

Table 3. List of Special Status Wildlife Species with Potential to Occur at Mattison Lane Parcels

SPECIES	STATUS[1]	HABITAT	POTENTIAL OCCURRENCE ON SITE
Rana boylii		substrate for egg attachment.	on site. Known from upper reaches of Soquel Creek.
Reptiles			
Western pond turtle *Emys (Actinemys) marmorata*	SSC	Creeks and ponds with water of sufficient depth for escape cover, and structure for basking; grasslands or bare areas for nesting.	**NOT PRESENT**. No suitable habitat on site. Intermittent creek with no suitable nesting sites on creek banks.
Birds			
Western snowy plover *Charadrius alexandrinum nivosus*	FT, SSC	Sandy beaches, salt pond levees, large alkali lakes	**NOT PRESENT**. No suitable habitat.
Western burrowing owl *Athene cunicularia hypugea*	SSC	Nests and winters in grasslands with burrows and short vegetation	**NOT PRESENT**. No suitable habitat.
Yellow warbler *Dendroica petechia brewsteri*	SSC	Nests in dense riparian with cottonwood canopy and dense willow understory	**UNLIKELY.** Development area lacks suitable canopy trees. May occur as seasonal migrant in riparian woodland
Loggerhead shrike *Lanius ludovicianus*	SSC	Dense shrubs and brush for nesting	**UNLIKELY.** No suitable habitat.
Least Bell's vireo *Vireo belii pusillus*	FE/SE	Riparian thickets along water	**UNLIKELY.** Development area lacks suitable canopy trees. May occur as seasonal migrant in riparian woodland.
Willow flycatcher *Empidonx trallii*	SSC	Dense riparian habitat along stream reservoirs or wetlands	**UNLIKELY.** Development area lacks suitable canopy trees. May occur as seasonal migrant in riparian woodland.
Tricolored blackbird *Agelaius tricolor*	SSC	Dense bulrush and/or cattail vegetation adjacent to freshwater marshes	**NOT PRESENT**. No suitable habitat.
Mammals			
Pallid bat *Antrozous pallidus*	SSC	Roosts in rock outcroppings, caves, hollow trees, mines, building and bridges; extremely sensitive to human disturbance.	**POSSIBLE.** May occur in abandoned nursery structures.
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	SSC	Woodlands including oaks, willow riparian, Eucalyptus	**PRESENT.** Occurs in riparian woodland.

[1] Key to status:

FE = Federally listed as endangered species
FT = Federally listed as threatened species
SE = State listed as endangered species
ST = State listed as threatened species
SSC = California species of special concern

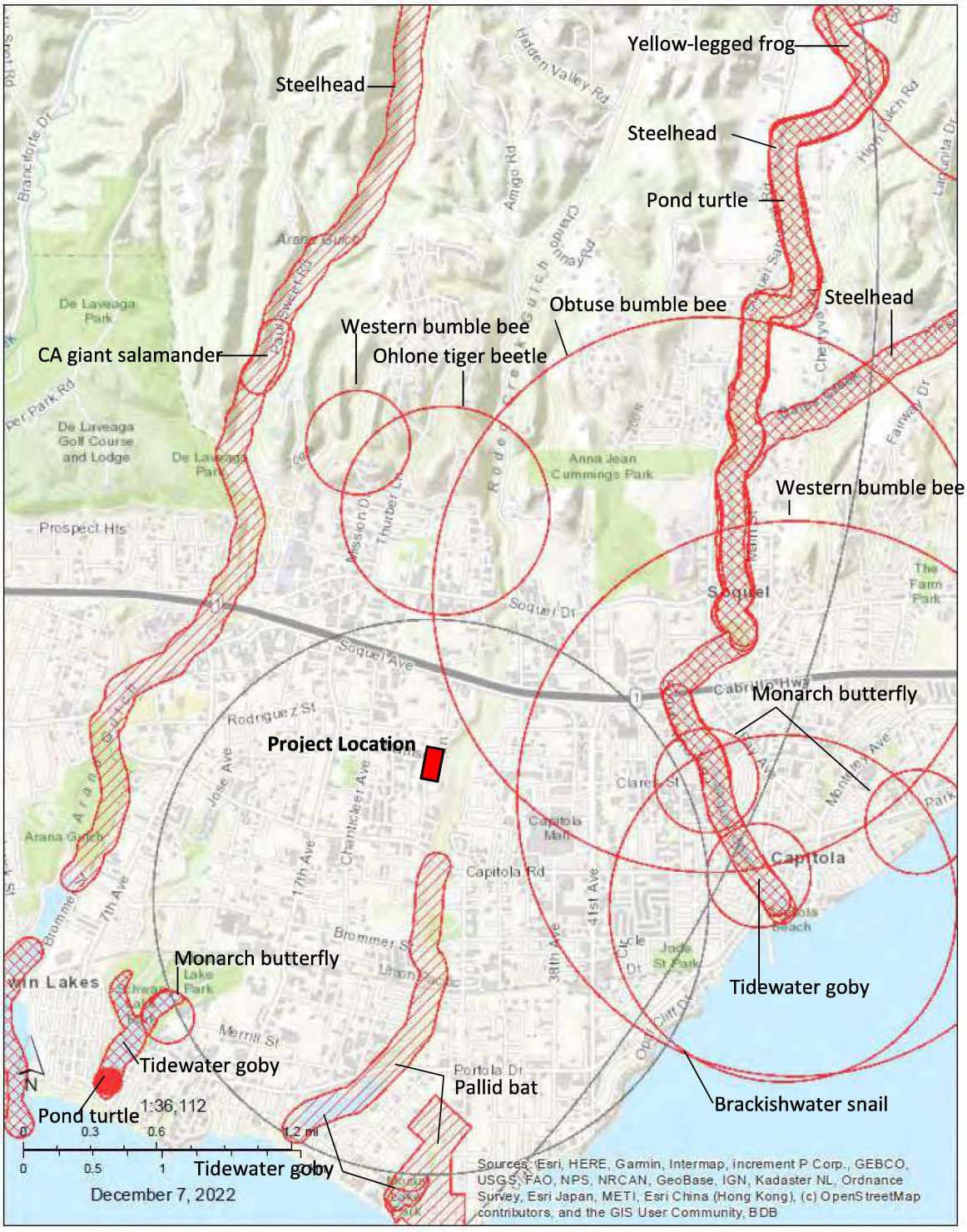


Figure 13. CNDDB BIOS Map for Animal Species

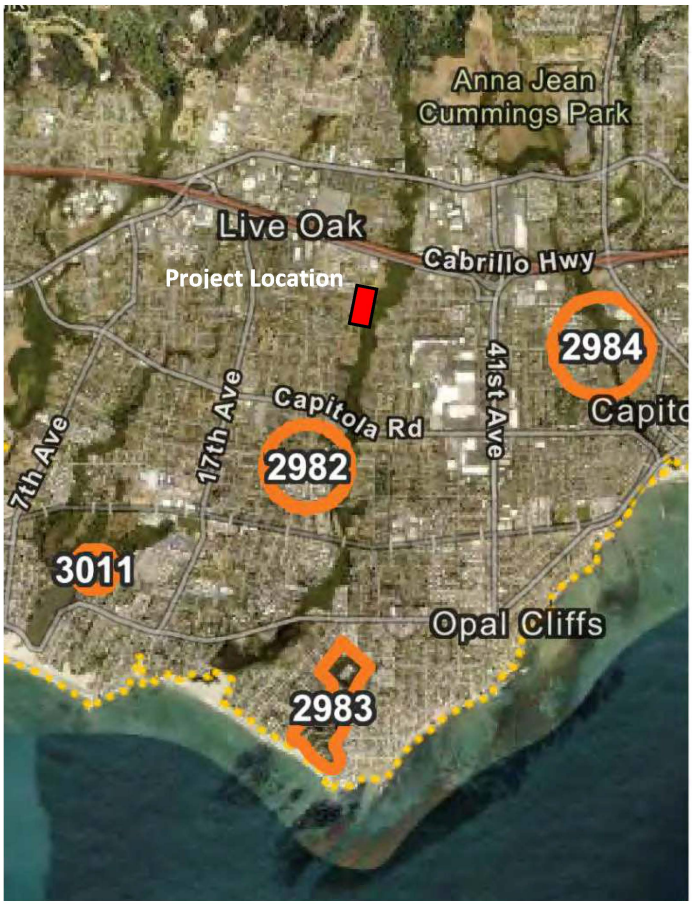


Figure 14. Monarch Butterfly Overwintering Sites (Source: Xerces Society)

6.0 PROJECT REVIEW AND RECOMMENDATIONS

6.1 Thresholds of Significance

The thresholds of significance presented in the CEQA Guidelines were used to evaluate project impacts and to determine if implementation of the proposed project would pose significant impacts to biological resources. For this analysis, significant impacts are those that substantially affect, either directly or through habitat modifications:

a) A species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by CDFW or USFWS;
b) Riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or USFWS;
c) State or Federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;
f) Conflict with the provisions of an adopted Habitat Conservation plan, Natural Community Conservation plan, or other approved local, regional, or state habitat conservation plan.

6.2 Project Review and Recommendations

The proposed project was evaluated for its potential direct and indirect impacts to biotic resources. The majority of the development will occur within ruderal vegetation and in areas supporting existing residences, a former commercial nursery, and areas with landscape trees and shrubs.

a) **Special Status Species.** The San Francisco dusky footed woodrat is a California Special of Special Concern. Woodrat houses were observed in the riparian woodland and may be present in/near the work area for the storm drain and energy dissipator. Bats may occur within trees and abandoned buildings that area to be removed/demolished.

Recommendations

BIO-1. Dusky-footed Woodrat. Retain all woodrat houses (middens) on the property. No earlier than two weeks prior to the start of project activities, a qualified biologist should perform a pre-construction survey for woodrat houses within the project work boundaries and a 25-foot buffer around the project site perimeter. Flag and establish buffers around each woodrat house observed. The buffer width will be determined by the qualified biologist, but will not be less than 5 feet. If a woodrat house is present and impacts cannot be avoided, then a qualified biologist shall contact CDFW for approval to implement a woodrat relocation plan. This could involve live trapping and the construction of alternate houses in adjacent suitable habitat. The woodrat relocation plan must be implemented by a qualified biologist possessing a Scientific Collection Permit authorizing the handling of woodrats. Authorization by CDFW must be obtained prior to the implementation of this measure. Post-relocation monitoring may be required by CDFW, as part of the plan.

BIO-2. Bats. Removal of trees and abandoned buildings could result in the loss of roost sites or abandonment of bat roosts through noise or vibrations. Maternity roosts are most important as negative impacts can have broad, far reaching effects, since such roosts are critical for reproduction and can support multiple generations of bats. No more than 30 days prior to demolition/tree removal, the applicant should hire a bat ecologist to investigate the interior of the outbuildings to determine if any bats have been using the structures. The bat ecologist should also check the oak trees to determine if any have cavities suitable for bat roosts. If there is no evidence of bat use (e.g., guano or observation of individuals), then the openings shall be secured/covered to prevent bats from entering prior to demolition and no further mitigation will be required. If bat use is detected, then schedule outbuilding demolition and tree removal to occur between August 15 and February 1 of any given year to avoid the bat breeding season for this part of the central coast. In addition, the bat ecologist shall conduct a focused survey no more than two weeks (14 days) prior to structure demolition and tree removal to determine if bats are currently using either. If no bats are occupying the outbuildings or tree cavities, then demolition may proceed. If bats are observed using the outbuildings or tree cavities, then the bat ecologist, in coordination with CDFW, will recommend methods to either allow bats to leave the outbuildings and trees and not return (exclusion devices), or other methods specific to this demolition project to avoid harm to individual bats. Trees without cavities may have foliage roosting bats occasionally. To avoid harm to individual bats, trees shall be cut down and allowed to lie on the ground for 24 hours prior to chipping, to allow any foliage roosting bats to leave on their own.

b) **Riparian Woodland and Other Sensitive Habitats.** The riparian woodland, including the open

water/channel bed of Rodeo Creek, is a sensitive and regulated habitat. Riparian woodland should be preserved on-site and impacts to the resource avoided, to greatest extent feasible. The project has done this, as all proposed development (except for storm drain and energy dissipater) are located outside the dripline of the mapped riparian woodland and the County-required 50-foot buffer. Although most of the riparian woodland along Rodeo Creek grows below top-of-bank, some willow tree canopy extends beyond the top-of-bank in one location; however, all of this riparian vegetation will be encompassed by the 50-foot wide buffer. Due to the close proximity of the residential units to the riparian buffer there could be demand for residents to use the riparian buffer area as a recreational open space. As such, incompatible uses may occur within the 50-foot riparian buffer.

The project will impact riparian woodland for placement of the storm drain and energy dissipator. This will result in the removal of riparian vegetation and habitat for protected species. The proposed above-ground storm drain and energy dissipater will be placed within the riparian woodland. An approximately 39-foot long, 12-inch diameter pipe, with an approximately 35 square feet of drain rock at the outlet, will require the removal and/or trimming of riparian vegetation. Removal of riparian woodland vegetation is a significant impact that requires compensatory mitigation. Approximately 74 square feet (0.002 acre) of riparian vegetation will be permanently affected. Assuming a 5-foot work area around the pipe and dissipater rock (construction access), an additional 440 square feet (0.01 acre) of riparian woodland will be temporarily impacted. Placement of the pipe and dissipater rock requires permits from state agencies (CDFW and RWQCB) as well as a riparian exception permit from Santa Cruz County. **Figure 15** displays the location of the permanent and temporary impacts to riparian woodland. **Table 4** outlines project impacts to this sensitive habitat.

Table 4. Impacts to Sensitive Habitat

	Permanent Impact (ac.)	Temporary Impact (ac.)	Total (ac.)	Mitigation Ratio	Required Mitigation (ac.)
Riparian Woodland					
Storm Drain Pipe and Energy Dissipater	0.002		0.012	2:1	0.024
Construction Access		0.01			
Oak Woodland					
Development	0.26	0.05[1]	0.31	2:1	0.62
TOTAL					**0.644**

[1] grading in/around mature 24" oak tree (T4)

Recommendations

BIO-3. Riparian Woodland and Buffer. To minimize indirect impacts from site development on the riparian woodland and buffer, install a fence (minimum height of 4 feet) at the outer limit of the 50-foot buffer such that residential land uses are precluded from the riparian woodland and 50-foot riparian buffer. The fence would preclude unauthorized access into the buffer and reduce potential indirect impacts from site residents (i.e., trampling, deposition of debris, etc.). Allowable uses with the buffer should be limited to periodic maintenance of plantings associated with habitat mitigation and periodic control of invasive, non-native plant species. Active recreational activities, such as play structures or other play areas, as well as urban gardening, should not be allowed within the riparian buffer. The landowner and/or HOA should be responsible for monitoring and enforcing use restrictions within the protected riparian woodland and

buffer area.

BIO-4. Riparian Woodland Compensation. Provide compensatory mitigation for impacts to the riparian woodland from the storm drain and energy dissipator, implement compensatory mitigation, which includes development and implementation of a Mitigation Plan for on -site habitat restoration at a 2:1 ratio. As the total impact area is approximately 0.012 acre, provide a minimum of 0.024 acre of on-site mitigation. Secure riparian exception permit from the County; secure all necessary permits and/or agreements from other federal and state regulating agencies (i.e., CDFW and RWQCB). **Figure 16** displays the location of suitable areas for riparian mitigation.

Oak Woodland. The County has a sensitive habitat ordinance that regulates vegetation removal and other impacts within designated habitats. The oak woodland is a sensitive habitat. Oak woodland should be preserved on-site and impacts to the resource avoided, to greatest extent feasible. Approximately 0.18 acre of extant oak woodland will be retained and preserved within the 50-foot wide riparian buffer area; however, the project will impact 0.31 acre of oak woodland, which is the canopy spread of the extant woodland to be permanently removed, temporarily impacted, and the oak woodland previously removed in 2021. **Table 4** outlines project impacts to this sensitive habitat. Within the impacted oak woodland, 12 mature oak trees will (or have been) removed. **Table 5** lists the trees proposed (or already) removed for the project. In addition, construction of project features will occur within the dripline of native oak trees which are to remain. Trenching and grading within the dripline of retained trees may affect tree health. **Figure 15** displays the location of the permanent and temporary impacts to the oak woodland.

Table 5. Oak Trees Removed by the Project[1]

Tree Number (Arborist Report)	Species	Diameter (inches)	Notes
T12	Coast Live Oak	10	Removed circa 2021
T13	Coast Live Oak	14	Removed circa 2021
T14	Coast Live Oak	10	Removed circa 2021
T15	Coast Live Oak	8	Removed circa 2021
T16	Coast Live Oak	12	Removed circa 2021
T17	Coast Live Oak	24	Removed circa 2021
T18	Coast Live Oak	40	Removed circa 2021
T19	Coast Live Oak	22	Removed circa 2021
T20	Coast Live Oak	23	Removed circa 2021
T21	Coast Live Oak	19	Removed circa 2021
T22	Coast Live Oak	16	Removed circa 2021
T1	Coast Live Oak	8	Proposed for removal in plan
TOTAL OAK TREES = 12			

[1] Source: Arborist Report, Appendix A, Revised 10/10/23, Kurt Fouts Arborist Consultant

Recommendations

BIO-5. Oak Trees. Avoid construction/development within the dripline of oak woodland vegetation that is to be retained. Implement protective measures around all retained oak trees, as directed by an arborist. Measures may include protective fencing, supervised pruning of limbs and roots, other measures as determined by the arborist.

BIO-6. Oak Woodland Compensation. Provide compensatory mitigation for impacts to oak woodland, prepare and implement a Mitigation Plan to establish native oak woodland that achieve a 2:1 habitat replacement ratio (i.e., areal extent), which shall include a minimum 3:1 tree replacement ratio. Mitigation for permanent impacts shall occur in areas not currently supporting oak trees/woodland. The mitigation plan would be subject to County review and approval and would include a 5-year maintenance and monitoring program. Assuming 12 oak trees are removed, a minimum of 36 oak trees shall be planted in the oak woodland mitigation area. The replacement oak trees should be planted within the 50-foot wide riparian buffer area such that the trees provide replacement oak woodland as well as adding habitat value to the adjacent riparian woodland. Planted trees and shrubs shall achieve a yearly survival rate of 80% for a minimum of five years after planting. If these survival rates are not achieved then replacement plantings shall occur in each year that the criteria are not met. **Figure 16** displays the location of suitable areas for this oak woodland mitigation.

c) **Federally and State Protected Wetlands.** Rodeo Creek supports federal jurisdictional areas. Federal jurisdiction typically extends to the Ordinary High Water Mark (OHWM) of a waterway; however, jurisdiction can also include adjacent wetlands (vegetated areas above OHWM) if there is an hydrologic connection. The project will not occur below the OHWM of Rodeo Creek; no impacts to federally protected wetlands or the active stream channel will occur. No mitigation is required.

d) **Migratory Birds.** Nesting birds may occur in the landscape trees, oak trees, and riparian vegetation to be removed as well as in non-native trees adjacent to the property. Removal of trees and other vegetation for construction has the potential to kill or injure nesting birds, if any are present in the construction area. Noise from construction has the potential to cause abandonment by adult birds of chicks or eggs in areas of close proximity to construction. Because most nesting birds are protected by the Migratory Bird Treaty Act, measures are required to avoid potentially significant impacts if any are present during construction.

Recommendations

BIO-7. Nesting Birds. To avoid impacting nesting birds, if present, schedule tree removal and construction to occur between August 1 and March 1 of any given year, which is outside the bird nesting season. If tree removal and/or construction is to occur within the bird breeding season (March 1 – July 31), perform pre-construction nesting bird surveys within one week before the scheduled start of the project. The nesting survey should be performed by a *qualified biologist* and cover the entire property, since potential nesting raptors may require buffers at a minimum of 300 feet. In the event active nests are observed, the nest site shall be flagged and a buffer shall be established, in an effort to prevent nest failure. The buffer widths shall be determined by the qualified biologist, based on species, site conditions and anticipated construction activities. Active nests should be monitored at a frequency determined by the monitoring biologist, but at a minimum of once per week, until the nestlings have fledged. In the event that construction activities appear to be interfering with nest maintenance (e.g., feedings and incubation), then the buffers should be enlarged or construction activities postponed, until the young have fledged, as determined by the qualified biologist.

e) **Local Policies or Ordinances.** The County has a sensitive habitat ordinance that regulates vegetation

removal and other impacts within designated habitats. The riparian woodland and oak woodland are identified as sensitive habitat under County Code. Please refer to item b) and c), above for the riparian woodland and oak woodland. The riparian buffer area, as shown in **Figure 16**, encompasses 0.85 acre. Of this area, the buffer supports 0.18 acre of extant oak woodland and 0.67 acre of annual grassland. The annual grassland can accommodate the required riparian mitigation (0.024 acre) and the oak woodland mitigation (0.62 acre).

f) **Habitat Conservation Plan.** The project site is not located in an area subject to a Habitat Conservation plan, Natural Community Conservation plan or other approved conservation plan. The project site is not located within any designated critical habitat for any federally-listed species.

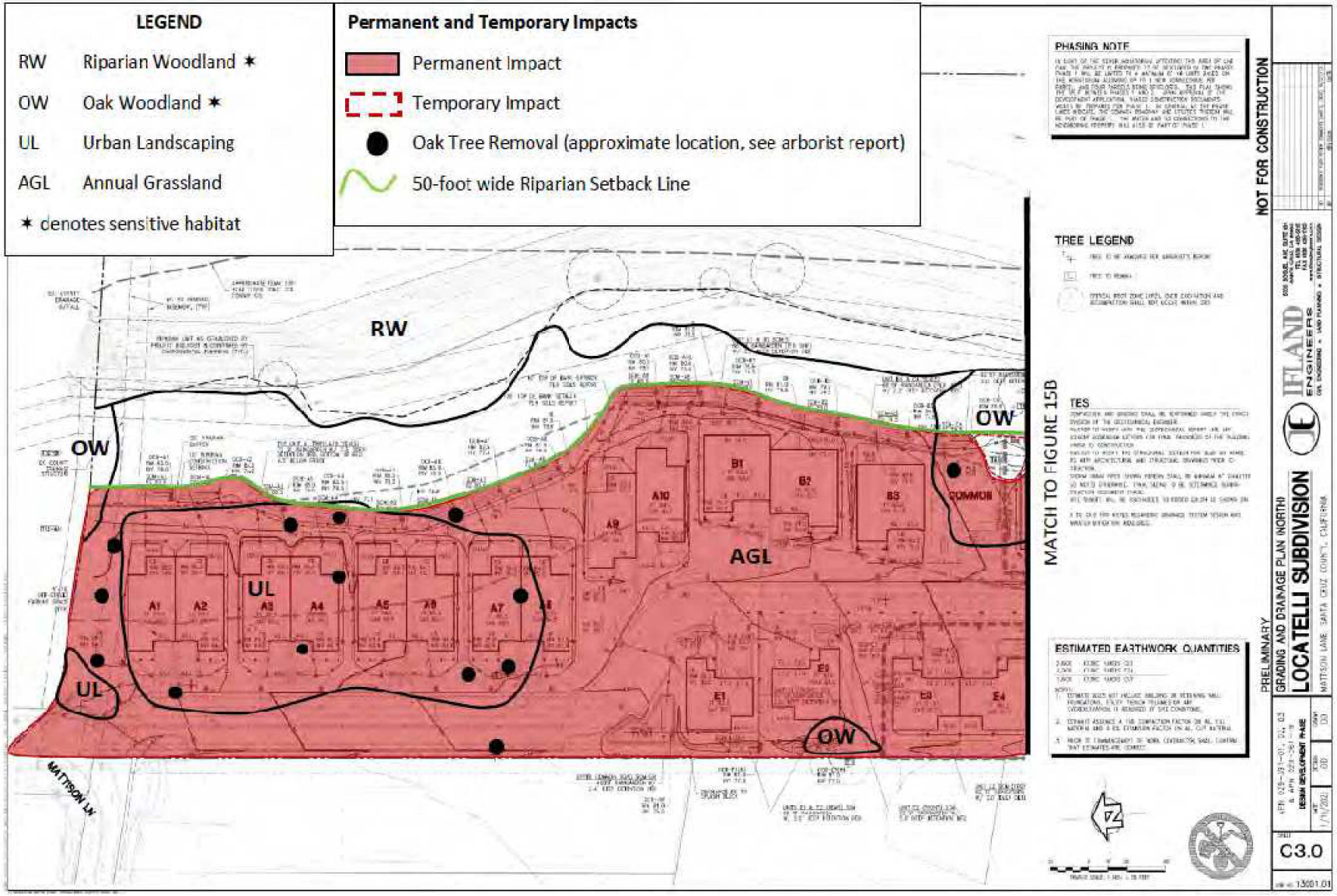


Figure 15A. Permanent and Temporary Impact Areas, Sheet 1 of 2

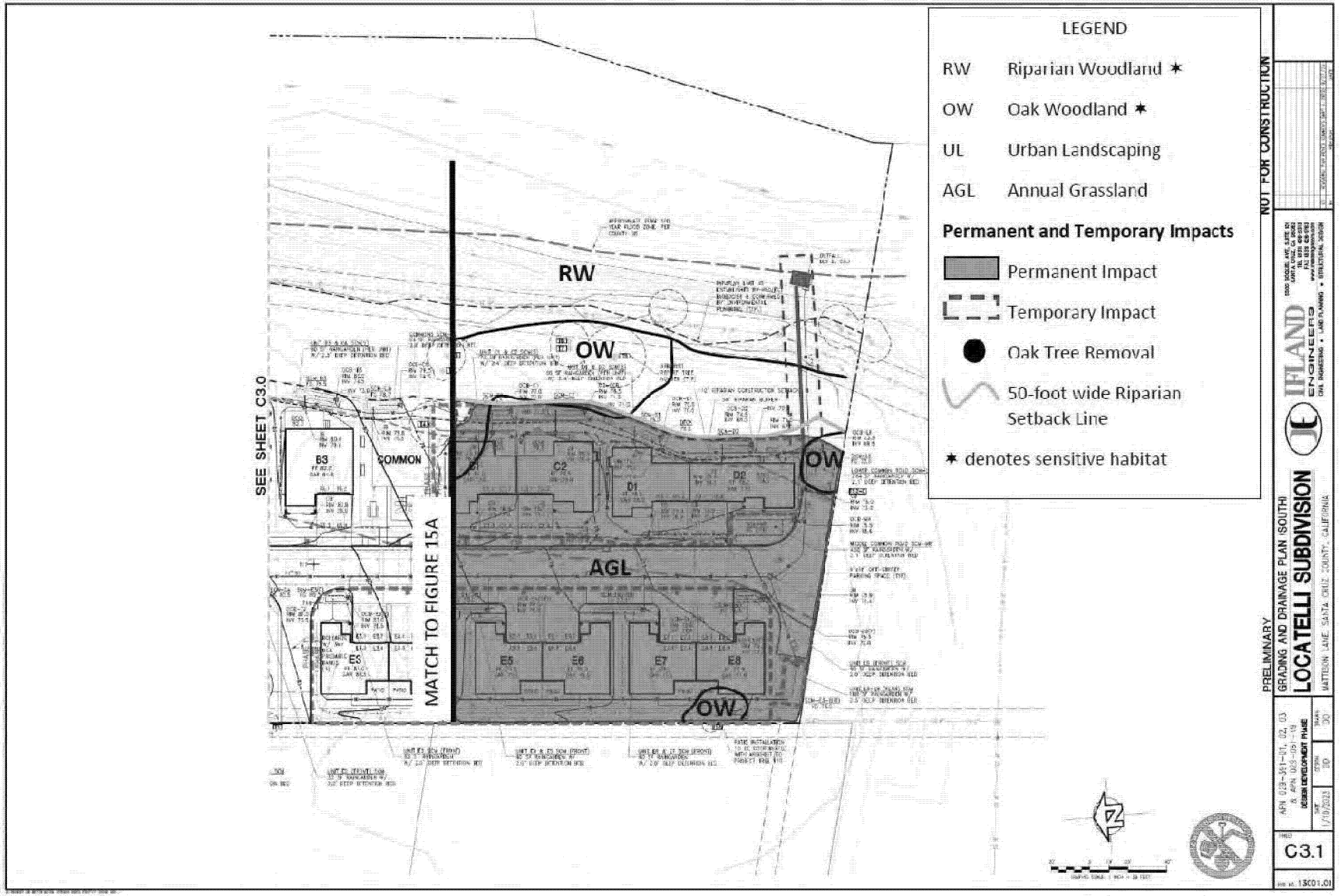


Figure 15B. Permanent and Temporary Impact Areas, Sheet 2 of 2

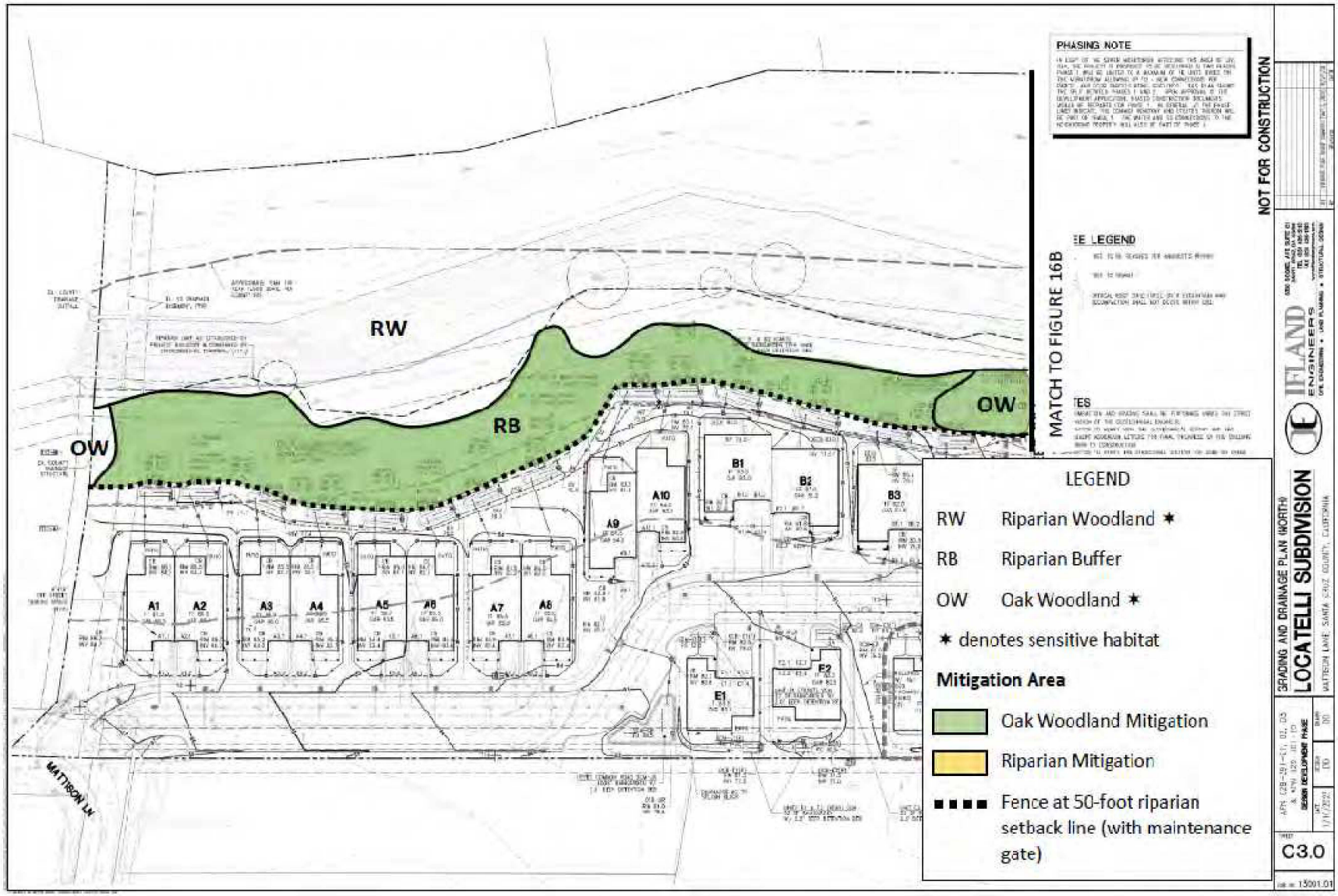


Figure 16A. Riparian and Oak Woodland Mitigation Area, Sheet 1 of 2

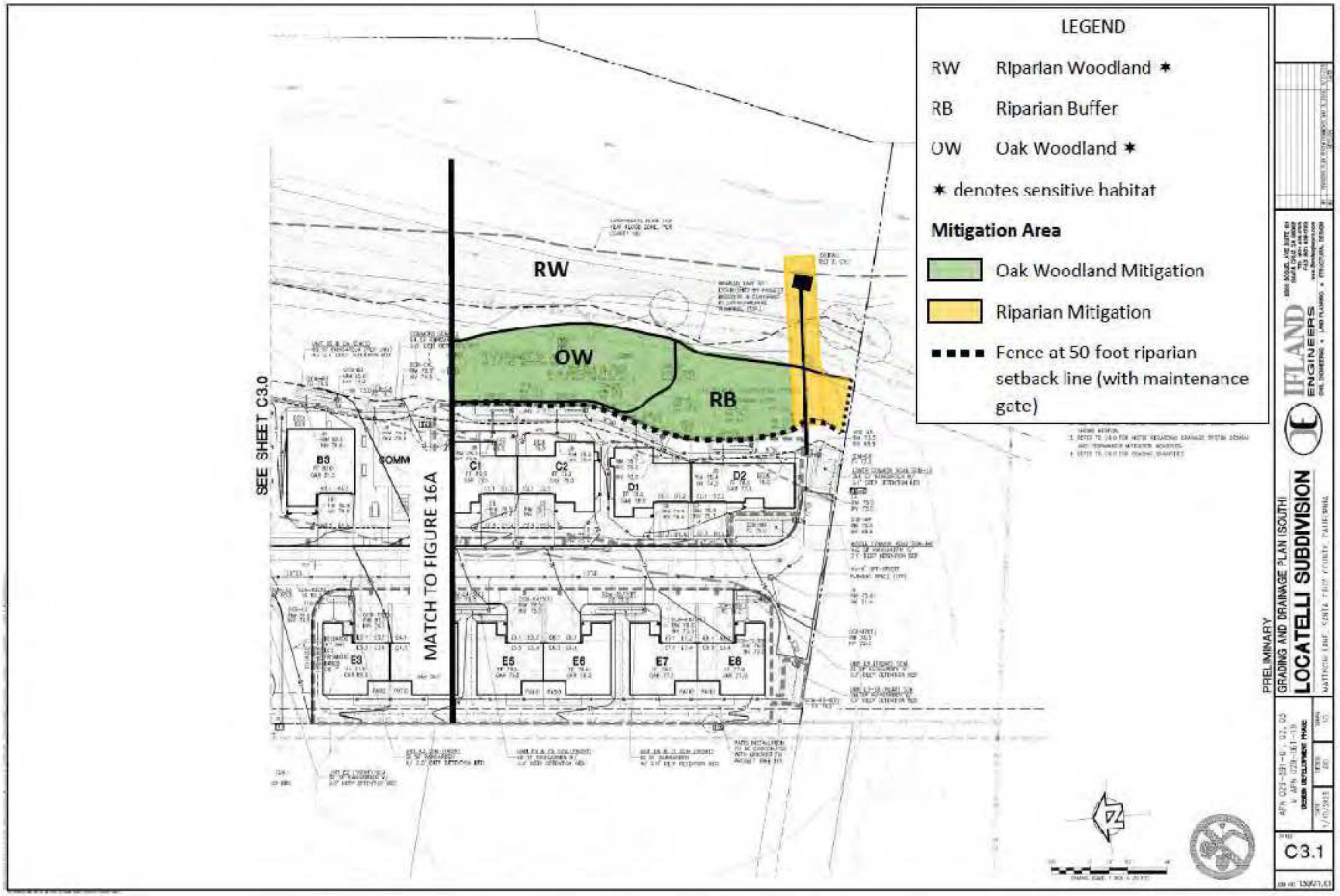


Figure 16B. Riparian and Oak Woodland Mitigation Area, Sheet 2 of 2

7.0 REFERENCES AND LITERATURE CITED

California Native Plant Society. 2022. Electronic Inventory of Rare and Endangered Vascular Plants of California. CNPS, Sacramento CA. https://www.cnps.org/rare-plants/cnps-inventory-of-rare-plants

California Native Plant Society. 2012. Annotated Checklist of the Vascular Plants of Santa Cruz County, 2nd Edition. CNPS, Santa Cruz Chapter.

California, State of, Department of Fish & Wildlife. 2022. California Natural Communities. July 2022. https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities

California, State of, Department of Fish & Wildlife. 2022. Californica Natural Diversity Data Base, Natural Communities. Rarefind 5 Program. https://wildlife.ca.gov/Data/CNDDB/Maps-and-Data

Hickman, J. 1993. The Jepson Manual Higher Plants of California. Berkeley: University of California Press.

Jepson Manual 2012. The Jepson Manual – Vascular Plants of California

Santa Cruz County, 2022a. Sustainability Policy and Regulatory Update, Draft Environmental Impact Report, Santa Cruz County, April 2022.

Santa Cruz County, 2022b. Sustainability Policy and Regulatory Update, Final Environmental Impact Report, planning Commission Hearing Draft, Santa Cruz County, August 2022.

Santa Cruz County, 2022. Agricultural, Natural Resources and Conservation Element, Chapter 5 of the Santa Cruz General Plan and Local Coastal Plan, Planning Commission Hearing Draft, August 2022.

County of Santa Cruz

Department of Community Development and Infrastructure

701 Ocean Street, Fourth Floor, Santa Cruz, CA 95060
Planning (831) 454-2580 Public Works (831) 454-2160
sccoplanning.com dpw.co.santa-cruz.ca.us

12 July 2024

Claudio Locatelli <locatellirentals224@gmail.com>
224 Center Street C
Santa Cruz, CA 95060

Subject: Review of the Geotechnical Investigation for the Proposed 12-Lot Subdivision, Mattison Lane/APN 029-391-01, -02 & -03, Santa Cruz County, CA report dated 5 March 2013 and the 2019 California Building Code Update for Proposed Townhouse Development for Mattison Lane, Santa Cruz, APN's 029-391-01, 02 & 03 and APN 029-061-19, Santa Cruz County, California report dated 7 February 2024 by Dees and Associates, Inc. – Project No. SCR-0636

Project Site: 2450 and 2452 Mattison Lane
APN's 029-391-01, -02, & -03 and APN 029-061-19
Application No. REV221076

Dear Applicant,

The Planning Division has accepted the subject geotechnical investigation reports for the proposed project. The following items shall be required:

1. All project design and construction shall comply with the recommendations of the subject geotechnical investigation reports.

2. Final plans shall reference the report by titles, author, and dates. Final Plans should also include a statement that the project shall conform to the report's recommendations.

3. After plans are prepared that are acceptable to all reviewing agencies, please submit a completed Soils (Geotechnical) Engineer Plan Review Form to Environmental Planning. The Consultants Plan Review Form (Form PLG-300) is available on the Planning Department's web page. The author of the soils reports shall sign and stamp the completed form. Please note that the plan review form must reference the final plan set by the last revision date.

4. As outlined in the subject geotechnical investigation reports, engineered fill is required to be utilized beneath foundation elements, slabs on grade, and pavement sections for structural support. A Grading Permit will be required for the proposed project. A preconstruction meeting is also required prior to any ground disturbance. Please contact Leah MacCarter at 831.454.3164 to schedule the preconstruction meeting.

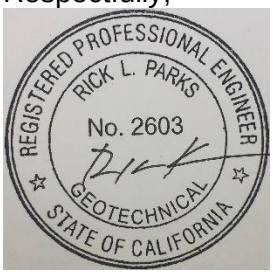
Electronic copies of all forms required to be completed by the Geotechnical Engineer may be found on our website: Assistance and Forms (santacruzcountyca.gov)

After building permit issuance the soils engineer *must remain involved with the project* during construction. Please review the Notice to Permits Holders (attached).

Our acceptance of the report is limited to its technical content. Other project issues such as zoning, fire safety, septic, or sewer approval, etc. may require resolution by other agencies.

If we may be of any further assistance, please contact the undersigned at: 831.454.3168 or rick.parks@santacruzcountyca.gov

Respectfully,



Rick Parks, GE 2603
Civil Engineer – Environmental Planning
County of Santa Cruz CDI Planning Division

Cc: Leah MacCarter
Jonathan DiSalvo
Rebecca Dees, GE
Ken Hart

Attachments: Notice to Permit Holders

NOTICE TO PERMIT HOLDERS WHEN A SOILS REPORT HAS BEEN PREPARED, REVIEWED AND ACCEPTED FOR THE PROJECT

After issuance of the building permit, the County requires your soils engineer to be involved during construction. Several letters or reports are required to be submitted to the County at various times during construction. They are as follows:

1. **When a project has engineered fills and/or grading**, a letter from your soils engineer must be submitted to the Environmental Planning section of the Planning Department prior to foundations being excavated. This letter must state that the grading has been completed in conformance with the recommendations of the soils report. Compaction reports or a summary thereof must be submitted.

2. **Prior to placing concrete for foundations**, a letter from the soils engineer must be submitted to the building inspector and to Environmental Planning stating that the soils engineer has observed the foundation excavation and that it meets the recommendations of the soils report.

3. **At the completion of construction,** a *Soils (Geotechnical) Engineer Final Inspection Form* from your soils engineer is required to be submitted to Environmental Planning that includes copies of all observations and the tests the soils engineer has made during construction and is stamped and signed, certifying that the project was constructed in conformance with the recommendations of the soils report.

   If the *Final Inspection Form* identifies any portions of the project that were not observed by the soils engineer, you may be required to perform destructive testing in order for your permit to obtain a final inspection. The soils engineer then must complete and initial an *Exceptions Addendum Form* that certifies that the features not observed will not pose a life safety risk to occupants.

Dees & Associates, Inc.
Geotechnical Engineers
501 Mission Street, Suite 8A Santa Cruz, CA 95060 Phone (831) 427-1770

February 7, 2024 Proposal No. SCR-0636

CLAUDIO LOCATELLI
% Swift Consulting Services
500 Chestnut Street, Suite 100
Santa Cruz, California 95060

Subject: 2019 California Building Code Update Letter

Reference: Proposed Townhouse Development
Mattison Lane, Santa Cruz
APN'S 029-391-01, -02 and -03 and APN 029-061-19
Santa Cruz County, California

Dear Mr. Locatelli:

This letter updates our 2013 report so it is in conformance with the 2019 California Building Code. The seismic loading has changed and now the seismic shaking is significantly higher than it was. As a result of the changes, we have re-evaluated the seismic hazards; including seismic loading, liquefaction potential and landsliding. We have also updated our foundation recommendations based on our new analyses. The recommendations of this letter shall be used where any conflicts arise between our 2013 report and this update letter.

As part of our update, we drilled three additional borings at the site to depths of 25.5 to 31 feet. The locations of our borings are indicated on Figure 1. We also performed additional laboratory testing including moisture-density relationships, grain size analysis and direct shear testing. The two direct shears were prepared using saturated, remolded samples where the gravels over ½-inch were removed. The results of our laboratory testing are included on the boring logs, Figures 2 to 4.

Liquefaction

An analysis of the liquefaction potential of the soils underlying the site was conducted as part of our update. Liquefaction occurs when saturated fine grained sands, silts and sensitive clays are subject to shaking during an earthquake and the water pressure within the pores build up leading to loss of strength.

Our analysis was performed using the soils encountered in Borings 11 to 13 and the groundwater levels encountered in our borings drilled in January 2013. Fines contents for the soils below the groundwater table were based on laboratory test results. Fines contents for the soils above the groundwater table were estimated. Seismic conditions were analyzed using the maximum expected peak ground acceleration (PGA_M) of 0.813g. The results of our liquefaction analysis indicate there is a potential for liquefaction to develop in zones of soil below the groundwater

table. See Figures 5 to 7. The zones of liquefaction varied between borings, but were generally between 10 and 25 feet below grade. Liquefaction could cause ground settlement and sand boils to occur. There is a low potential for and lateral spreading and soil strength loss due to the density of the soils.

Settlement

Total ground settlements associated with the design earthquake are predicted to be on the order of 2.5 to 3 inches. Differential settlements are expected to be on the order of 0.5 to 0.75 inches.

Sand Boils

Sand boils are caused when water pressures are relieved at the ground surface and the upward movement of groundwater causes soil to rise to the ground surface creating a mound of soil at the surface. There is a potential for sand boils to develop at the ground surface. Sand boils will not adversely affect the proposed structure foundations but sand boils may cause movement and cracking in thin slab and pavement sections.

Slope Stability

To evaluate the stability of the ravine slope, we performed a stability analysis using a cross section prepared from the topographic map provided to us.

Shear strength properties of the soils comprising the slope were based on remolded, saturated direct shear tests. Groundwater levels were based on the groundwater levels encountered in January 2013. Seismic analyses were performed using a seismic coefficient of 0.31g. The seismic coefficient was determined by the following equation PGAm/1.5 *feq, where PGAm was determined from the OHSPD Seismic Design Calculator and feq was determined from SP117 for a 5cm displacement. Our analyses were performed using Janbu Simplified and Spencer's method.

The results of our analysis indicate the ravine slope is seismically stable for the design earthquake. Our slope stability analysis results are attached.

Seismic Parameters

The following ground motion parameters may be used in seismic design and were determined using the OHSPD Seismic Design Calculator and ASCE 7-16.

Seismic Design Parameters	ASCE 7-16
Site Class	D
Mapped Spectral Acceleration for Short Periods	Ss = 1.765 g
Mapped Spectral Acceleration for 1-second Period	S_1 = 0.678 g
5% Damped Spectral Response Acceleration for Short Period	S_{Ds} = 1.177 g
5% Damped Spectral Response Acceleration for 1-Second Period	S_{D1} = N/A

Seismic Design Category	N/A
PGAm	0.813 g

Site Grading

- Temporary cut slopes should be inclined no steeper than 1:1 (horizontal to vertical).

- Engineered fill should be observed and tested by our firm. At a minimum, in-place density tests should be performed as follows: one test for every foot of fill, one test for every 1,000 sq. ft. of material for relatively thin fill sections and one test whenever there is a definite suspicion of a change in the quality of moisture control or effectiveness in compaction.

Retaining Walls

- Retaining walls over 6 feet high should include a seismic surcharge load of 13 pcf, EFW, in addition to the above lateral earth pressures. The resultant dynamic pressure should be applied at a point 0.6 H above the base of the wall.

- Drainage materials behind retaining walls may consist of ¾-inch drainrock wrapped in filter cloth, Class 1 or Class 2 Type A permeable material (Caltrans Specification 68-1.025), or an approved equivalent.

Foundations

- Foundations should be designed to accommodate 0.75-inches of seismically induced settlements. Stiffened spread footings or mat slab foundations may be used as long as the differential settlements meet current design standards. The spread footing design criteria presented in our 2013 report, in conjunction with ¾-inches of differential settlement, may be used for design of spread footing foundations.

Mat Slab Foundations

- A mat slab foundation bearing on 12 inches of compacted subgrade soil may be used to support structures.

- Mat slabs should be designed to accommodate 0.75-inches of seismically induced settlements over the width of the slab.

- Mat slabs designed using strip loads may be designed for an allowable soil bearing pressure of 2,000 psf for dead plus live loads for strip loads up to 3 feet wide. If a uniformly loaded slab design is used, the bearing capacity should be limited to 500 psf. These values may be increased by one-third to include short-term seismic and wind loads.

- Footings located adjacent to mat slab foundations should have their bearing surfaces founded below an imaginary 1:1 plane projected upward from the bottom edge of the adjacent footings or utility trenches.

- Total and differential settlements from building loads are anticipated to be on the order of 1 inch and 1/2 inches respectively. Differential settlement from seismic loading is anticipated to be on the order of 0.75 inches over the width of the slab.

- Lateral load resistance may be developed in friction between the foundation bottom and the supporting subgrade. A friction coefficient of 0.40 may be assumed. Where slabs are poured neat against the adjacent soil, a passive lateral earth pressure of 350 pcf EFW, may be used. The upper 12 inches of soil should be neglected in passive design.

- All slabs-on-grade can be expected to suffer some cracking and movement. However, thickened exterior edges, a well-prepared subgrade including pre-moistening prior to pouring concrete, adequately spaced expansion joints and good workmanship should reduce cracking and movement.

- Dees & Associates, Inc. are not experts in the field of moisture proofing and vapor barriers. In areas where floor wetness would be undesirable, an expert, experienced with moisture transmission and vapor barriers should be consulted. At a minimum, a blanket of 4 inches of free-draining gravel should be placed beneath the floor slab to act as a capillary break. In order to minimize vapor transmission, an impermeable membrane (10-mil. minimum) should be placed over the gravel.

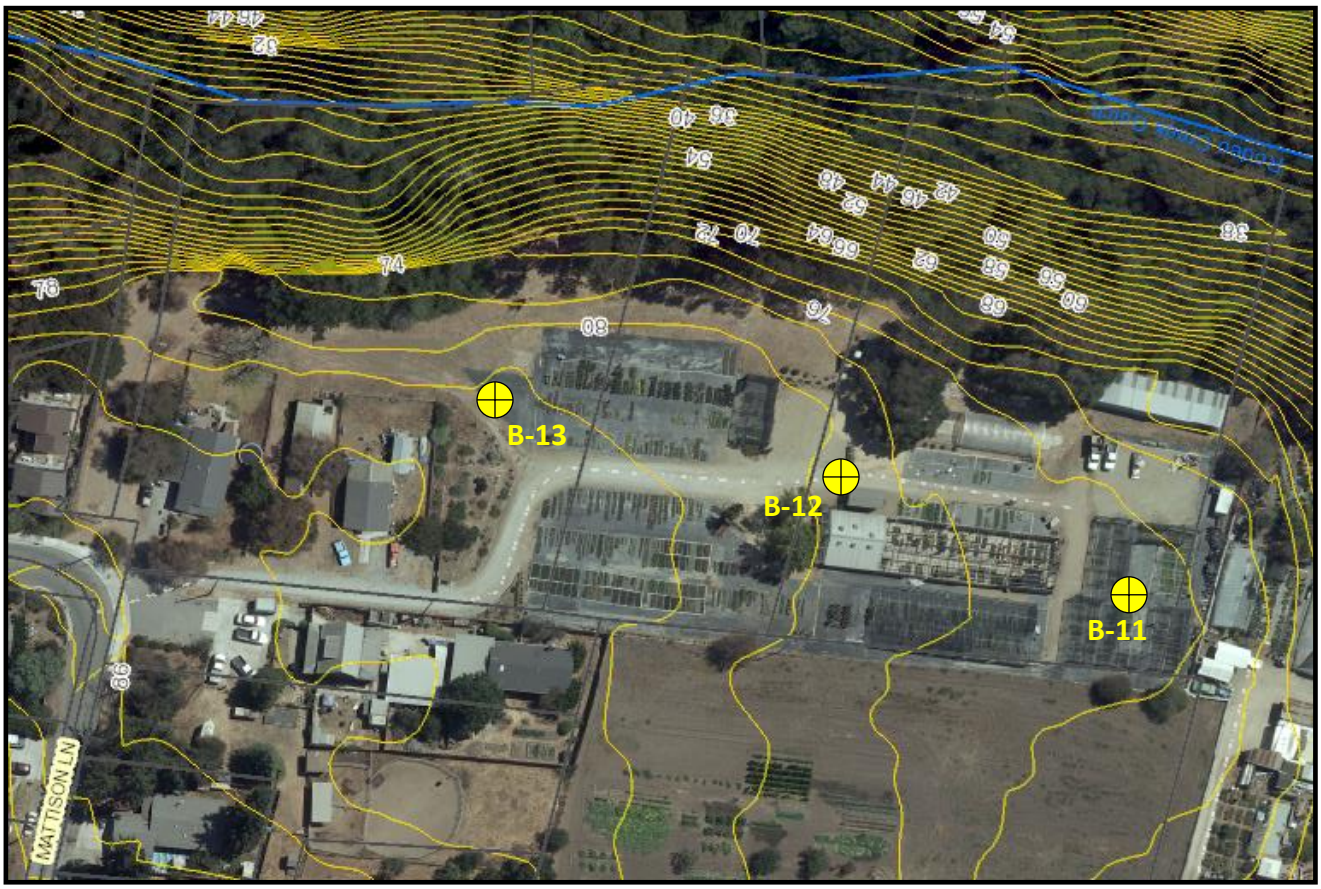
Very truly yours,

DEES & ASSOCIATES, INC.

Rebecca L Dees

Rebecca L. Dees
Geotechnical Engineer
G.E. 2623

Attachments
Copies: 1 to Addressee



BORING SITE PLAN
Figure 1

TEST BORING LOG

SCR-0636
Mattison Lane

LOGGED BY: BD	DATE DRILLED: 8/1/22	BORING TYPE: 6" SOLID STEM	BORING NO: 11

	SAMPLE NO.	SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
1		Dark brown Silty SAND topsoil, dry, medium dense	SM	12								
	11-1-1			20								
2	L	Dark yellow brown with very fine white speckles Sandy CLAY, dry-damp, hard		20	20	107.7	14.1					
			CL	10								
3	11-2			15								
	T			20	35		13.9					
4												
		Estimated Contact										
5												
6												
7												
8			SC	16								
	11-3	Dark yellow brown Clayey SAND with rounded gravels, damp,		17								
9	T	dense		19	36		11.1	21.9	0	59		
10												
11												
12												
13												
14		Dark yellow brown Clayey SAND, damp, medium dense (less clay than above)	SC									
15				4								
	11-4			8								
16	T			12	20		19.6					
17		Dark yellow brown poorly graded fine SAND with Clay, dry-damp, dense	SP									
18												
19												
20												
	11-5			9								
21	T			16								
				20	36		12.7	26.2	258.1	33.2	13.0	
22												
23		Increase in gray coloring										
24												

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 2

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-0636
Mattison Lane

LOGGED BY: BD | DATE DRILLED: 8/1/22 | BORING TYPE: 6" SOLID STEM | BORING NO: 11 Con't.

	SAMPLE NO.		SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
25					10								
26	11-6 T		Gray and dark yellow brown poorly graded fine SAND, dry-damp, medium dense	SP	13 14	27		13.0				8.6	
27													
28													
29													
30	11-7 T				16 50/6"	50/6"							
31													
32			Boring Terminated at 31.0 Feet No Groundwater Encountered										
33													
34													
35													
36													
37													
38													
39													
40													
41													
42													
43													
44													
45													
46													
47													
48													

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 2a

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-0636
Mattison Lane

LOGGED BY: BD | DATE DRILLED: 8/1/22 | BORING TYPE: 6" SOLID STEM | BORING NO: 12

	SAMPLE NO.	SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
1		Dark yellow brown Clayey SAND	SC									
2												
3												
4												
5												
6												
7		Dark yellow brown Clayey SAND with Gravel										
8			SC									
9												
10				5								
11	12-1 T	Olive brown Clayey SAND, damp, medium dense		5 10	15		17.2				14.4	
12												
13												
14												
15				10								
16	12-2 T			13 13	26		10.8				8.1	
17												
18												
19												
20				10								
21	12-3 T	Olive brown with lenses of dark yellow brown and gray fine Clayey SAND, damp, medium dense		10 15	25		23.9				15.0	
22												
23												
24												

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 3

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-0636
Mattison Lane

LOGGED BY: BD | DATE DRILLED: 8/1/22 | BORING TYPE: 6" SOLID STEM | BORING NO: 12 Con't.

	SAMPLE NO.		SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
25													
26	12-4 T		Olive brown fine SAND with Clay or Clayey SAND, damp, very dense	SP/ SC	10 50/6"	50/6"							
27													
28													
29													
30	12-5 T		Olive brown SAND with Clay, damp, very dense	SP	50/5"	50/5"							
31			Boring Terminated at 30.5 Feet No Groundwater Encountered										
32													
33													
34													
35													
36													
37													
38													
39													
40													
41													
42													
43													
44													
45													
46													
47													
48													

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 3a

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-0636
Mattison Lane

LOGGED BY: BD | DATE DRILLED: 8/1/22 | BORING TYPE: 6" SOLID STEM | BORING NO: 13

	SAMPLE NO.		SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
10			Gravelly Drilling		9								
11	13-1 T		Orange brown and gray Sandy GRAVEL, dry-damp, medium dense, Gravels ¾ -1 ½ " rounded-subrounded	GW	13 14	27							
13			Approximate Contact										
15					5								
16	13-2 T		Olive brown fine SAND with Clay, damp-moist, medium dense	SP	7 7	14		19.9				15.3	
20					12								
21	13-3 T		Olive brown fine Clayey SAND, damp, very dense	SC	16 50/6"	50/6"							

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 4

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-0636
Mattison Lane

LOGGED BY: BD | DATE DRILLED: 8/1/22 | BORING TYPE: 6" SOLID STEM | BORING NO: 13

	SAMPLE NO.		SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
25	13-4 T		Olive brown, mottled orange brown, fine Clayey SAND, damp	SC	50/6"	50/6"							
26			Boring Terminated at 25.5 Feet No Groundwater Encountered										
27													
28													
29													
30													
31													
32													
33													
34													
35													
36													
37													
38													
39													
40													
41													
42													
43													
44													
45													
46													
47													
48													

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 4a

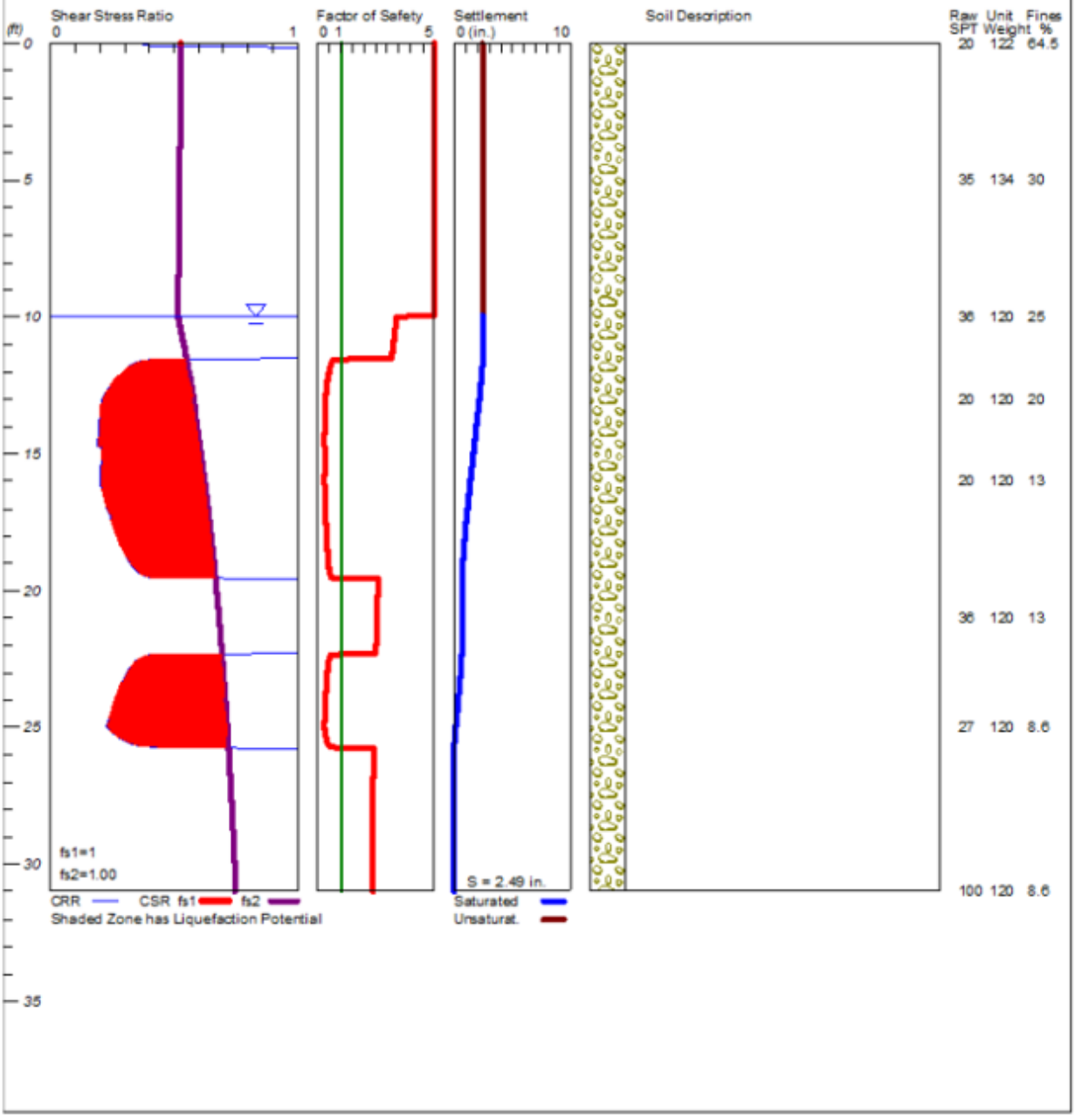
* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

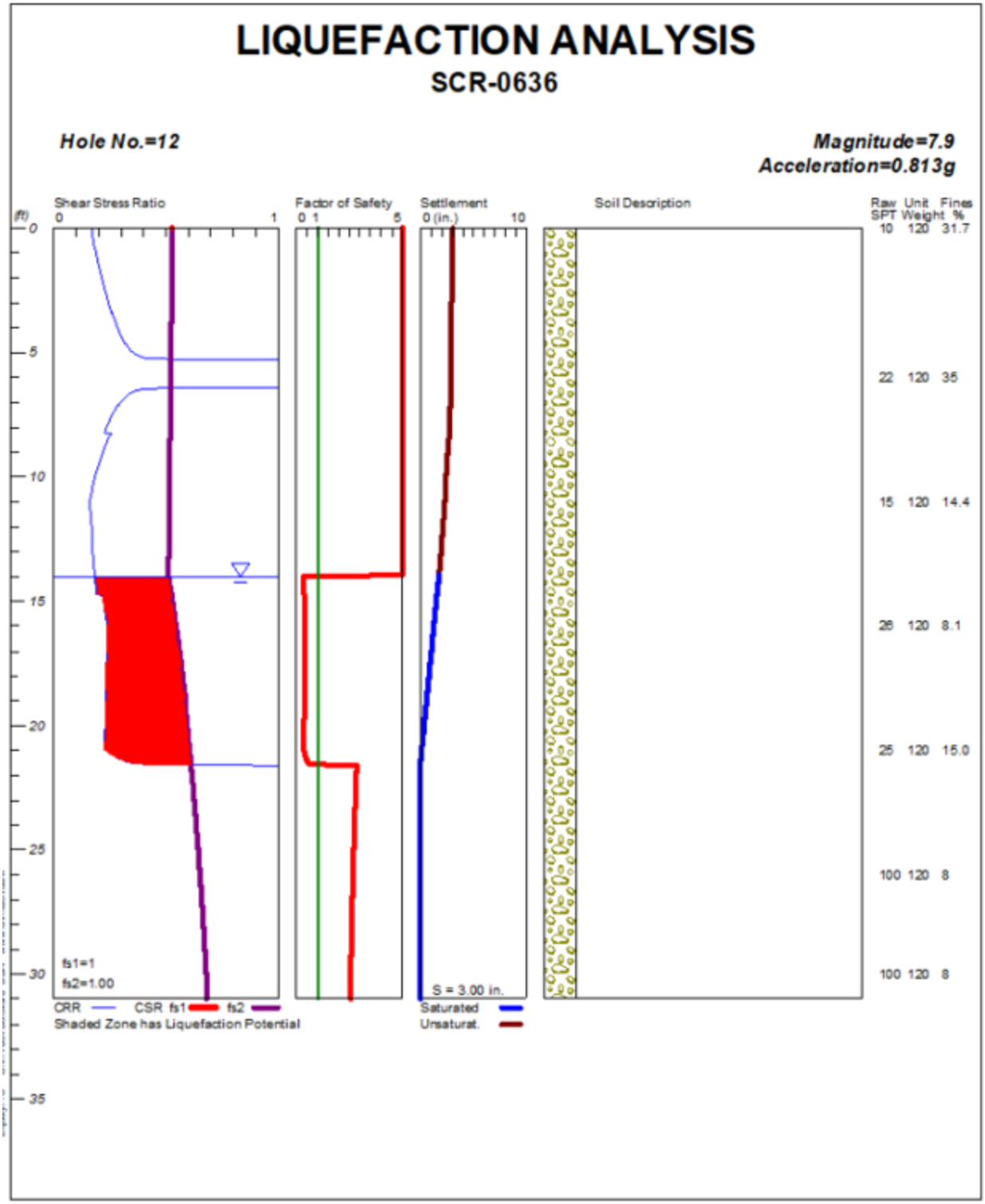
LIQUEFACTION ANALYSIS

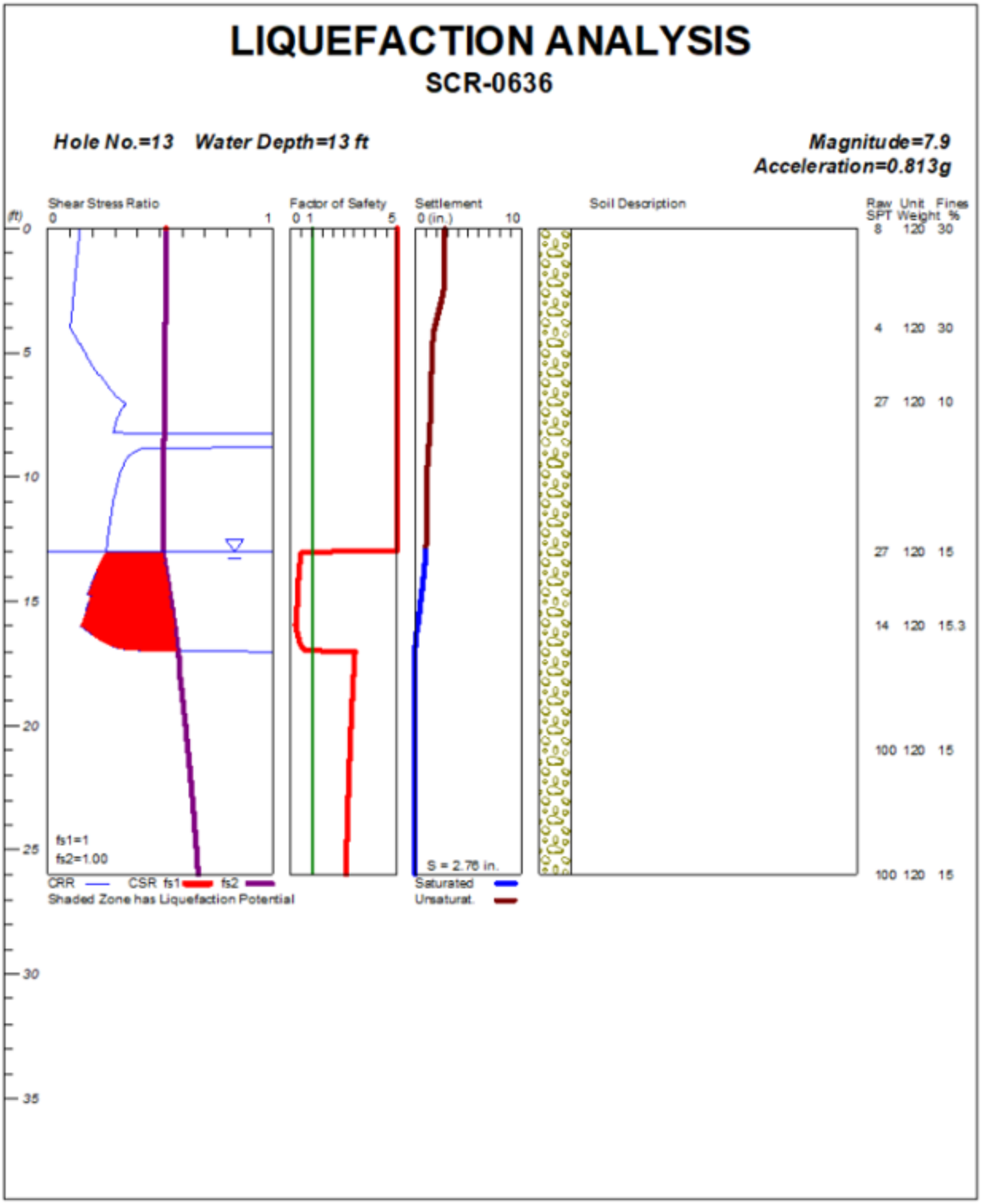
SCR-0636

Hole No.=11

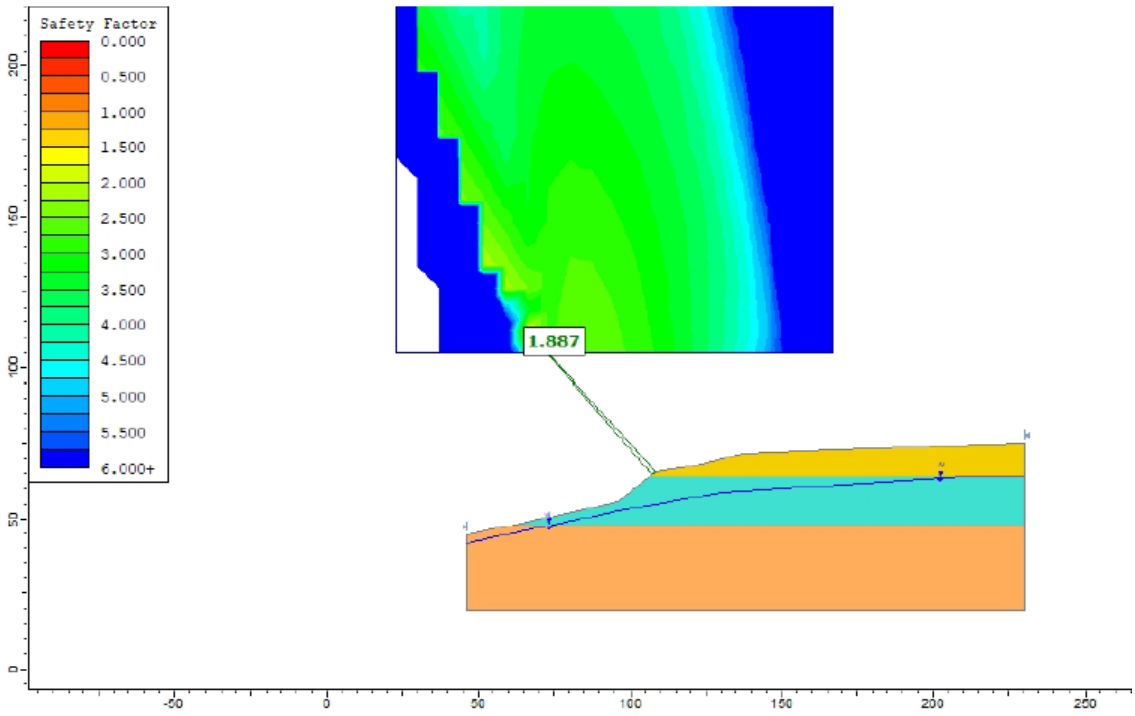
Magnitude=7.9
Acceleration=0.813g



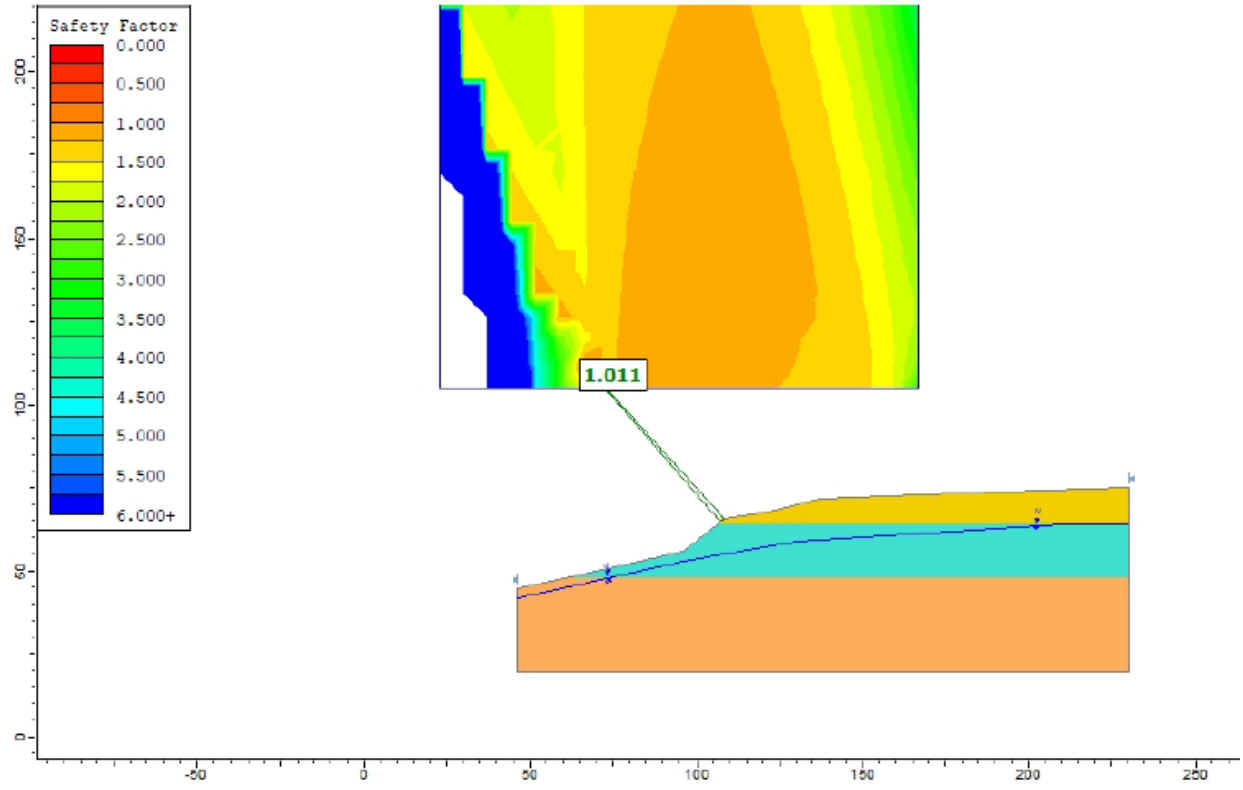

LIQUEFACTION ANALYSIS
SCR-0636
Hole No.=12
Magnitude=7.9
Acceleration=0.813g
Shear Stress Ratio
Factor of Safety
Settlement
Soil Description
Raw SPT
Unit Weight
Fines %
(ft)
0
5
10
15
20
25
30
35
0
1
0 1
5
0 (in.)
10
10 120 31.7
22 120 35
15 120 14.4
26 120 8.1
25 120 15.0
100 120 8
100 120 8
fs1=1
fs2=1.00
S = 3.00 in.
CRR
CSR fs1
fs2
Saturated
Unsaturat.
Shaded Zone has Liquefaction Potential


LIQUEFACTION ANALYSIS
SCR-0636
Hole No.=13 Water Depth=13 ft
Magnitude=7.9
Acceleration=0.813g
Shear Stress Ratio
Factor of Safety
Settlement
Soil Description
Raw SPT
Unit Weight
Fines %
(ft)
0
5
10
15
20
25
30
35
0 1
0 1 5
0 (in.) 10
8 120 30
4 120 30
27 120 10
27 120 15
14 120 15.3
100 120 15
100 120 15
fs1=1
fs2=1.00
S = 2.76 in.
CRR
CSR fs1 fs2
Shaded Zone has Liquefaction Potential
Saturated
Unsaturat.

1: Static


Safety Factor
0.000
0.500
1.000
1.500
2.000
2.500
3.000
3.500
4.000
4.500
5.000
5.500
6.000+
1.887
200
150
100
50
0
-50
0
50
100
150
200
250

Seimsic K = 0.31



Materials

Material 1	
Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [lbs/ft3]	83.2
Saturated Unit Weight [lbs/ft3]	124.3
Cohesion [psf]	0
Friction Angle [deg]	59.5
Water Surface	Assigned per scenario
Hu Value	1
Material 2	
Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [lbs/ft3]	89.1
Saturated Unit Weight [lbs/ft3]	91
Cohesion [psf]	258.1
Friction Angle [deg]	33.2
Water Surface	Assigned per scenario
Hu Value	1
Material 3	
Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [lbs/ft3]	100
Saturated Unit Weight [lbs/ft3]	110
Cohesion [psf]	300
Friction Angle [deg]	35
Water Surface	Assigned per scenario
Hu Value	1

Dees & Associates, Inc.
Geotechnical Engineers
501 Mission Street, Suite 8A Santa Cruz, CA 95060 Phone (831) 427-1770

August 23, 2022 Proposal No. SCR-0636
Revised May 8, 2023

CLAUDIO LOCATELLI
% Swift Consulting Services
500 Chestnut Street, Suite 100
Santa Cruz, California 95060

Subject: 2019 California Building Code Update Report

Reference: Proposed Townhouse Development
Mattison Lane, Santa Cruz
APN'S 029-391-01, 02 & 03
Santa Cruz County, California

Dear Mr. Locatelli:

This update letter updates our 2013 report so it is in conformance with the 2019 California Building Code. The seismic loading has changed and now the seismic shaking is significantly higher than it was. As a result of the changes, we have re-evaluated the seismic hazards; including seismic loading, liquefaction potential and landsliding. We have also updated our foundation recommendations based on our new analyses. The recommendations of this letter shall be used where any conflicts arise between our 2013 report and this update letter.

As part of our update, we drilled three additional borings at the site to depths of 25.5 to 31 feet. The locations of our borings are indicated on Figure 1. We also performed additional laboratory testing including moisture-density relationships, grain size analysis and direct shear testing. The two direct shears were prepared using saturated, remolded samples where the gravels over ½-inch were removed. The results of our laboratory testing are included on the boring logs, Figures 2 to 4.

Liquefaction

An analysis of the liquefaction potential of the soils underlying the site was conducted as part of our update. Liquefaction occurs when saturated fine grained sands, silts and sensitive clays are subject to shaking during an earthquake and the water pressure within the pores build up leading to loss of strength.

Our analysis was performed using the soils encountered in Borings 11 to 13 and the groundwater levels encountered in our borings drilled in January 2013. Fines contents for the soils below the groundwater table were based on laboratory test results. Fines contents for the soils above the groundwater table were estimated. Seismic conditions were analyzed using the maximum expected peak ground acceleration (PGA_M) of 0.813g. The results of our liquefaction analysis indicate there is a potential for liquefaction to develop in zones of soil below the groundwater

table. See Figures 5 to 7. The zones of liquefaction varied between borings, but were generally between 10 and 25 feet below grade. Liquefaction could cause ground settlement and sand boils to occur. There is a low potential for and lateral spreading and soil strength loss due to the density of the soils.

Settlement

Total ground settlements associated with the design earthquake are predicted to be on the order of 2.5 to 3 inches. Differential settlements are expected to be on the order of 0.5 to 0.75 inches.

Sand Boils

Sand boils are caused when water pressures are relieved at the ground surface and the upward movement of groundwater causes soil to rise to the ground surface creating a mound of soil at the surface. There is a potential for sand boils to develop at the ground surface. Sand boils will not adversely affect the proposed structure foundations but sand boils may cause movement and cracking in thin slab and pavement sections.

Slope Stability

To evaluate the stability of the ravine slope, we performed a stability analysis using a cross section prepared from the topographic map provided to us.

Shear strength properties of the soils comprising the slope were based on remolded, saturated direct shear tests. Groundwater levels were based on the groundwater levels encountered in January 2013. Seismic analyses were performed using a seismic coefficient of 0.31g. The seismic coefficient was determined by the following equation PGAm/1.5 *feq, where PGAm was determined from the OHSPD Seismic Design Calculator and feq was determined from SP117 for a 5cm displacement. Our analyses were performed using Janbu Simplified and Spencer's method.

The results of our analysis indicate the ravine slope is seismically stable for the design earthquake. Our slope stability analysis results are attached.

Seismic Parameters

Structures designed according to the 2019 California Building Code may use the following parameters in their analysis. The following ground motion parameters may be used in seismic design and were determined using the OHSPD Seismic Design Calculator and ASCE 7-16.

Seismic Design Parameters	ASCE 7-16 2019 CBC
Site Class	D
Mapped Spectral Acceleration for Short Periods	Ss = 1.765 g
Mapped Spectral Acceleration for 1-second Period	S_1 = 0.678 g
5% Damped Spectral Response Acceleration for Short Period	S_{Ds} = 1.177 g

5% Damped Spectral Response Acceleration for 1-Second Period	See Section 11.4.8
Seismic Design Category	See Section 11.4.8
PGAm	0.813 g

Site Grading

- Temporary cut slopes should be inclined no steeper than 1:1 (horizontal to vertical).

- Engineered fill should be observed and tested by our firm. At a minimum, in-place density tests should be performed as follows: one test for every foot of fill, one test for every 1,000 sq. ft. of material for relatively thin fill sections and one test whenever there is a definite suspicion of a change in the quality of moisture control or effectiveness in compaction.

Retaining Walls

- Retaining walls over 6 feet high should include a seismic surcharge load of 13 pcf, EFW, in addition to the above lateral earth pressures. The resultant dynamic pressure should be applied at a point 0.6 H above the base of the wall.

- Drainage materials behind retaining walls may consist of ¾-inch drainrock wrapped in filter cloth, Class 1 or Class 2 Type A permeable material (Caltrans Specification 68-1.025), or an approved equivalent.

Foundations

- Foundations should be designed to accommodate 0.75-inches of seismically induced settlements. Stiffened spread footings or mat slab foundations may be used as long as the differential settlements meet current design standards. The spread footing design criteria presented in our 2013 report, in conjunction with ¾-inches of differential settlement, may be used for design of spread footing foundations.

Mat Slab Foundations

- A mat slab foundation bearing on 12 inches of compacted subgrade soil may be used to support structures.

- Mat slabs should be designed to accommodate 0.75-inches of seismically induced settlements over the width of the slab.

- Mat slabs designed using strip loads may be designed for an allowable soil bearing pressure of 2,000 psf for dead plus live loads for strip loads up to 3 feet wide. If a uniformly loaded slab design is used, the bearing capacity should be limited to 500 psf. These values may be increased by one-third to include short-term seismic and wind loads.

- Footings located adjacent to mat slab foundations should have their bearing surfaces founded below an imaginary 1:1 plane projected upward from the bottom edge of the adjacent footings or utility trenches.

- Total and differential settlements from building loads are anticipated to be on the order of 1 inch and 1/2 inches respectively. Differential settlement from seismic loading is anticipated to be on the order of 0.75 inches over the width of the slab.

- Lateral load resistance may be developed in friction between the foundation bottom and the supporting subgrade. A friction coefficient of 0.40 may be assumed. Where slabs are poured neat against the adjacent soil, a passive lateral earth pressure of 350 pcf EFW, may be used. The upper 12 inches of soil should be neglected in passive design.

- All slabs-on-grade can be expected to suffer some cracking and movement. However, thickened exterior edges, a well-prepared subgrade including pre-moistening prior to pouring concrete, adequately spaced expansion joints and good workmanship should reduce cracking and movement.

- Dees & Associates, Inc. are not experts in the field of moisture proofing and vapor barriers. In areas where floor wetness would be undesirable, an expert, experienced with moisture transmission and vapor barriers should be consulted. At a minimum, a blanket of 4 inches of free-draining gravel should be placed beneath the floor slab to act as a capillary break. In order to minimize vapor transmission, an impermeable membrane (10-mil. minimum) should be placed over the gravel.

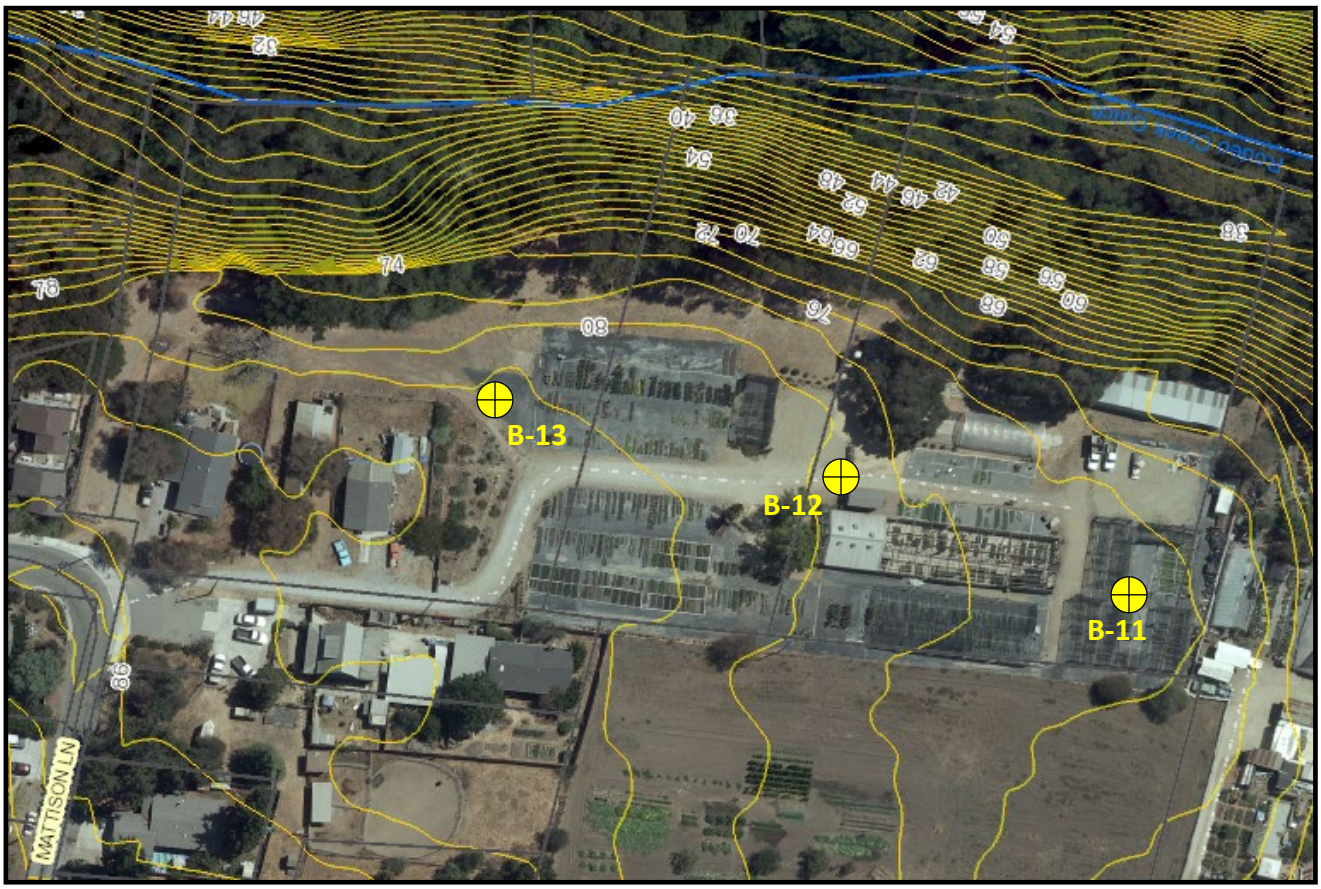
Very truly yours,

DEES & ASSOCIATES, INC.

Rebecca L Dees

Rebecca L. Dees
Geotechnical Engineer
G.E. 2623

Attachments
Copies: 1 to Addressee



BORING SITE PLAN
Figure 1

TEST BORING LOG

SCR-0636
Mattison Lane

LOGGED BY: BD	DATE DRILLED: 8/1/22	BORING TYPE: 6" SOLID STEM	BORING NO: 11

	SAMPLE NO.	SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
1		Dark brown Silty SAND topsoil, dry, medium dense	SM	12								
	11-1-1			20								
2	L	Dark yellow brown with very fine white speckles Sandy CLAY, dry-damp, hard		20	20	107.7	14.1					
			CL	10								
3	11-2			15								
	T			20	35		13.9					
4												
		Estimated Contact										
5												
6												
7												
8			SC	16								
	11-3	Dark yellow brown Clayey SAND with rounded gravels, damp,		17								
9	T	dense		19	36		11.1	21.9	0	59		
10												
11												
12												
13												
14		Dark yellow brown Clayey SAND, damp, medium dense (less clay than above)	SC									
15				4								
	11-4			8								
16	T			12	20		19.6					
17		Dark yellow brown poorly graded fine SAND with Clay, dry-damp, dense	SP									
18												
19												
20												
	11-5			9								
21	T			16								
				20	36		12.7	26.2	258.1	33.2	13.0	
22												
23		Increase in gray coloring										
24												

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 2

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-0636
Mattison Lane

LOGGED BY: BD | DATE DRILLED: 8/1/22 | BORING TYPE: 6" SOLID STEM | BORING NO: 11 Con't.

	SAMPLE NO.	SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
25				10								
26	11-6 T	Gray and dark yellow brown poorly graded fine SAND, dry-damp, medium dense	SP	13 14	27		13.0				8.6	
27												
28												
29												
30	11-7 T			16 50/6"	50/6"							
31												
32		Boring Terminated at 31.0 Feet No Groundwater Encountered										
33												
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 2a

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-0636
Mattison Lane

LOGGED BY: BD | DATE DRILLED: 8/1/22 | BORING TYPE: 6" SOLID STEM | BORING NO: 12

	SAMPLE NO.	SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
1		Dark yellow brown Clayey SAND	SC									
2												
3												
4												
5												
6												
7		Dark yellow brown Clayey SAND with Gravel										
8			SC									
9												
10				5								
11	12-1 T	Olive brown Clayey SAND, damp, medium dense		5 10	15		17.2				14.4	
12												
13												
14												
15				10								
16	12-2 T			13 13	26		10.8				8.1	
17												
18												
19												
20				10								
21	12-3 T	Olive brown with lenses of dark yellow brown and gray fine Clayey SAND, damp, medium dense		10 15	25		23.9				15.0	
22												
23												
24												

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 3

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-0636
Mattison Lane

LOGGED BY: BD | DATE DRILLED: 8/1/22 | BORING TYPE: 6" SOLID STEM | BORING NO: 12 Con't.

	SAMPLE NO.		SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
25													
26	12-4 T		Olive brown fine SAND with Clay or Clayey SAND, damp, very dense	SP/ SC	10 50/6"	50/6"							
27													
28													
29													
30	12-5 T		Olive brown SAND with Clay, damp, very dense	SP	50/5"	50/5"							
31			Boring Terminated at 30.5 Feet No Groundwater Encountered										
32													
33													
34													
35													
36													
37													
38													
39													
40													
41													
42													
43													
44													
45													
46													
47													
48													

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 3a

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-0636
Mattison Lane

LOGGED BY: BD | DATE DRILLED: 8/1/22 | BORING TYPE: 6" SOLID STEM | BORING NO: 13

	SAMPLE NO.		SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
10			Gravelly Drilling		9								
11	13-1 T		Orange brown and gray Sandy GRAVEL, dry-damp, medium dense, Gravels ¾ -1 ½ " rounded-subrounded	GW	13 14	27							
13			Approximate Contact										
15					5								
16	13-2 T		Olive brown fine SAND with Clay, damp-moist, medium dense	SP	7 7	14		19.9				15.3	
20					12								
21	13-3 T		Olive brown fine Clayey SAND, damp, very dense	SC	16 50/6"	50/6"							

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 4

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-0636
Mattison Lane

LOGGED BY: BD | DATE DRILLED: 8/1/22 | BORING TYPE: 6" SOLID STEM | BORING NO: 13

	SAMPLE NO.		SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
25	13-4 T		Olive brown, mottled orange brown, fine Clayey SAND, damp	SC	50/6"	50/6"							
26			Boring Terminated at 25.5 Feet No Groundwater Encountered										
27													
28													
29													
30													
31													
32													
33													
34													
35													
36													
37													
38													
39													
40													
41													
42													
43													
44													
45													
46													
47													
48													

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 4a

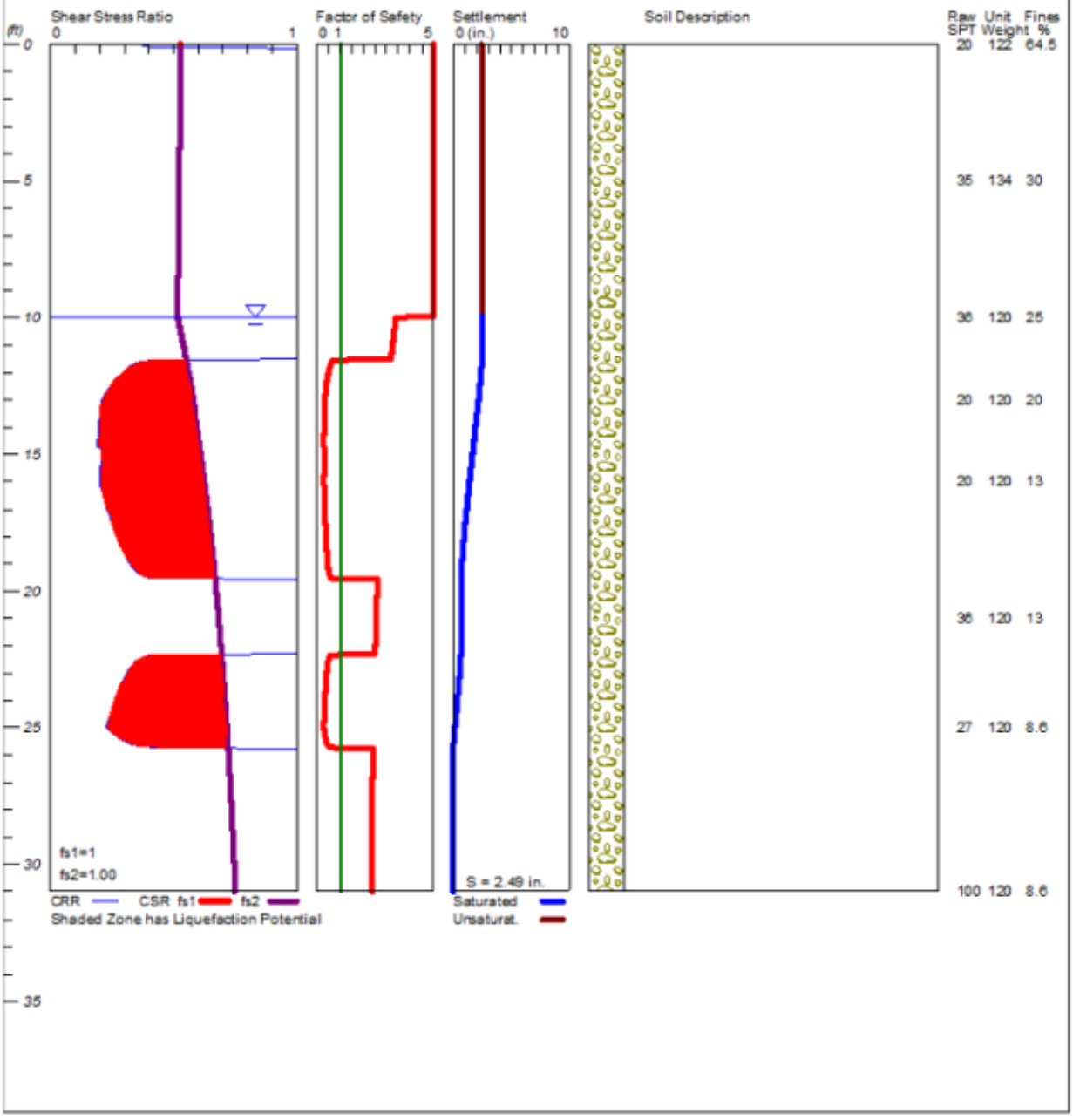
* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

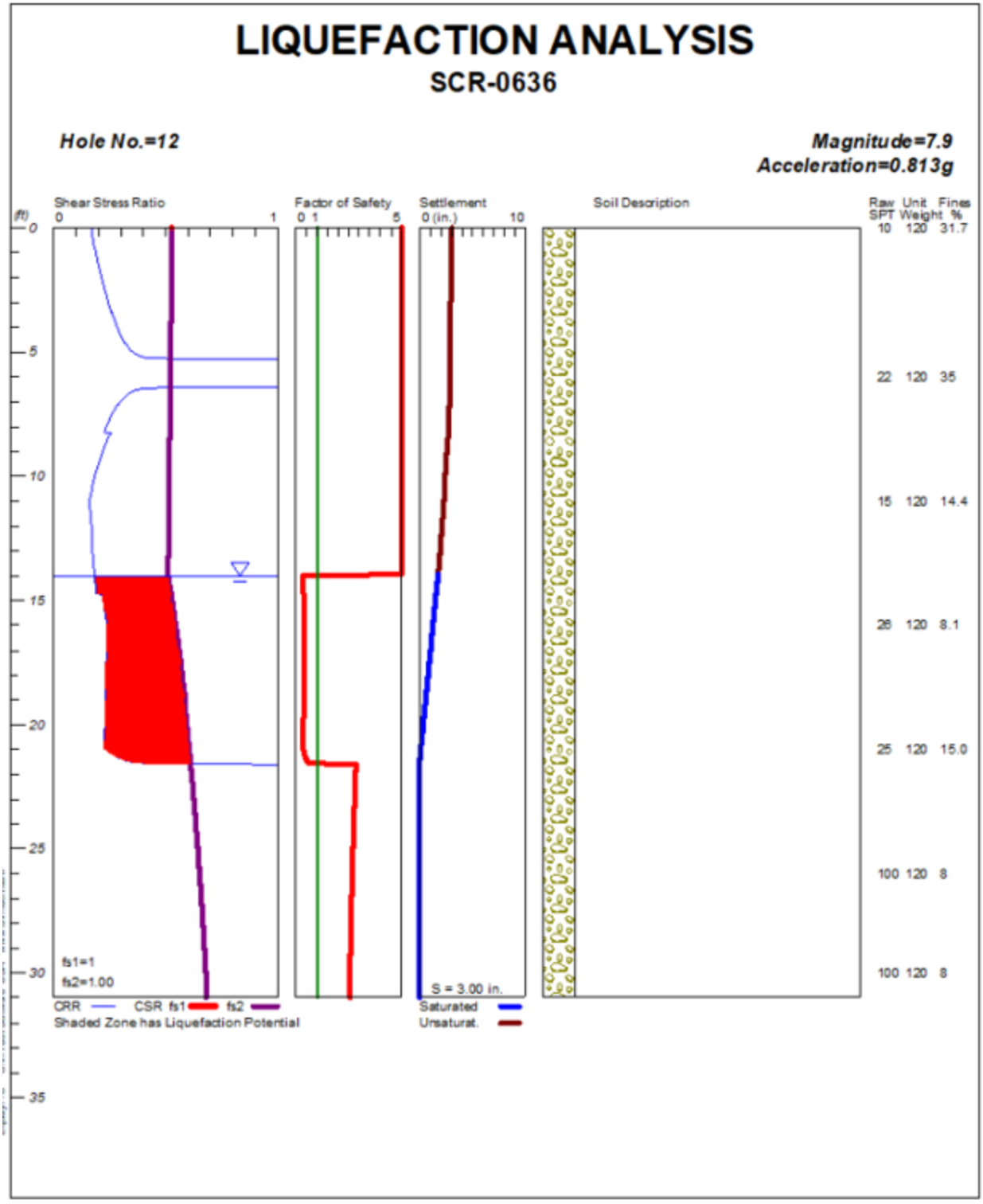
LIQUEFACTION ANALYSIS

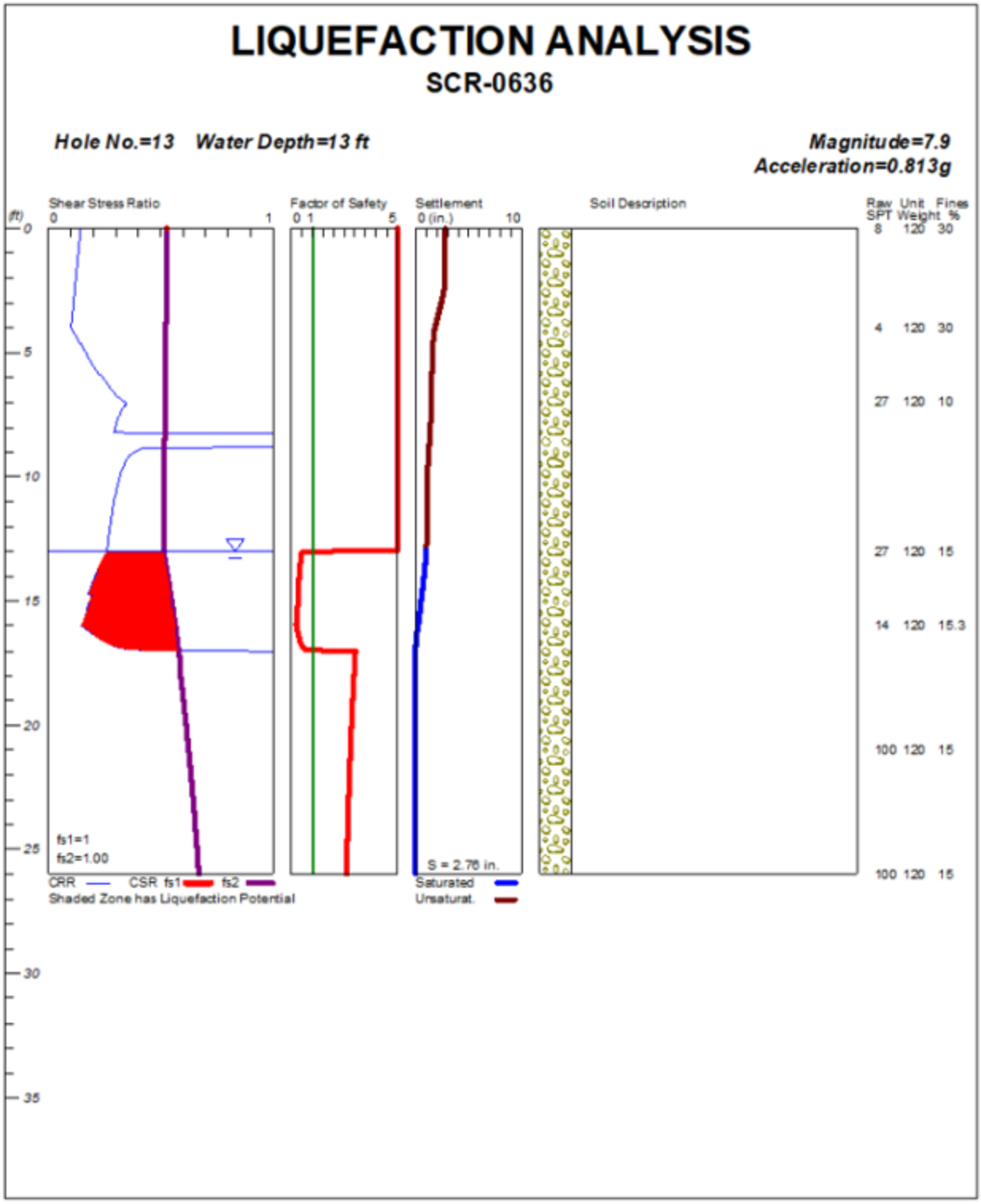
SCR-0636

Hole No.=11

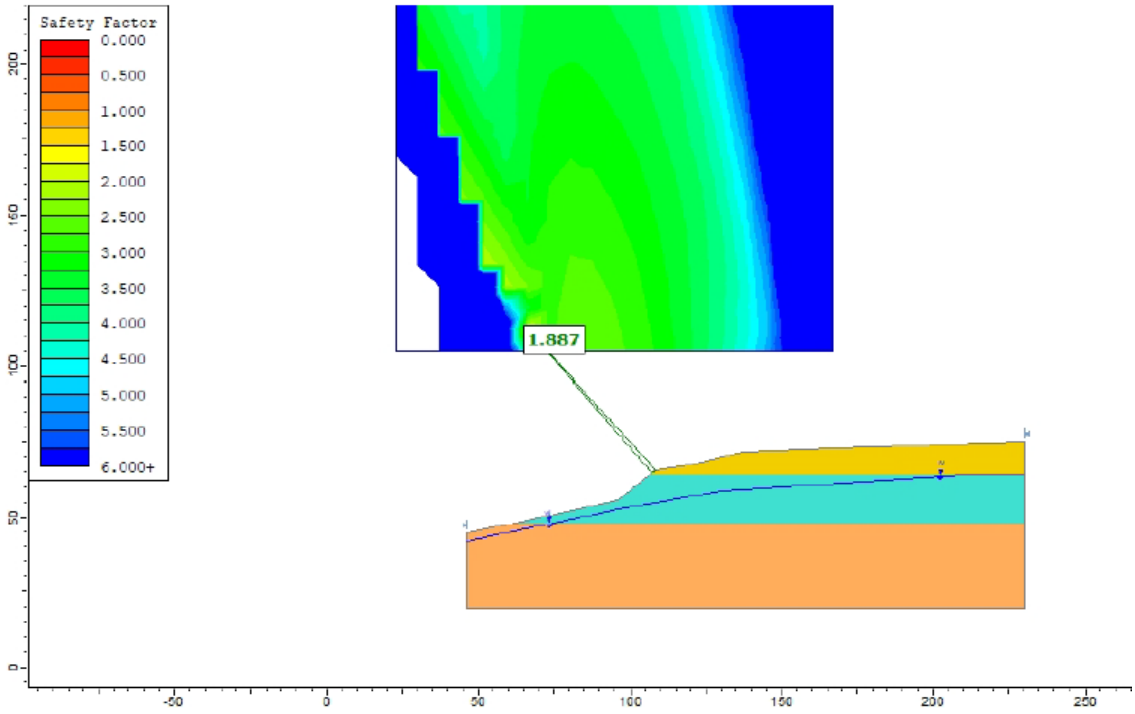
Magnitude=7.9
Acceleration=0.813g



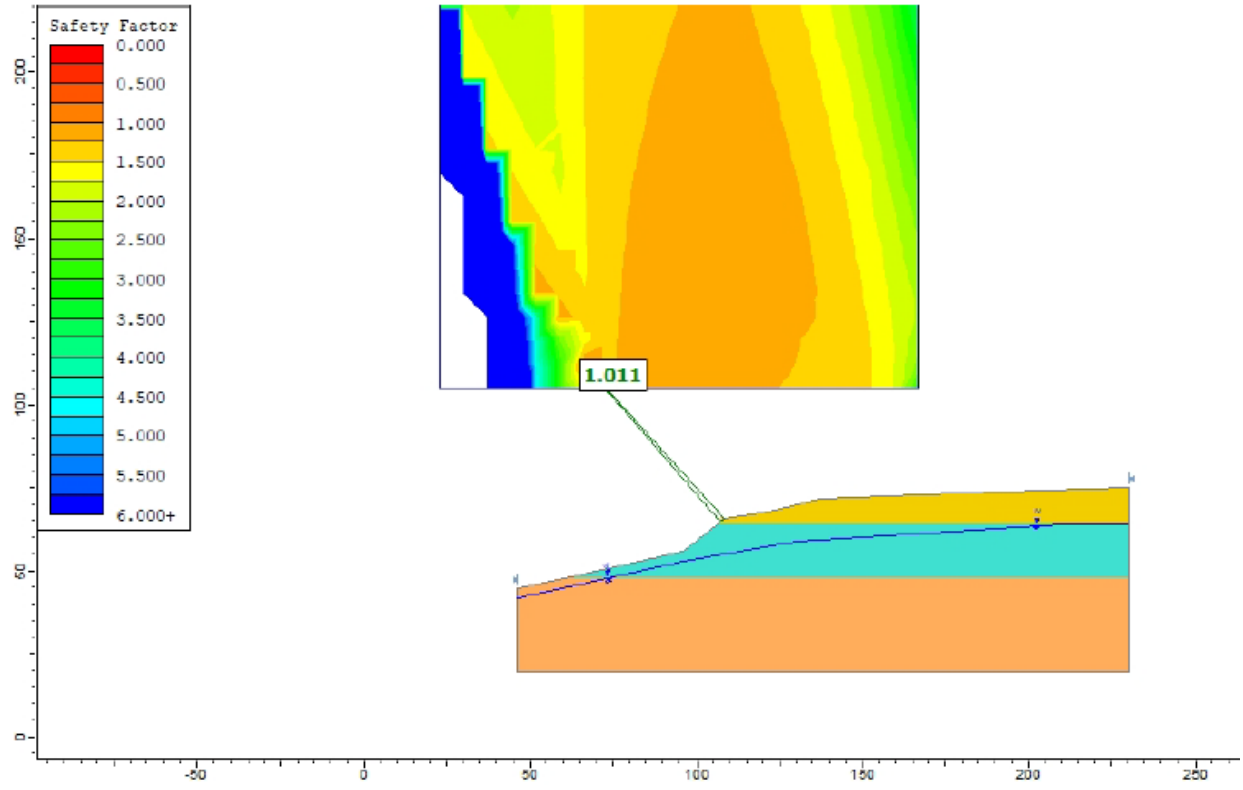

LIQUEFACTION ANALYSIS
SCR-0636
Hole No.=12
Magnitude=7.9
Acceleration=0.813g
Shear Stress Ratio
Factor of Safety
Settlement
Soil Description
Raw SPT
Unit Weight
Fines %
10 120 31.7
22 120 35
15 120 14.4
26 120 8.1
25 120 15.0
100 120 8
100 120 8
fs1=1
fs2=1.00
S = 3.00 in.
CRR
CSR fs1 fs2
Shaded Zone has Liquefaction Potential
Saturated
Unsaturat.


LIQUEFACTION ANALYSIS
SCR-0636
Hole No.=13 Water Depth=13 ft
Magnitude=7.9
Acceleration=0.813g
Shear Stress Ratio
Factor of Safety
Settlement
Soil Description
Raw SPT
Unit Weight
Fines %
(ft)
0
5
10
15
20
25
30
35
0 1
0 1 5
0 (in.) 10
8 120 30
4 120 30
27 120 10
27 120 15
14 120 15.3
100 120 15
100 120 15
fs1=1
fs2=1.00
S = 2.76 in.
CRR
CSR fs1 fs2
Shaded Zone has Liquefaction Potential
Saturated
Unsaturat.

1: Static


Safety Factor
0.000
0.500
1.000
1.500
2.000
2.500
3.000
3.500
4.000
4.500
5.000
5.500
6.000+
1.887
200
150
100
50
0
-50
0
50
100
150
200
250

Seimsic K = 0.31



Materials

Material 1	
Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [lbs/ft3]	83.2
Saturated Unit Weight [lbs/ft3]	124.3
Cohesion [psf]	0
Friction Angle [deg]	59.5
Water Surface	Assigned per scenario
Hu Value	1
Material 2	
Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [lbs/ft3]	89.1
Saturated Unit Weight [lbs/ft3]	91
Cohesion [psf]	258.1
Friction Angle [deg]	33.2
Water Surface	Assigned per scenario
Hu Value	1
Material 3	
Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [lbs/ft3]	100
Saturated Unit Weight [lbs/ft3]	110
Cohesion [psf]	300
Friction Angle [deg]	35
Water Surface	Assigned per scenario
Hu Value	1

GEOTECHNICAL INVESTIGATION
For
PROPOSED 12-LOT SUBDIVISION
Mattison lane
APN 029-391-01, 02 and 03
Santa Cruz County, California

Prepared
For
CLAUDIO LOCATELLI
% Steve Elmore
Santa Cruz, California

Prepared By
DEES & ASSOCIATES, INC.
Geotechnical Engineers
Project No. SCR-0636
MARCH 2013

Dees & Associates, Inc.
Geotechnical Engineers
501 Mission Street, Suite 8A Santa Cruz, CA 95060 Phone (831) 427-1770

March 5, 2013 Project No. SCR-0636

CLAUDIO LOCATELLI
% Steve Elmore
1557 Taylor Lane
Santa Cruz, California 95062

Subject: Geotechnical Investigation

Reference: Proposed 12-Lot Subdivision
Mattison Lane
APN 029-391-01, 02 and 03
Santa Cruz County, California

Dear Mr. Locatelli:

As requested, we have completed a Geotechnical Investigation for the 12-lot subdivision proposed at the referenced site. The purpose of our investigation was to evaluate the soil conditions at the site and provide geotechnical recommendations for the proposed improvements.

This report presents the results, conclusions and recommendations of our investigation. If you have any questions regarding this report, please call our office.

Very truly yours,

DEES & ASSOCIATES, INC.

Rebecca L Dees

Rebecca L. Dees
Geotechnical Engineer
G.E. 2623

Copies: 6 to Addressee

TABLE OF CONTENTS

GEOTECHNICAL INVESTIGATION

Introduction

This report presents the results of our Geotechnical Investigation for the 12-lot subdivision proposed at APN 029-391-01, 02 and 03 on Mattison Lane in Santa Cruz County, California.

Purpose and Scope

The purpose of our investigation was to explore and evaluate surface and near surface soil at the site and provide geotechnical recommendations for its design and construction.

The specific scope of our services was as follows:

1. Site reconnaissance and review of available data in our files pertinent to the site and vicinity.

2. Exploration of subsurface conditions consisting of logging and sampling of ten (10) exploratory borings drilled between 4 and 21.5 feet below grade.

3. Laboratory testing to evaluate the engineering properties of the subsoils.

4. Liquefaction Analysis.

5. Engineering analysis and evaluation of the resulting field and laboratory test data. Based on our findings, we have developed geotechnical design criteria for general site grading, foundations, retaining walls, concrete slabs-on-grade and general site drainage.

6. Preparation of this report presenting the results of our investigation.

Project Location and Description

The site is located on Mattison Lane, APN 029-391-01, 02 and 03, in Santa Cruz County, California. The combined 4.8 acre site is located at the southeast corner of Mattison Lane along the eastern edge of Rodeo Creek Gulch. The majority of the site is nearly level to very gently sloping with slope gradients on the order of 1 to 2 percent. The 40 foot high creek bank along the western edge of the site slopes at about a 20 percent slope gradient with locally steeper slopes along the top 15 to 20 feet of the slope where slope gradients are on the order of 50 to 70 percent.

The site is developed with three single family residences, a nursery and a dirt road. The nursery has a small office building, two large sheds, a green house and several covered terraces.

The project consists of removing the existing improvements and constructing up to 12

single family residences and a road at the site. The road will come off Mattison Lane and provide access to the residences. The road will be located along the eastern edge of the site and the 12 lots will be located along the western edge of the roadway with the exception of one lot located at the south end of the road. Most of the lots will have one single family residence with an attached garage. Several of the parcels will also include accessory dwellings located behind the main residence. The lots will be setback at least 60 feet from the top edge of the western slope.

Field Investigation

Subsurface conditions at the site were explored on January 30, 2013 with ten (10) exploratory borings drilled with 6-inch diameter continuous flight augers advanced with tractor mounted drilling equipment. Our borings were drilled to depths of 4 to 21.5 feet. The approximate locations of our exploratory borings are indicated on Figure 2.

The soils observed in the test borings were logged in the field and described in accordance with the Unified Soil Classification System (D2487 and D2488), Figures 3. The Test Boring Log denotes subsurface conditions at the locations and times observed, and it is not warranted it is representative of subsurface conditions at other locations or times.

Representative soil samples were obtained from the exploratory borings at selected depths, or at major strata changes. These samples were recovered using the 3.0-inch O.D. Modified California Sampler (L) or the Standard Terzaghi Sampler (T). The penetration resistance blow counts for the (L) and (T) noted on the boring logs were obtained as the sampler was dynamically driven into the in situ soil. The process was performed by dropping a 140-pound hammer a 30-inch free fall distance and driving the sampler 6 to 18 inches and recording the number of blows for each 6-inch penetration interval. The blows recorded on the boring logs present the accumulated number of blows that were required to drive the last 12 inches. **The blow counts indicated on the logs have been converted to equivalent standard penetration test (SPT) values.**

Laboratory Testing

The laboratory testing program was directed toward a determination of the physical and engineering properties of the soils underlying the site. Moisture content and dry densities were performed on representative soil samples to determine the consistency of the soil and the moisture variation throughout the explored soil profile. Grain size analysis and Atterberg Limits were performed on select samples to aid in soil classification and to evaluate the relative shrink/swell potential of the foundation zone soils. A direct shear test was performed to evaluate the shear strength properties of the foundation zone soil. The results of our field and laboratory testing appear on the "Log of Test Borings", opposite the sample tested.

Subsurface Soil Conditions

The Santa Cruz County Geologic Map indicates the site is underlain by Purisima Formation, Figure 3. The Purisima Formation (Pliocene and upper Miocene) is

described as, “Very thick bedded yellowish-gray tuffaceous and diatomaceous siltstone containing thick interbeds of bluish-gray, semifriable, fine-grained andesitic sandstone”.

Our borings indicate the entire site is underlain by Lowest Emergent Coastal terrace Deposits. The soils generally consisted of 2 to 2.5 feet of silty sand over clayey sand which is further underlain by silty sand with thin gravelly sand lenses. The top 2 to 5 feet of soil is loose in the area of the proposed improvements. The loose soil is deeper as you move towards the western slope where loose soil extended about 3 to 5 feet below grade along the west side of the proposed homesites.

Five (5) to 12 feet of loose to very loose soil exists along the top of the eastern slope. Based on our borings, the loose soil extends about 25 to 30 feet back from the top edge of the slope. The loose soil lies west of the proposed improvements and did not extend into the proposed homesites.

The soils below the site are classified as a Site Class “D” for analysis using the 2010 California Building Code.

Groundwater

Perched groundwater was encountered in Borings 1, 2, 3 and 9. Borings 5, 8 and 10 were not drilled deep enough to encounter groundwater. Groundwater was encountered 10 to 14 feet below grade where it was encountered. The soils near the groundwater level were wet and the soils below the groundwater zone were moist.

The groundwater levels encountered in our borings denote groundwater conditions at the locations and times observed, and it is not warranted it is representative of groundwater conditions at other locations or times. Groundwater levels may vary with seasonal variations and other factors not evident during our investigation.

Seismicity

The project site is located about 9.3 kilometers (5.7 miles) southwest of the Zayante-Vergeles Fault zone, 14.5 kilometers (8.9 miles) southwest of the San Andreas Fault zone, 14.6 kilometers (9.0 miles) northeast of the offshore Monterey Bay-Tularcitos Fault zone and 20.7 kilometers (12.7 miles) northeast of the offshore San Gregorio Fault zone.

The San Andreas Fault is the largest and most active of the faults, however, each fault is considered capable of generating moderate to severe ground shaking. It is reasonable to assume that the proposed development will be subject to at least one moderate to severe earthquake from one of the faults during the next fifty years.

The Seismic Design Category (SDC) for structures with an occupancy category of I or II is “D” for analysis using the 2010 California Building Code. The following ground motion parameters may be used in seismic design and were determined using the USGS Ground Motion Parameter Calculator: Ss, Site Class B (0.2 sec) = 1.500g; S1, Site

Class B (1.0 sec) = 0.600g; SMs, Site Class D (0.2 sec) = 1.500g; SM1, Site Class D (1.0 sec) = 0.900g; SDs, Site Class D (0.2 sec) = 1.000g; SD1, Site Class D (1.0 sec) = 0.600g.

Liquefaction

The site is mapped as having a low liquefaction potential in the zone mapped as Terrace Deposits and no liquefaction potential in the zone mapped as Purisima. See Figure 4.

Liquefaction occurs when saturated fine grained sands, silts and sensitive clays are subject to shaking during an earthquake and the water pressure within the pores build up leading to loss of strength. The excess pore water pressures then start to dissipate upwards and sideways. The primary movement is in an upward direction towards the ground surface which often results in ground settlement. Lateral dissipation of pore pressures could result in lateral spreading if soils liquefy near a slope face.

An analysis of the liquefaction potential of the soils underlying the site was conducted using the computer program LiquefyPro (CivilTech 2009). The LiquefyPro liquefaction program analyzes the liquefaction resistance of the sandy layers using the liquefaction resistance proposed by Blake, T.F (1997) and normalized SPT blow count ($N_{1\text{-}60}$) proposed by Liao & Whitman (1986). Fines corrections were performed using methods developed by Stark/Olsen. Settlement analysis methods were developed by Ishihara/Yoshimine.

Percent passing the No. 200 sieve were obtained from laboratory test results. Groundwater depth was based on the depth of groundwater at the time of drilling. Seismic conditions were analyzed using a maximum expected peak ground acceleration of 0.4g. The maximum peak ground acceleration was determined using the seismic coefficient S_{DS} divided by 2.5.

The results of the liquefaction analysis indicate there is a low potential for liquefaction to develop below the homesite. See Figure 5.

Landsliding

The site is very gently sloping with the exception of the slope along the western edge of the site. The top of the slope is steep and some signs of erosion and slumping were observed along the top of the slope. The proposed homesites will be setback at least 60 feet from the top edge of the western slope. There is a low potential for landslides to affect improvements located 60 feet from the top edge of the slope.

DISCUSSIONS AND CONCLUSIONS

Based on the results of our investigation, the new single family residences and road proposed at the site are feasible provided the recommendations presented in this report are incorporated into the design and construction of the project.

Primary geotechnical concerns for the project include setting improvements back from the top edge of the western slope, compacting loose soil below improvements, embedding foundations into firm native soil or engineered fill, controlling site drainage and designing structures to resist strong seismic shaking.

There is 5 to 12 feet of loose to very loose soil along the top of the drainage ravine slope at the western edge of the property. Improvements should be set back from the top of the slope. We understand there are a 50 foot wide riparian setback and a 10 foot wide construction setback from the riparian zone which puts the improvements at least 60 feet from the top edge of the slope. The 60 foot setback provides more than enough setback from the top of the slope from a geotechnical perspective.

Most of the proposed homesites are underlain by 2 to 2.5 feet of loose soil. The depth of loose soil deepens as you move westward towards the drainage ravine. The homesites with accessory dwellings in the back are expected to have 3 or more feet of loose soil below the accessory dwellings. Site grading is expected to include minor cuts and fills to establish building pads and the roadway. The top 3 feet of loose soil should be removed and replaced as compacted engineered fill below the proposed improvements and in areas where fill is planned. The proposed residences may be supported on conventional spread footings embedded into firm, native soil or engineered fill.

Surface runoff should be controlled and collected roof runoff should be discharged away from foundations. Uncontrolled runoff should not be allowed to flow over the top of the ravine slope. There is loose fill at the top of the slope and concentrated runoff could lead to erosion and slumping along the top of the slope. Impervious surfaces should be limited to reduce the amount of concentrated runoff at the site. Concentrated runoff from residences and driveways should be dispersed at least 60 feet from the top of the slope or discharged at the base of the slope into the natural drainage ravine. Concentrated runoff from the roadway should be collected and either percolated back into the ground at least 120 feet from the top of the ravine or discharged at the base of the slope into the natural drainage ravine.

Structures should be designed to resist strong seismic shaking. Structures designed in accordance with current seismic design requirements should react well to seismic shaking.

RECOMMENDATIONS

The following recommendations should be used as guidelines for preparing project plans and specifications:

Site Grading

1. The soil engineer should be notified at least four (4) working days prior to any site clearing or grading to make arrangements for construction observation and testing services. The recommendations of this report are based on the assumption that the soil engineer will perform the required testing and observation during grading and construction. It is the owner's responsibility to make the necessary arrangements for these required services.

2. Areas to be graded should be cleared of obstructions, organics and other unsuitable material. Voids created during site clearing should be backfilled with engineered fill.

3. Where fill is planned to raise grade, any existing loose soil should be removed and the area to receive engineered fill should be scarified 6 inches, moisture conditioned to 2 to 3 percent over optimum moisture content and compacted to 90 percent relative compaction.

4. The top 3 feet of loose soil should be removed from below proposed structures and replaced as compacted engineered fill. The area to receive engineered fill should be scarified 6 inches, moisture conditioned to 2 to 3 percent over optimum moisture content and compacted to 90 percent relative compaction.

5. Where referenced in this report, Percent Relative Compaction and Optimum Moisture Content shall be based on ASTM Test Designation D1557-00.

6. Soils used for engineered fill should be free of organic material, and contain no rocks or clods greater than 6 inches in diameter, with no more than 15 percent larger than 4 inches. Soils with more than 3 percent organic matter by weight should be considered organic and not suitable as engineered fill.

7. We estimate shrinkage factors of about 15 percent for the on-site materials when used in engineered fills.

8. Engineered fill should be placed in thin lifts not exceeding 8 inches in loose thickness; moisture conditioned to 2 to 3 percent over optimum moisture content and compacted to at least 90 percent relative compaction.

9. The upper 6 inches of subgrade below driveway pavements should be moisture conditioned 2 to 3 percent over optimum moisture content and compacted to at least 95 percent relative compaction. The aggregate base below driveways and pavements should also be compacted to 95 percent relative compaction.

10. Engineered fill slopes and permanent cutslopes should be inclined less than 2:1 (horizontal to vertical). Fill slopes should be keyed and benched into firm native soil. Keys should be at least 8 feet wide and embedded at least 18 inches into firm, native soil on the downslope side. Benches should be created in the natural hillside as the fill is placed. Benches should be at least 6 feet wide, remove all loose soil and be sloped into the hillside at least 2 percent.

11. Any keys or benches exposing potential seepage zones should be drained. Drains should consist of a minimum 12 inch wide column of Caltrans Class 1, Type A, permeable material that extends to within 12 inches of the final ground surface. A 4-inch perforated rigid pipe should be placed about 4 inches above the base of the gravel with the holes facing down. The pipe should be sloped at least 2 percent towards the discharge end. A solid collector pipe should be connected to the perforated pipe to carry the collected water to a suitable discharge point. The presence of seepage zones and the location and dimensions of the drains should be determined in the field by a representative from our office at the time of grading.

12. The face of cut and fill slopes should be groomed to remove any loose soil, create a fairly uniform slope surface. Cut and fill slopes should be protected from erosion at all times.

13. Engineered fill should be observed and tested by our firm. For planning purposes, in-place density tests should be performed as follows: one test for every 12 vertical inches of material placed for embankments, in trenches or around structures, one test for every 400 square feet for relatively thin fill sections and one test whenever there is a definite suspicion of a change in the quality of moisture control or effectiveness in compaction. The actual testing schedule should be determined by a representative from our firm at the time of grading.

14. After the earthwork operations have been completed and the soil engineer has finished their observation of the work, no further earthwork operations shall be performed except with the approval of and under the observation of the soil engineer.

Conventional Spread Footing and Concrete Slab-on-Grade Foundations

15. Conventional spread footings or concrete slabs-on-grade with thickened edges may be used to support the proposed residences. Foundations should be embedded into firm, native soil or engineered fill. A minimum of 18 inches of engineered fill should be placed below foundations supported on engineered fill.

16. Footings should be a minimum of 12 inches deep and 12 inches wide for one story structures and 18 inches deep and 15 inches wide for two story structures. The depth of foundations should be measured from the lowest adjacent grade.

17. Footings located adjacent to other footings or utility trenches should have their bearing surfaces founded below an imaginary 1.5:1 plane projected upward from the bottom edge of the adjacent footings or utility trenches.

18. Foundations designed in accordance with the above may be designed using an allowable bearing capacity of 2500 psf for footings embedded into native soil and 4,000 psf for footings embedded into engineered fill. The allowable bearing capacities may be increased by 1/3 for short term seismic and wind loads.

19. Total and differential settlements under the proposed light building loads are anticipated to be less than 1 inch and 1/2 inch respectively.

20. Lateral load resistance for structures supported on footings may be developed in friction between the foundation bottom and the supporting subgrade. A friction coefficient of 0.40 is considered applicable. Where footings are poured neat against firm native soil or engineered fill, a passive lateral earth pressure of 350 pcf may be used. The top 12 inches of soil should be neglected in passive design.

21. Prior to placing concrete, foundation excavations should be cleaned of loose soil and debris and observed by the soils engineer.

Retaining Wall Lateral Pressures

22. Retaining structures should be designed to resist both lateral earth pressures and any additional surcharge loads.

23. Retaining walls may be designed using the following active and passive pressures:

NATIVE SOIL

Slope	Active Pressure	Passive Pressure	Restrained Pressure
Level	40 pcf EFW	350 pcf EFW	60 pcf EFW
3:1 (h:v)	45 pcf EFW	300 pcf EFW	80 pcf EFW
2:1 (h:v)	65 pcf EFW	200 pcf EFW	100 pcf EFW

ENGINEERED FILL

Backslope	Active Pressure	Passive Pressure	Restrained Pressure
Level	35 pcf EFW	350 pcf EFW	55 pcf EFW
3:1 (h:v)	40 pcf EFW	350 pcf EFW	75 pcf EFW
2:1 (h:v)	50 pcf EFW	250 pcf EFW	95 pcf EFW

24. Retaining walls should include an added seismic component of 18 pcf, equivalent fluid weight. Dynamic surcharges should be added to the above active lateral earth pressures. The resultant dynamic pressure should be applied at a point 0.3 H above the base of the wall.

25. The above lateral pressures assume that the walls are fully drained to prevent hydrostatic pressure behind the walls. Drainage materials behind the wall should consist of Class 1, Type A permeable material (Caltrans Specification 68-1.025) or an approved equivalent. The drainage material should be at least 12 inches thick. The drains should extend from the base of the walls to within 12 inches of the top of the backfill. A perforated pipe should be placed (holes down) about 2 inches above the bottom of the wall and be tied to a suitable drain outlet. Wall backdrains should be plugged at the surface with clayey material to prevent infiltration of surface runoff into the backdrains.

26. Retaining wall foundations should be designed in accordance with the foundation recommendations presented in this report.

Concrete Slabs-on-Grade

27. The upper 8 inches of subgrade below concrete slab-on-grade floors, walkways and patios should be compacted to at least 90 percent relative compaction.

28. The upper 8 inches of subgrade below pavements should be moisture conditioned to 2 to 3 percent over optimum moisture content and compacted to 95 percent relative compaction.

29. All slabs-on-grade can be expected to suffer some cracking and movement. However, thickened exterior edges, a well prepared subgrade including pre-moistening prior to pouring concrete, adequately spaced expansion joints and good workmanship should reduce cracking and movement.

30. Dees & Associates, Inc. are not experts in the field of moisture proofing and vapor barriers. In areas where floor wetness would be undesirable, an expert, experienced with moisture transmission and vapor barriers should be consulted. At a minimum, a blanket of 4 inches of free-draining gravel should be placed beneath the floor slab to act as a capillary break. In order to minimize vapor transmission, an impermeable membrane should be placed over the gravel.

Pavements

31. To have the selected pavement sections perform to their greatest efficiency, the grading recommendations provided in this report should be closely followed. Subgrade preparation is very important to the life of pavement.

32. Only quality materials of the type and thickness (minimum) specified should be used. Baserock (R=78 minimum) should meet CALTRANS Standard Specifications for Class 2 Untreated Aggregate Base. Subbase (R=50 minimum) should meet CALTRANS Standard Specifications for Class 2 Untreated Aggregate Subbase.

33. Place the concrete only during periods of fair weather when the free air temperature is within prescribed limits.

34. Develop a maintenance program and perform routine maintenance.

35. Sufficient gradients should be provided for rapid runoff of storm water and to prevent ponding water on or adjacent to the pavement.

Utility Trenches

36. Utility trenches placed parallel to structures should not extend within an imaginary 1.5:1 (horizontal to vertical) plane projected downward from the bottom edge of the adjacent footing.

37. Trenches should be shored in accordance with appropriate safety codes.

38. Trenches may be backfilled with compacted engineered fill placed in accordance with the grading section of this report. The backfill material should not be jetted in place.

39. The portion of utility trenches that extend under slab-on-grade foundations should be sealed with 2-sack sand slurry (or equivalent) to prevent subsurface seepage from flowing under interior floor slabs.

Site Drainage

40. Controlling surface and subsurface runoff is important to the performance of the project.

41. Surface drainage should include provisions for positive gradients so that surface runoff is not permitted to pond adjacent to foundations or other improvements. Where bare soil or pervious surfaces are located next to the foundation, the ground surface within 10 feet of the structure should be sloped at least 5 percent away from the foundation. Where impervious surfaces are used within 10 feet of the foundation, the impervious surface within 10 feet of the structure should be sloped at least 2 percent away from the foundation. Swales should be used to collect and remove surface runoff where the ground cannot be sloped the full 10 foot width away from the structure. Swales should be sloped at least 2 percent towards the discharge point.

42. Full roof gutters should be placed around the eves of the structure. Discharge from the roof gutters should be conveyed away from the downspouts and discharged in a controlled manner.

43. Uncontrolled runoff should not be allowed to flow over the top of the ravine slope. There is loose soil at the top of the slope and concentrated runoff could lead to erosion and slumping along the top of the slope.

44. Impervious surfaces should be limited to reduce the amount of concentrated runoff at the site. Drainage systems should be designed to disperse runoff and allow water to percolate into the ground or runoff should be collected and discharged at the base of the slope into the drainage ravine.

45. Concentrated runoff from residences and driveways may be dispersed at least 60 feet from the top of the slope or discharged at the base of the slope into the natural drainage ravine. Concentrated runoff from the roadway may be collected and either percolated back into the ground at least 120 feet from the top of the ravine or discharged at the base of the slope into the natural drainage ravine.

46. The location of all drainage outlets should be reviewed and approved in the field prior to installation.

Plan Review, Construction Observation, and Testing

47. Dees & Associates, Inc. should be provided the opportunity for a general review of the final project plans prior to construction to evaluate if our geotechnical recommendations have been properly interpreted and implemented. If our firm is not accorded the opportunity of making the recommended review, we can assume no responsibility for misinterpretation of our recommendations. We recommend that our office review the project plans prior to submittal to public agencies, to expedite project review. Dees & Associates, Inc. also requests the opportunity to observe and test grading operations and foundation excavations at the site. Observation of grading and foundation excavations allows anticipated soil conditions to be correlated to those actually encountered in the field during construction.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed in the borings. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that planned at the time, our firm should be notified so that supplemental recommendations can be given.

2. This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information and recommendations contained herein are called to the attention of the Architects and Engineers for the project and incorporated into the plans, and that the necessary steps are taken to ensure that the Contractors and Subcontractors carry out such recommendations in the field. The conclusions and recommendations contained herein are professional opinions derived in accordance with current standards of professional practice. No other warranty expressed or implied is made.

3. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated, wholly or partially, by changes outside our control. Therefore, this report should not be relied upon after a period of three years without being reviewed by a soil engineer.

APPENDIX A

Site Vicinity Map

Boring Site Plan

Geologic Map

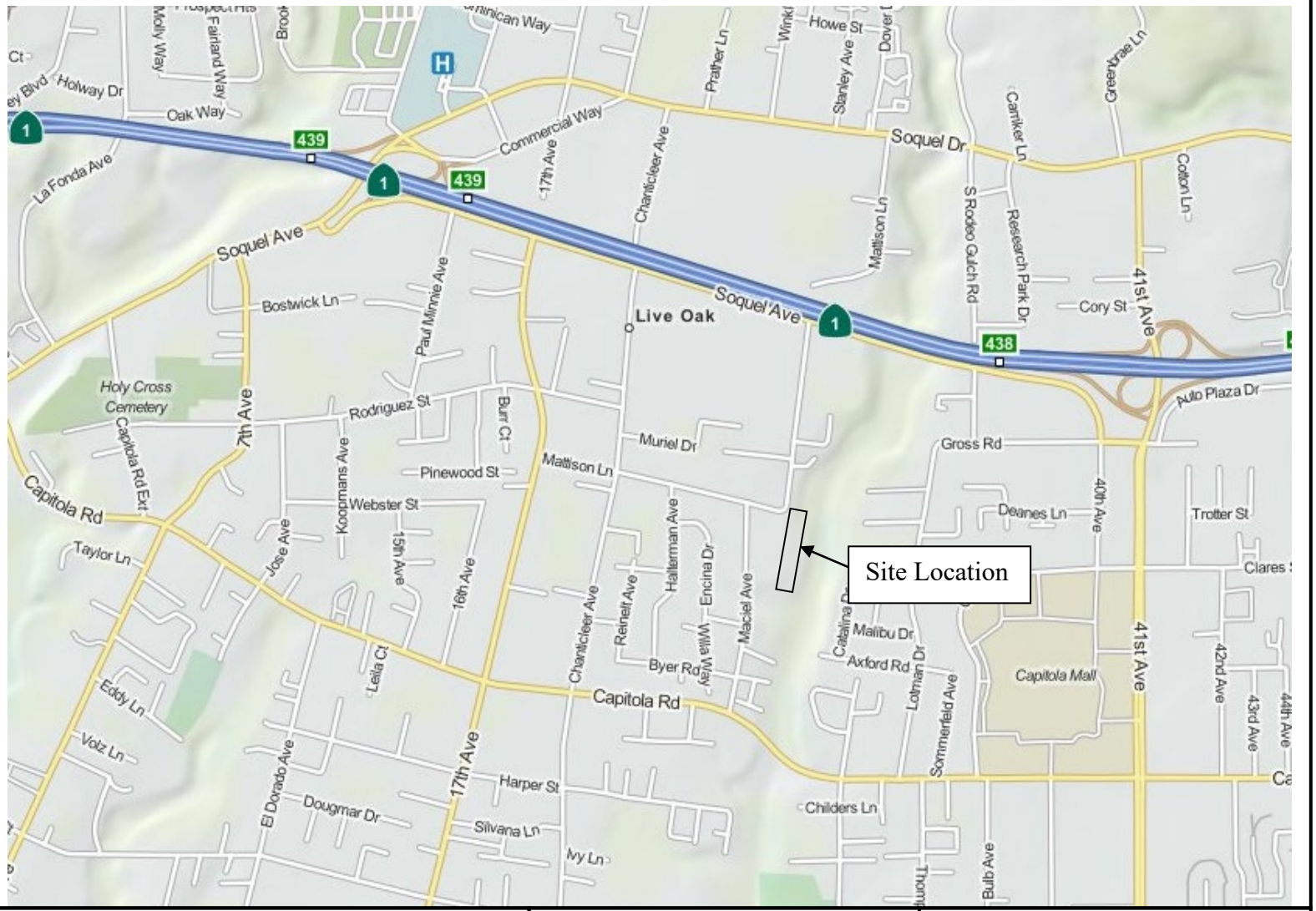
Liquefaction Map

Liquefaction Analysis Results

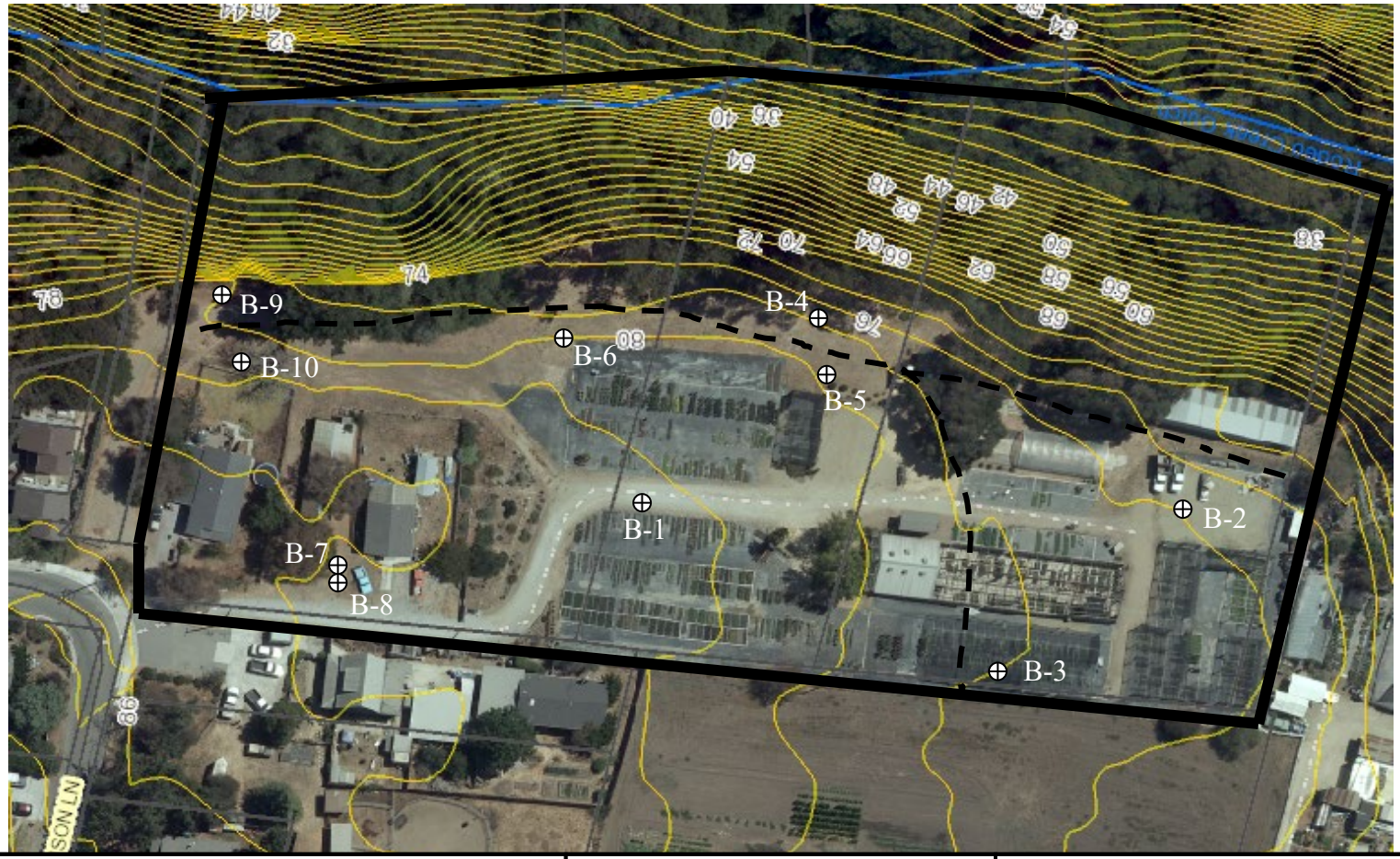
Unified Soil Classification System

Logs of Test Borings

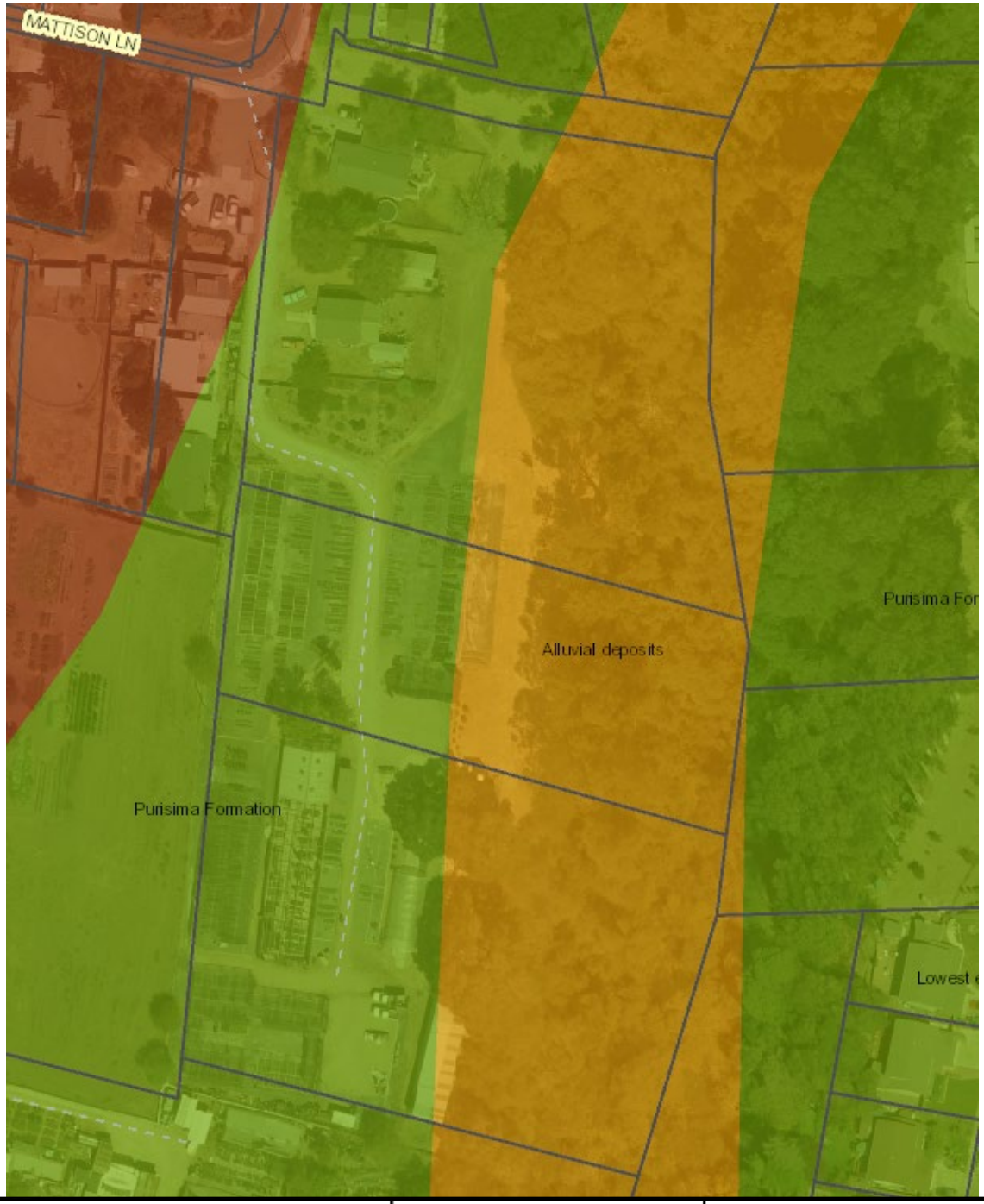
Laboratory Test Results



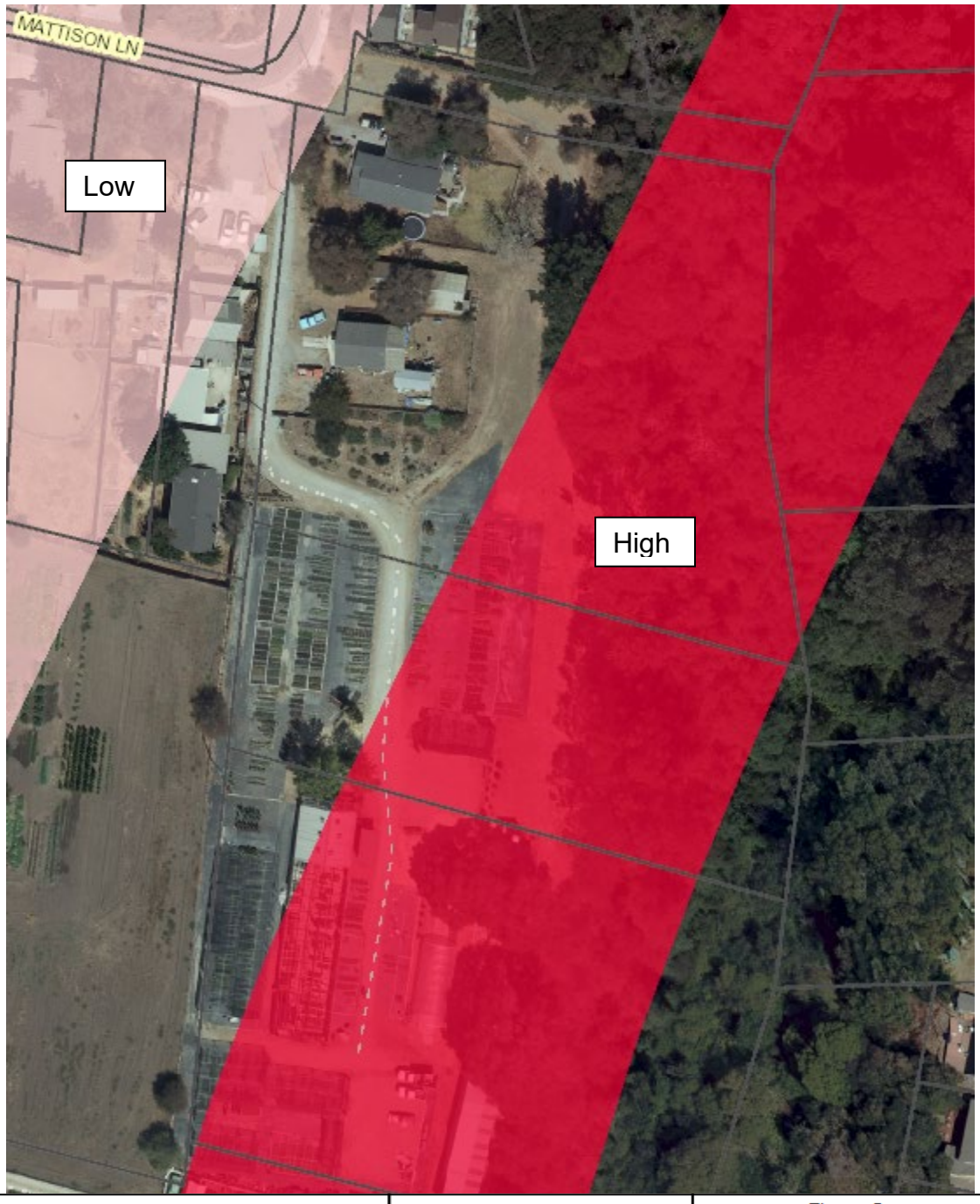
Dees & Associates, Inc. Geotechnical Engineers	**SITE VICINITY MAP**	Figure: 1
		Project Number: SCR-0636
	Mattison Lane Santa Cruz County, California	Scale: N.T.S. / February 2013



Dees & Associates, Inc. Geotechnical Engineers	**BORING SITE PLAN**	Figure: 5
		Project Number: SCR-0636
	Mattison Lane Santa Cruz County, California	Scale: N.T.S. / February 2013



Dees & Associates, Inc. Geotechnical Engineers	**GEOLOGIC MAP**	Figure: 3
		Project Number: SCR-0636
	Mattison Lane Santa Cruz County, California	Scale: N.T.S. / February 2013



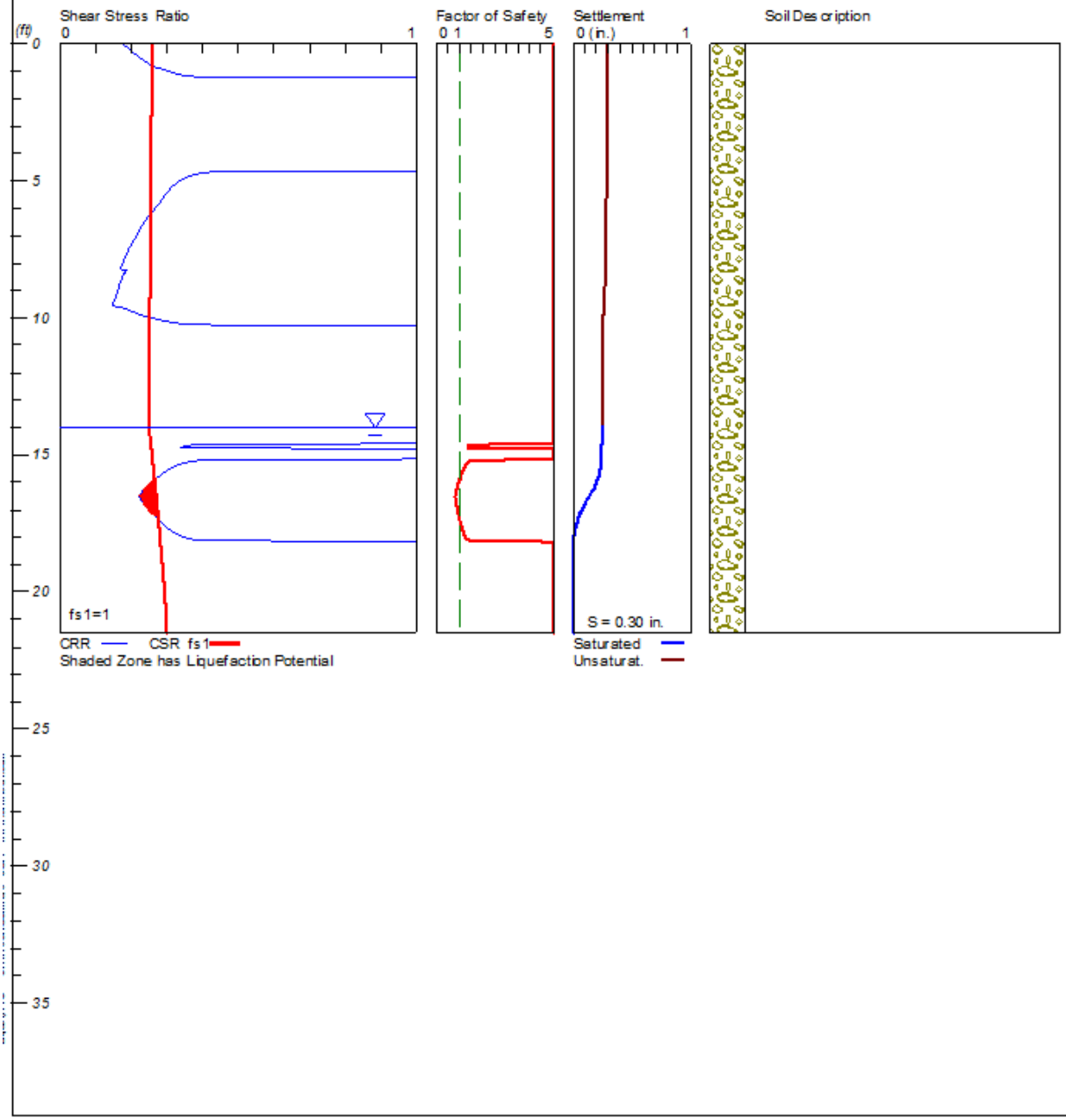
Dees & Associates, Inc. Geotechnical Engineers	**LIQUEFACTION MAP**	Figure: 5
		Project Number: SCR-0636
	Mattison Lane Santa Cruz County, California	Scale: N.T.S. / February 2013

LIQUEFACTION ANALYSIS

Mattison Lane

Hole No.= Water Depth=14 ft

Magnitude=7.9
Acceleration=0.40g



CivilTech Corporation | SCR-0636 | Plate A-1

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES	CLASSIFICATION CRITERIA	
COARSE-GRAINED SOILS** MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE (THE NO. 200 SIEVE SIZE IS ABOUT THE SMALLEST PARTICLE VISIBLE TO THE NAKED EYE)	**GRAVELS** MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS (< 5% FINES)	**GW**	Well-graded gravels, gravel-sand mixtures, little or no fines	Wide range in grain sizes and substantial amounts of all intermediate particle sizes	
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Predominantly one size or a range of sizes with some intermediate sizes missing Not meeting all gradation requirements for GW	
		GRAVELS WITH FINES (>12% FINES)	**GM**	Silty gravels, gravel-sand-silt mixtures	Non plastic fines or fines with low plasticity Atterberg limits below "A" line or PI < 4	Above "A" line with 4 < PI < 7 are borderline cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures	Plastic fines Atterburg limits above "A" line with PI > 7	
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS (<5% FINES)	**SW**	Well-graded sands, gravelly sands, little or no fines	Wide range in grain sizes and substantial amounts of all intermediate sizes missing	
			SP	Poorly graded sands, gravelly sands, little or no fines	Predominantly one size or a range of sizes with some intermediate sizes missing Not meeting all gradation requirements for SW	
		SANDS WITH FINES (>12% FINES)	**SM**	Silty sands, sand-silt mixtures	Non plastic fines or fines with low plasticity Atterburg limits below "A" line or PI < 4	Limits plotting in hatched zone with 4 < PI < 7 are borderline cases requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures	Plastic fines Atterburg limits above "A" line with PI > 7	
FINE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE (THE NO. 200 SIEVE SIZE IS ABOUT THE SMALLEST PARTICLE VISIBLE TO THE NAKED EYE)	SILTS AND CLAYS (LIQUID LIMIT < 50)		**ML**	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity		
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			OL	Organic silts and organic silty clays of low plasticity		
	SILTS AND CLAYS (LIQUID LIMIT > 50)		**MH**	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			CH	Inorganic clays of medium to high plasticity, organic silts		
			OH	Organic clays of medium to high plasticity, organic silts		

**Gravels and sands with 5% to 12 % fines are borderline cases requiring use of dual symbols.

RELATIVE DENSITY OF SANDS AND GRAVELS

DESCRIPTION	BLOW / FT*
VERY LOOSE	0 – 4
LOOSE	4 – 10
MEDIUM DENSE	10 – 30
DENSE	30 – 50
VERY DENSE	OVER 50

CONSISTENCY OF SILTS AND CLAYS

DESCRIPTION	BLOWS / FT*
VERY SOFT	0 – 2
SOFT	2 – 4
FIRM	4 – 8
STIFF	8 – 16
VERY STIFF	16 – 32
HARD	OVER 32

*Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. 12 vertical inches.

L M T B

SAMPLE TYPES REFERENCED ON BORING LOGS

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 1

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1			2 inches of aggregate base at surface										
2	1-1-1 L		Dark brown fine Silty SAND, moist, loose to medium dense	SM									
3	1-2 T		Orange brown fine Clayey SAND, moist, medium dense (low plasticity)	SC	11 22	104.8	17.3						
5	1-3 T		Orange brown Clayey SAND, moist, loose to medium dense (non-plastic)		8		14.9				31.7		
10	1-4 T		Orange brown Gravelly SAND or Sandy GRAVEL (1/2" to 2" rounded), damp, dense	SW	42								
12			Olive brown fine Silty SAND, very moist, medium dense Coarse SAND from 12 to 15 feet.	SM									
14			▼ Perched groundwater at 14 feet										
15	1-5 T		Fine Silty SAND, moist below 15 feet, medium dense		18		22.0				19.1		
16			Boring terminated at 16.5 feet. Perched groundwater perched at 14 feet.										
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 2

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1	2-1-1 L		Olive brown and dark brown CLAY, moist, medium stiff	CL									
2					6								
3	2-2 T		Mottled orange brown Clayey SAND with angular gravels, moist, medium dense	SC									
4					17		20.3						
5	2-3 T				22								
6													
7													
8	2-4 T												
9			Mottled orange brown Clayey SAND with angular gravels, moist, medium dense		24		16.9						
10													
11			▼ Perched groundwater										
12	2-5-1 L		Olive brown Sandy SILT grading to										
13			Olive brown with orange mottling Silty SAND, moist, dense	SM	32	78.7	38.0						
14	2-6 T												
15					34								
16			Boring terminated at 15 feet. Groundwater perched at 11 feet.										
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 3

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1			6 inches of Gravel										
	3-1-1 L		Dark brown fine Silty SAND, moist, very loose	SM									
2			Dark brown fine Sandy CLAY, moist, soft	SC	3	104.2	17.5						
3	3-2 T												
4					3		14.9				64.5		
5	3-3-1 L												
6			Brown fine Silty SAND, moist, loose	SM	6	117.5	14.0						
7													
8													
9			Orange brown Silty SAND, moist, medium dense around 8 feet										
10	3-4 T		▼ Groundwater										
11			Orange brown Gravelly SAND, very moist, medium dense	SW	20		17.6						
12													
13													
14			Olive brown fine Silty SAND, wet, medium dense	SM									
15													
16			Boring terminated at 15 feet. Groundwater perched at 10 feet.										
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 4

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1	4-1-1 L		Dark brown fine Silty SAND, moist, very loose	SM									
2			lens of grey sand at 2.5 feet										
3			Dark brown Silty SAND		3								
4													
5	4-2 T		Dark brown Silty SAND and orange brown Gravelly SAND, moist, very loose	SW	5								
6													
7													
8			Orange brown Gravelly SAND, moist, medium dense	SW									
9													
10	4-3-2 L		Orange brown SAND, damp, medium dense	SM	19								
11													
12			Orange brown Gravelly SAND, moist, medium dense	SW									
13													
14			Cobbles from 14 feet to 14.5 feet.	SM									
15	4-4 T		Light grayish brown with orange Silty SAND/SAND with Silt, damp, dense										
16					28								
17													
18													
19													
20	4-5-1 L												
21			Orange brown and grey SAND with Silt, damp, very dense		47								
22			Boring terminated at 21.5 feet. No groundwater encountered.										
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 5

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1			Dark brown Silty SAND, moist, loose	SM									
2	5-1-1												
3	5-2		Brown Silty SAND, moist, loose	SM	8	104.8	20.0						
4					6								
5			Boring terminated at 5 feet. No groundwater encountered.										
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 6

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1	6-1-1 L		Dark brown Silty SAND, moist, loose	SM									
2					8								
3	6-2 T		Orange brown Silty SAND, moist, loose	SM	4		20.8						
4													
5	6-3 T		Approximate contact Grey brown Clayey SAND, moist, loose	SC	5								
6													
7			Orange brown SAND with Silt, damp to moist, medium dense	SM									
8	6-4 T												
9													
10			Orange brown Sandy GRAVEL, damp, dense	SW	27								
11													
12													
13													
14													
15	6-5 T		Grey brown with orange Silty SAND, moist, wet from 15 to 16 feet, medium dense	SM	16								
16													
17			Boring terminated at 16.5 feet. No groundwater encountered.										
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 7

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1	7-1-1 L		Dark brown Silty SAND, moist, loose	SM	7	108.7	18.5						
2													
3	7-2 T		Orange brown Clayey SAND, moist, medium dense	SC	16		21.8					9.6	
4													
5	7-3 T		Orange brown Clayey SAND, moist, medium dense		10								
6													
7													
8													
9													
10			Orange brown Gravelly SAND, moist, medium dense Grades to Sandy GRAVEL with Cobbles at 11.5 feet	SW									
11													
12			Boring terminated at 11.5 feet. No groundwater encountered.										
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 8

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1			Dark brown Silty SAND, moist, loose	SM									
2													
3	8-1-1		Orange brown Clayey SAND, moist, medium dense	SC									
4					13	95.3	24.0	27.0	395	30			
5			Boring terminated at 4.5 feet. No groundwater encountered.										
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 9

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1			Dark brown mottled with orange brown Silty Clayey SAND, moist, loose	SC									
2													
3													
4													
5	9-1-1												
6	L		Dark brown mottled orange brown Clayey SAND (chunk of sandstone at tip of sample), moist, loose to medium dense		10								
7													
8			Approximate contact										
9													
10	9-2-1 L		Orange brown mottled brown Sandy SILT with Gravel, moist, medium dense	ML									
11					16								
12			Dark brown Silty SAND, moist, medium dense										
13			▼ Groundwater at 13 feet.	SM									
14													
15	9-3-1 L												
16			Orange brown with grey Silty SAND, damp, very dense	SM	39								
17			Boring terminated at 16.5 feet. Groundwater encountered at 13 feet.										
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 10

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1			Dark brown Silty SAND, moist, loose	SM									
2													
3			Orange brown Clayey SAND, moist, medium dense	SC									
4			Boring terminated at 4 feet. No groundwater encountered.										
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

Consolidated – Drained (CD)
Direct Shear Test Results

Project Number: SCR-0636

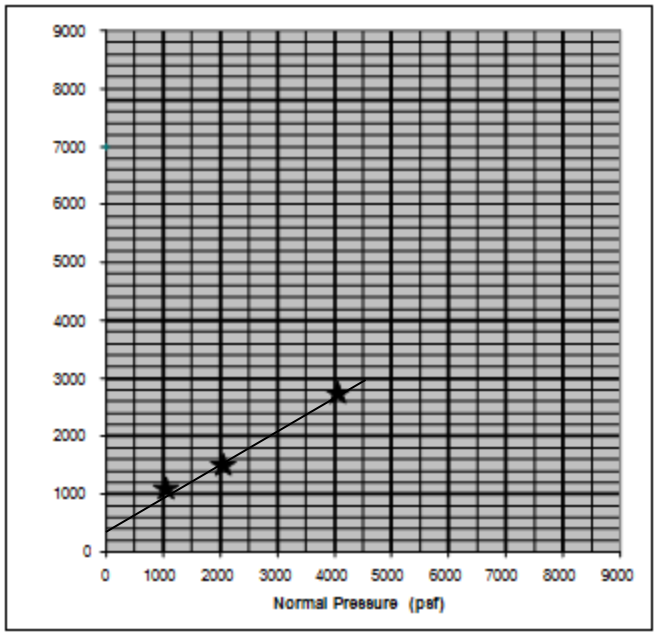
Project Name: Mattison Lane

Date: February 12, 2013

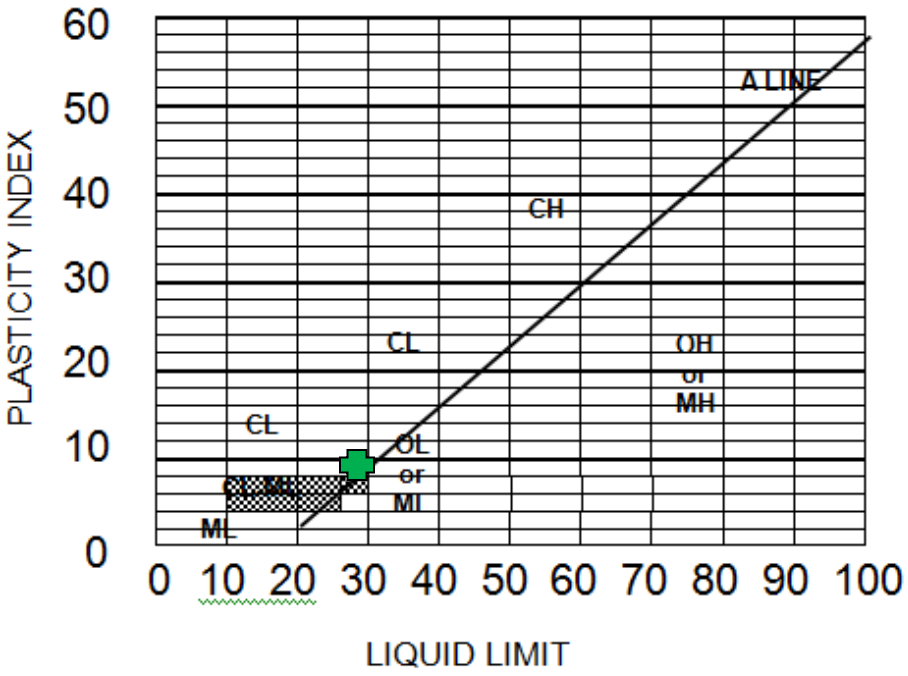
Sample No: 8-1-1

Test Notes: Ring samples were saturated 24 hours prior to shearing.

Ring No.	Normal Pressure (psf)	Shear Strength (psf)	In-Situ Moisture Content (%)	Saturated Moisture Content (%)	In-Situ Dry Density (pcf)
1	1030	1041.1	24.5	26.7	93.3
2	2030	1509.1	24.4	27.5	94.5
3	4030	2766.2	23.9	27.4	95.8
4			23.1	26.2	97.5



Phi = 30˚
C= 395 psf



MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	**ML**	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
CH	Inorganic clays of medium to high plasticity, organic silts, fat clays	**CL**	Inorganic clays of low to medium plasticity, gravelly clay sandy clays, silty clays, lean clays
OH	Organic clays of medium to high plasticity, organic silts	**OL**	Organic silts and organic silty clays of low plasticity
Pt	Peat and other highly organic soils		

PLASTICITY DATA

SYMBOL	SAMPLE NO.	DEPTH (FEET)	IN-SITU MOISTURE CONTENT (%)	LIQUID LIMIT (%	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX (W-PL)/ (LL PL)	UNIFIED SOIL CLASSIFICATION SYMBOL
✚	7-2	3.5	21.8	29.0	19.4	9.6	0.25	CL

CITY OF SANTA CRUZ
Water Department

WATER SERVICE INFORMATION FORM

Surf City Saves
Water For Our Future

March 14, 2022

Owner: Locatelli Rentals Llc
Site Address: 2440 Mattison Ln, Live Oak
Site APN: 029-391-01
Project Description: Multi Residential Development

Dear Sean Swift:

Your project is located within the City of Santa Cruz Water Service area.The subject parcel is currently a developed lot, with an existing water service, and is subject to the following conditions:

1. Water Service is available for the proposed development.

   Domestic water service and fire service size to be determined upon further review.

   Three meters currently serve the property. Any unused water services will be required to be retired as per SCWD Standard Specifications.

2. When available, please submit a full set of building permit plans. Provide a utility site plan with existing water main & service locations, types, and sizes. Provide new water service locations, types, and sizes with new domestic, irrigation, and fire service backflow device type, size, and locations. Provide call outs to new or existing services referencing SCWD standard details.
   Upon review SCWD will determine final water permit fees due and upgrading water service requirements. All water permit fees must be paid in full and water service retrofit work must be completed for this project prior to signing off on the Water Service Installation Permit.

If you have any questions, please contact the Water Department Engineering Division at (831) 420-5210

Sincerely,

BJ Dericco
City of Santa Cruz | Water Dept., Engineering
212 Locust Street, Suite C
Santa Cruz, CA 95060

Hexagon Transportation Consultants, Inc.

Memorandum

Date: October 4, 2022

To: Mr. Claudio Locatelli

From: Jonathan Wong
Gary Black

Subject: Transportation Analysis for Mattison Lane Residential Development

Hexagon Transportation Consultants, Inc. has completed a transportation study for the proposed residential development on Mattison Lane in Santa Cruz County, California (see Figure 1). The project would combine 4 parcels to construct 25 3-bedroom townhouse units. Parking would be provided in front of each townhouse and within the project site (see Figure 2). The project site currently comprises two homes that would be demolished.

Vehicles Miles Travelled (VMT) Analysis

In December 2018, the California Natural Resources Agency certified and adopted the CEQA Guidelines update package, including the Guidelines section implementing Senate Bill 743. The guidelines state that level of service will no longer be considered to be an environmental impact under CEQA and that vehicle miles traveled (VMT) is the most appropriate measure of transportation impact. Counties have adopted the new procedures. In accordance with new CEQA guidelines, the County has transitioned from intersection LOS to vehicle miles traveled (VMT) for CEQA transportation analysis.

A project's VMT is compared to the appropriate thresholds of significance based on the project location and type of development. When assessing a residential project, the project's VMT is divided by the number of residents expected to occupy the project to determine the VMT per capita.

To determine whether a project would result in CEQA transportation impacts related to VMT, the County has established thresholds for residential, office, and retail projects.

The established thresholds are as follows:

Residential projects

A project may indicate a significant transportation impact if the anticipated VMT exceeds 85% of existing County-wide average VMT per capita. The VMT threshold for Santa Cruz County is 8.7 daily VMT per capita, which is 15% below the existing County-wide average VMT level.

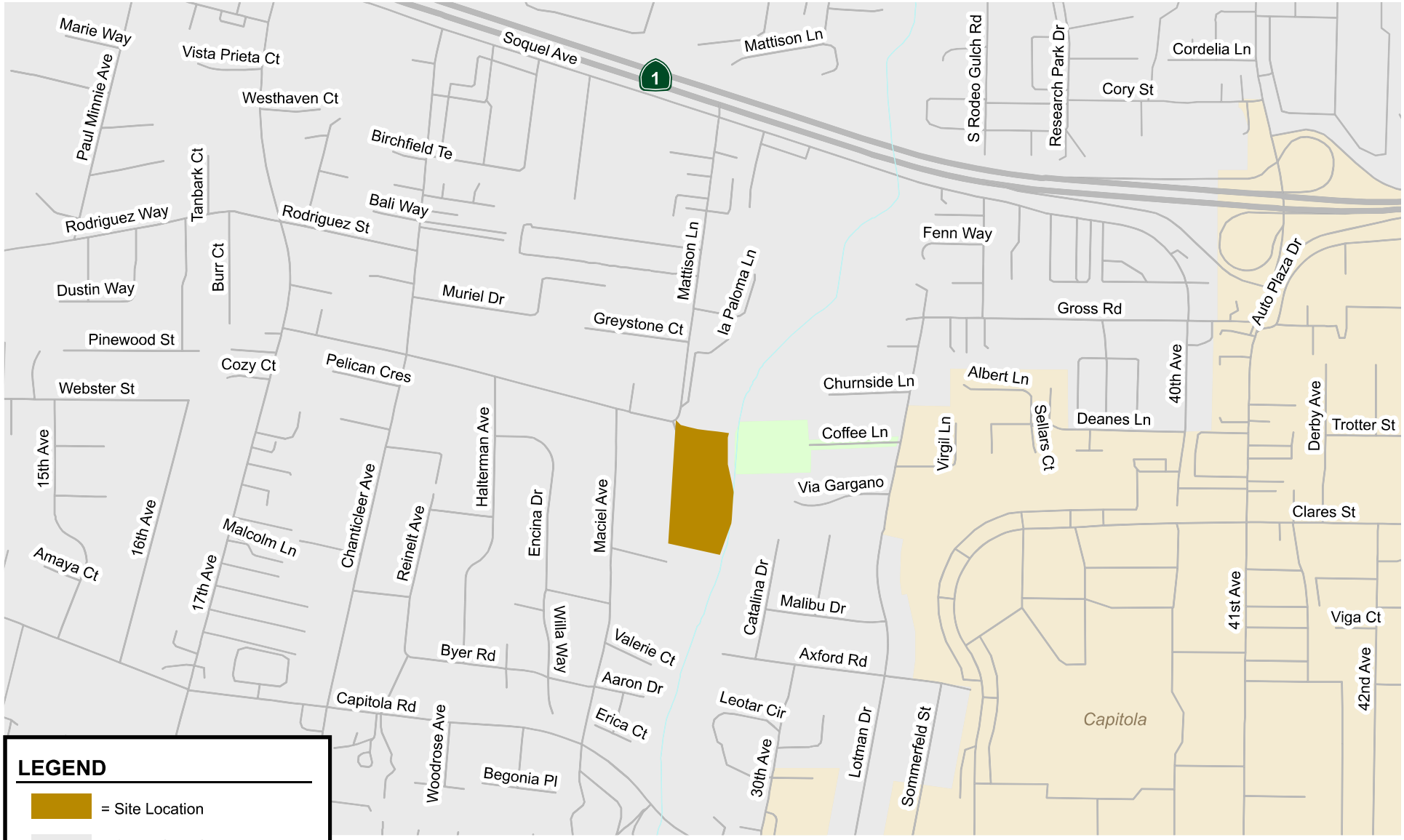


Figure 1
Site Location

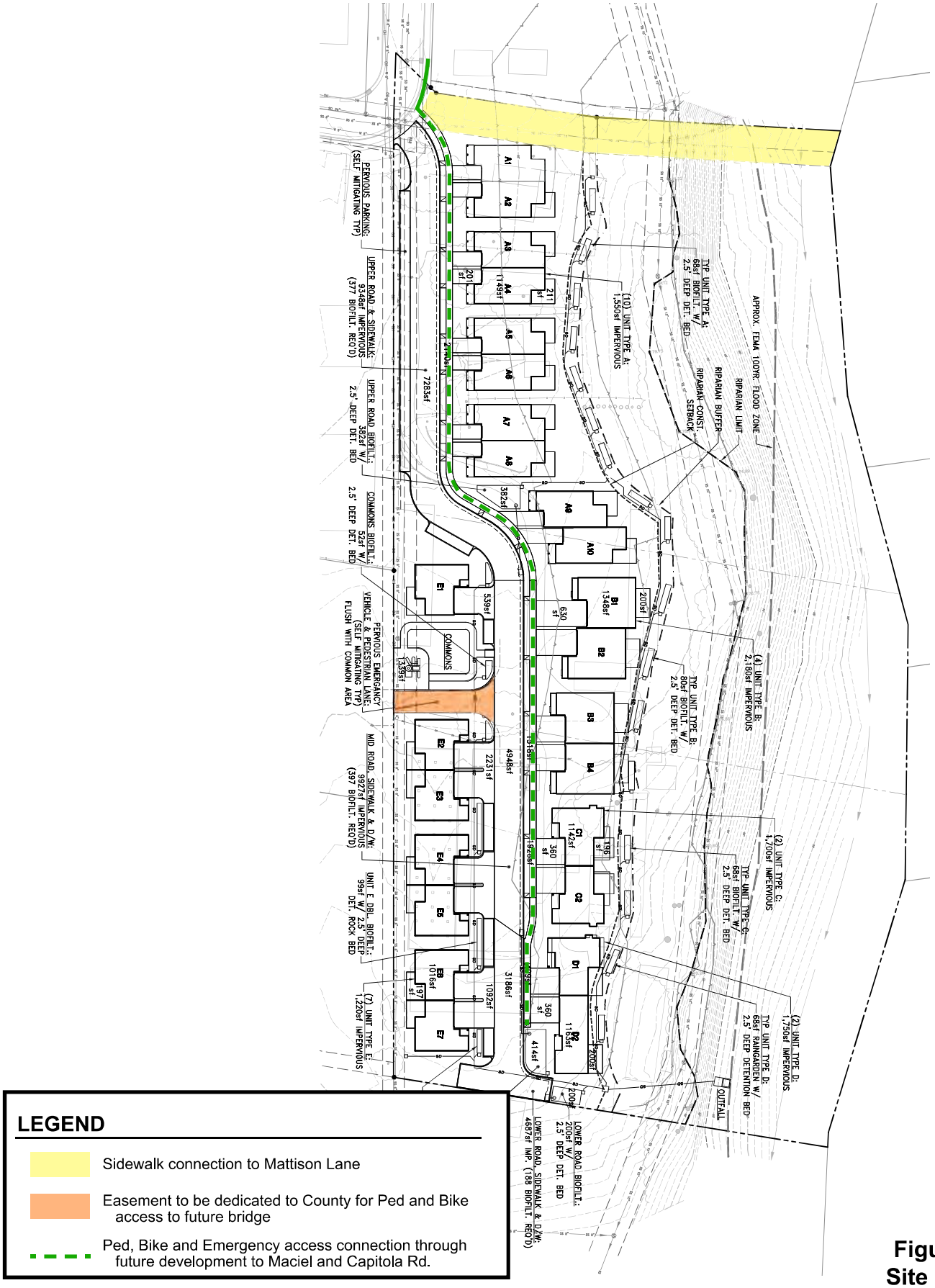


Figure 2
Site Plan

NORTH
Not to Scale

Screening for Less-than-Significant Transportation Impact

The Santa Cruz County Analyzing Vehicle Miles Traveled for CEQA Compliance Guidelines includes screening criteria for projects that are expected to result in less-than-significant VMT impacts. Projects, or portions of the project, that meet the screening criteria do not require a CEQA transportation analysis.

Projects will have a less-than-significant CEQA transportation impact based on their project location and characteristics. These include:

- Small projects that generate fewer than 110 trips per day;
- Projects near high quality transit: within a ½ mile of a major transit stop or a high quality transit corridor with a combined service interval frequency of 15 minutes or less during the AM and PM peak hours;
- Local-serving retail;
- Affordable Housing;
- Local essential service;
- Map based screening; and
- Redevelopment projects that do not result in a net increase in VMT

Project-level VMT Analysis

According to the Santa Cruz County Guidelines, projects with trip generation of less than 110 net new daily trips would be screened out of the CEQA transportation analysis. The trip generation estimate shows that this project would add 166 net new daily trips. In addition, the project was analyzed to determine if the project could be screened out based on the area where the project is located. From the County residential screening map, the project is located in an area where the VMT is between 10 to 14.9 percent below the per Capita Average VMT. According to the Santa Cruz County VMT Guidelines, the area does not meet the County's threshold. Based on the trip generation and map-based screening, the project requires a VMT analysis.

Potential VMT Mitigations

Access to Mattison Lane and Maciel Avenue

The site plan shows that the project is proposing to implement a sidewalk that would connect the townhouses to the existing sidewalks on Mattison Lane. The sidewalk would run along the east side of the new road within the project site.

The site plan also shows a proposed pedestrian and bicycle access lane would be provided on the west side of the project site that allows for a connection to an adjacent development that fronts Maciel Avenue. This connection would set in place a pedestrian and bicycle connection to Maciel Avenue when the adjacent property develops, which would then provide continuous sidewalk access to the bus stops on Capitola Road, which is only about 1,000 feet away.

Bicycle Improvements

Currently, Maciel Avenue does not have bicycle infrastructure to encourage bicycling to various points of interest. The project could contribute to implementing bike sharrows along Mattison Lane and Maciel Avenue to provide access to bicycle lanes and transit on Capitola Road.

Bike Repair Station

The project can implement bicycle facility measures to reduce the VMT of the project. A bicycle repair station in the parklet of the project site could be installed to reduce the VMT of the project. The bicycle repair station can provide repair tools and space to use them would support the continual use of bicycle for transportation in and out of the project site.

VMT Reductions Using Tool

These potential mitigation measures would help reduce the VMT impact of the project. The Santa Cruz County Sketch Planning VMT tool was used to calculate the VMT reduction of each potential TDM measure. The VMT Sketch tool was developed by Santa Cruz County to determine the VMT for land use projects. The VMT tool analyzes the VMT proposed by the project along with any TDM measures that would be implemented. The implementation of the sidewalk that connects to Mattison Lane would reduce the project VMT by 0.2 VMT/capita. The bicycle improvements along Maciel Avenue would reduce the project VMT by 0.4 VMT/capita. The future connection through the adjacent property to a future sidewalk on Maciel Avenue would reduce the project VMT by 0.1 VMT/capita. The bike repair station within the project site would reduce the VMT by 0.2 VMT/capita. Using the VMT tool, the project VMT is 9.7 VMT/capita, which is above the 8.7 VMT/capita threshold. With the potential mitigations listed above that can be analyzed with the tool, the project VMT would be reduced to 8.9 VMT/ capita, which is still slightly over the threshold.

Additional VMT Reductions

The VMT reduction measures proposed by the project that can be analyzed with the VMT tool still leave the project VMT slightly over the threshold. Additional VMT mitigation is necessary. A 20-foot pedestrian and bike easement could be implemented along the north property line of the project site. This pedestrian and bicycle easement would provide access to a future pedestrian and bicycle bridge that would span across the creek located east of the project site and connect to the west side of Coffee Lane Park. Currently, there is a 20-foot easement for a storm drain. Providing access to a potential bridge could provide a substantial reduction in VMT by allowing residents of the project and the surrounding neighborhood quick access to the Capitola Mall Shopping Center and its transit services.

The VMT tool can not calculate the VMT reduction for the frontage easement that could provide access to a future pedestrian and bicycle bridge to Coffee Lane Park. Therefore, this mitigation measure was quantified to analyze the reduction in VMT.

In order for the project impact to be less-than-significant, the frontage easement mitigation must reduce the project VMT to 8.7 VMT/capita or below, or by 0.2 VMT/capita. Currently, the Capitola Mall is approximately 1 mile of vehicle travel away from the project site. This would mean that the total miles a vehicle would travel between the project site and the Capitola Mall is 2 miles (1 mile for the destination trip and 1 mile for the return trip). Given that the project units would have three bedrooms, we can assume an occupancy of 3 persons per unit, or 75 people total. In order to reduce the VMT below the threshold, the project would need to reduce the total vehicle miles travelled by 15 miles (0.2 VMT/capita x 75 people). If a pedestrian were to walk to the Capitola Mall,

each person would reduce the VMT by 2 miles. Thus, if at least 8 people per day from the project or from the surrounding neighborhood used the bridge, the VMT would be reduced below the 8.7 VMT/capita threshold. It is reasonable to assume that at least 8 people per day would use the bridge.

With these potential mitigation measures, the project would have a less-than-significant VMT impact.

Roadside Improvement and Traffic Improvement Fees

The project will be required to pay the County's roadside improvement fee ($3,000/unit) and traffic improvement fee ($3,000/unit) for a total of 23 units, assuming credit for the two existing units on-site, for a total of $136,000. These fees would help pay for projects in the Live Oak area that have been identified in the Capitol Improvement Plan to improve pedestrian and bicycle access as well as traffic flow and efficiency. These improvement projects will result in a reduction in VMT in the area although their impact has not been figured into the VMT reduction calculations for this project.

Figure 2 shows the location of TDM improvements.

Figure 3 shows the VMT analysis with the bike and pedestrian improvements.

VMT CALCULATOR

Version 1.2 Build Date 11_02_20

PROJECT INFORMATION

Project Name	Mattison Lane
Address	2450 Mattison Lane
TAZ	516
Project Context/Setting	Low Density Suburb

LAND USE INFORMATION

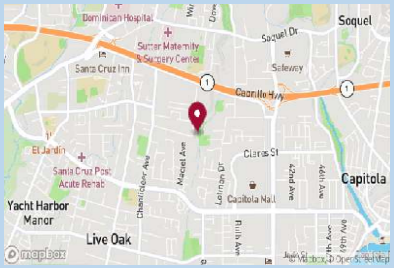
VMT Land Use Type	Residential
ITE Trip Gen Land Use	220 | Multifamily Housing (Low-Rise)
Dwelling Unit(s)	25
Mixed-Use Adjustment	0%

PRESUMPTIONS OF LESS THAN SIGNIFICANT IMPACT

- ☐ Affordable Housing
- ☐ Within a 1/2 mile of Major Transit Stop
- ☐ Local Retail (<50,000 Sq Ft)
- ☐ Less than 110 Trips per Day

Map shows TAZ centroid location

SEARCH LOCATION | RESET



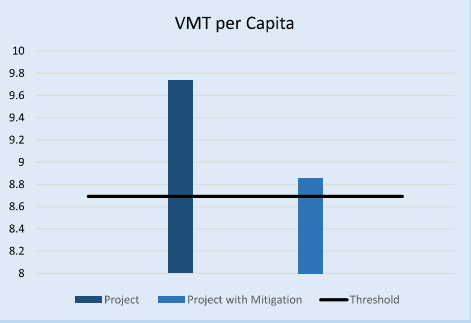
VMT OUTPUT

This tool is only intended for projects of 2,000 trips or less.

	PROJECT	REDUCTIONS	PROJ. WITH MITIGATION
VMT/Capita	9.7	0.9	8.9
Daily Trips	184	17	167

Average (VMT/Capita)	10.2
Threshold (15% below Average)	8.7
Significant Impact?	Yes

County of Santa Cruz Threshold



TRANSPORTATION DEMAND MANAGEMENT (TDM) STRATEGIES

- PARKING STRATEGIES
- TRANSIT STRATEGIES
- COMMUNICATIONS & INFORMATION STRATEGIES
- COMMUTING STRATEGIES
- SHARED MOBILITY STRATEGIES
- BICYCLE INFRASTRUCTURE STRATEGIES
- NEIGHBORHOOD ENHANCEMENT STRATEGIES
- MISCELLANEOUS STRATEGIES

Figure 3
VMT Analysis

Local Mobility Analysis (Non-CEQA Analysis)

The study includes an evaluation of potential operational deficiencies of the proposed residential development on the study intersections during the weekday AM and PM peak hours of traffic (7:00-9:00 AM and 4:00-6:00 PM) and a VMT Analysis for the proposed project. The study intersections are shown below.

1. Chanticleer Avenue and Soquel (unsignalized)
2. Chanticleer Avenue and Mattison Lane (unsignalized)
3. Maciel Avenue and Capitola Road (unsignalized)

The potential intersection operational deficiencies were evaluated following the standards and methodologies set forth by Santa Cruz County.

Scenario 1: *Existing Conditions.* Existing traffic volumes were obtained from traffic counts conducted in September 2022.

Scenario 2: *Existing Plus Project Conditions.* Existing plus project traffic volumes were estimated by adding to existing traffic volumes the trips associated with the proposed development. Existing plus project conditions were evaluated relative to existing conditions in order to determine potential intersection operational deficiencies.

Scenario 3: *Cumulative Conditions.* Cumulative traffic volumes were estimated by applying a growth factor up to year 2040 to existing traffic volumes. The growth factor was derived from the Santa Cruz Medical Office Building (MOB) study.

Scenario 4: *Cumulative plus Project Conditions.* Cumulative traffic volumes with the project were estimated by adding to cumulative traffic volumes the additional traffic generated by the project. Cumulative plus project conditions were evaluated relative to cumulative conditions in order to determine potential intersection operational deficiencies.

Methodology

This section describes the methods used to determine the traffic conditions for each scenario described above. It includes descriptions of the analysis methodologies and the applicable level of service standards.

Level of Service Standards and Methodology

Traffic conditions at the study intersections were evaluated using level of service (LOS). *Level of Service* is a qualitative description of operating conditions ranging from LOS A, or free-flow conditions with little or no delay, to LOS F, or jammed conditions with excessive delays. The analysis methods are described below.

The County of Santa Cruz evaluates intersection levels of service using the SYNCHRO software, which is based on the Highway Capacity Manual (HCM) method, for signalized and unsignalized intersections. The HCM method evaluates signalized intersection operations on the basis of average control delay time for all vehicles at the intersection. This average delay can then be correlated to a level of service. The HCM method evaluates unsignalized intersection operations on the basis of worst approach delay time at the intersection. This worst approach delay can then be

correlated to a level of service. Table 1 presents the current VTA level of service definitions for unsignalized intersections. The County of Santa Cruz level of service standard for unsignalized intersections is LOS D or better.

Table 4
Unsignalized Intersection Level of Service Definitions Based on Delay

Level of Service	Description	Average Delay Per Vehicle (Sec.)
A	Little or no traffic delay	10.0 or less
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	Extreme traffic delays	greater than 50.0

Source: Transportation Research Board, *Highway Capacity Manual, 6th Edition* (Washington, D.C., 2000) p17-2.

Intersection Operational Deficiencies

According to Santa Cruz County General Plan, the County considers LOS C as the objective, but accepts LOS D as the minimum acceptable level of service at both signalized and unsignalized study intersections where costs, right-of-way requirements, or environmental impacts of maintaining LOS under this policy are excessive, capacity enhancement may be considered infeasible. A development is said to create an operational deficiency at a signalized intersection if for either peak hour, either of the following conditions occurs:

1. The level of service at the intersection degrades from an acceptable level (LOS D or better for local intersections) under no-project conditions to an unacceptable level (LOS E or F) under project conditions, or
2. The level of service at the intersection is an unacceptable level (LOS E or F) under no-project conditions and the volume to capacity (v/c) ratio of the sum of all critical movements at the intersection increases by 1 percent or more with the project.

Existing Intersection Levels of Service

The existing lane configurations at the study intersections were obtained from field observations. Existing traffic volumes were obtained from traffic counts conducted on September 13, 2022. The existing AM and PM peak hour intersection volumes are shown graphically on Figure 4. Volumes under existing conditions are presented in Appendix A.

Intersection levels of service were evaluated against the County of Santa Cruz standards (see Table 2). The results of the analysis show that the Maciel Avenue/Capitola Road intersection currently operates at an unacceptable level during the PM peak period at the northbound and southbound approaches. All other intersections currently operate at an acceptable level of service

during both AM and PM peak periods. The intersection level of service calculation sheets are included in Appendix B.

Table 2
Existing Intersection Level of Service Summary

#	Intersection	Intersection Control	LOS Standard	Peak Hour	Count Date	Existing Conditions Delay[1] (sec)	Existing Conditions LOS
1	Chanticleer Avenue & Soquel Avenue	One-Way Stop	D	AM	09/13/22	15.0	B
				PM	09/13/22	20.8	C
2	Chanticleer Avenue & Mattison Lane	One-Way Stop	D	AM	09/13/22	11.6	B
				PM	09/13/22	13.1	B
3	Maciel Avenue & Capitola Road	Two-Way Stop	D	AM	09/13/22	24.3	C
				PM	09/13/22	**>80**	**F**

Notes:

Bold indicates a substandard Level of Service

1. The delay reported for signalized intersections is the average stopped delay for all vehicles entering the intersection. The delay reported for one- and two-way stop controlled intersections is the delay experienced by vehicles on the worst stop controlled approach.

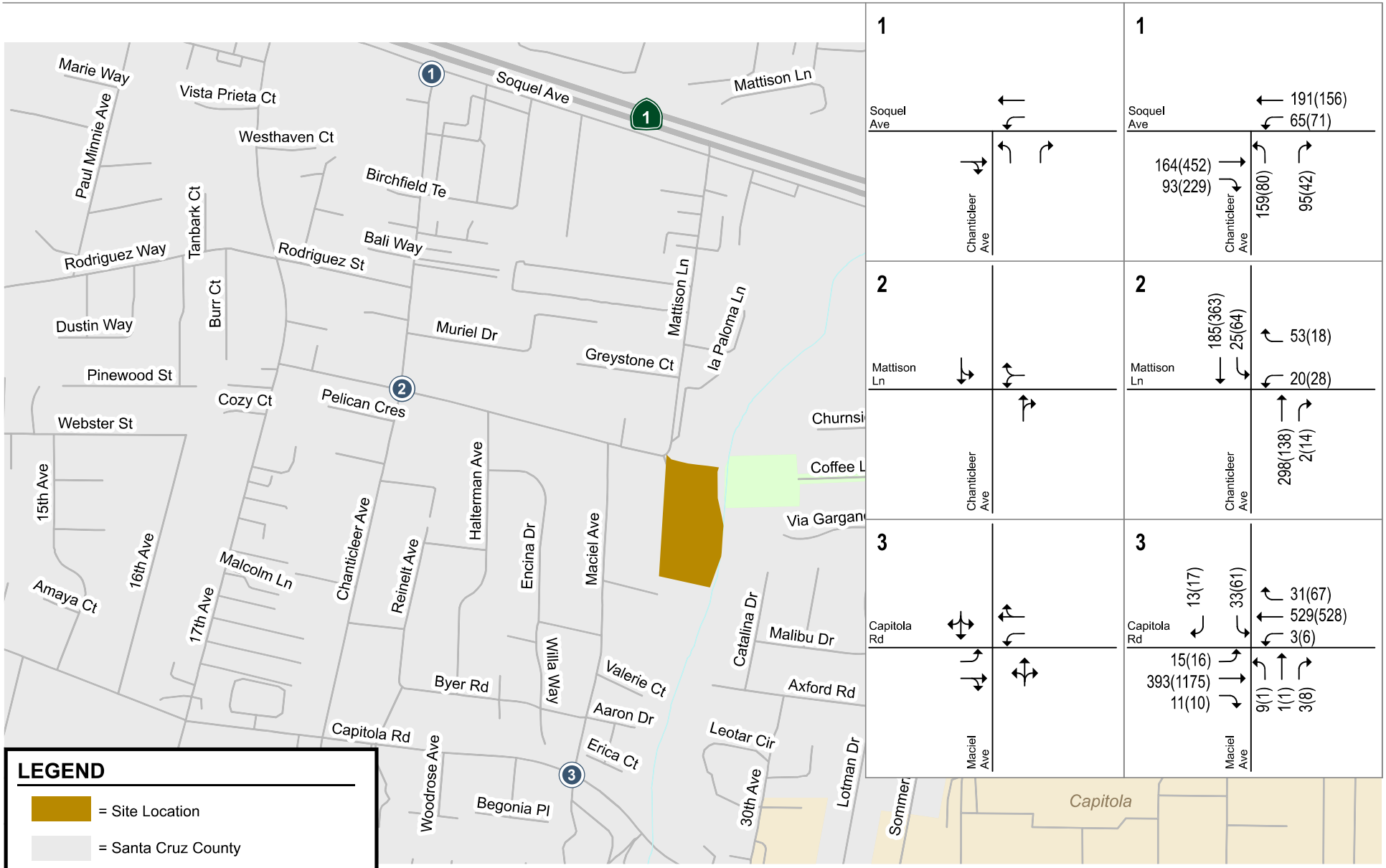


Figure 4
Existing Lane Configurations and Traffic Volumes

Cumulative Conditions

Cumulative peak hour traffic volumes were estimated by applying a growth factor up to year 2040 to existing traffic volumes. The growth factor was derived by comparing the existing and cumulative volume counts at the Chanticleer Avenue/Soquel Avenue intersection in the Santa MOB traffic study. Comparing the existing and cumulative volume counts at the Chanticleer Avenue/Soquel Avenue intersection, the cumulative AM peak hour counts were higher by a factor of 1.12, and the cumulative PM peak hour counts were higher by a factor of 1.23. These factors were applied to all the 2022 traffic counts to derive the cumulative volume estimates. Volumes under cumulative conditions are presented graphically in Figure 5 and also shown in Appendix A. The results of the intersection level of service analysis under cumulative conditions are summarized in Table 3. The results of the analysis show that the Chanticleer Avenue/Soquel Avenue intersection would operate at an unacceptable level of service during the PM peak period under cumulative conditions at the northbound approach, and the Maciel Avenue/Capitola Road intersection would operate at an unacceptable level of service during the PM peak period under cumulative conditions at the northbound and southbound approaches. All other intersections would operate at an acceptable level of service during both AM and PM peak periods. The intersection level of service calculation sheets are included in Appendix B.

Table 3
Cumulative Intersection Level of Service Summary

#	Intersection	Intersection Control	LOS Standard	Peak Hour	Count Date	Cumulative Conditions Delay[1] (sec)	Cumulative Conditions LOS
1	Chanticleer Avenue & Soquel Avenue	One-Way Stop	D	AM	09/13/22	17.4	C
				PM	09/13/22	**35.5**	**E**
2	Chanticleer Avenue & Mattison Lane	One-Way Stop	D	AM	09/13/22	12.3	B
				PM	09/13/22	15.5	C
3	Maciel Avenue & Capitola Road	Two-Way Stop	D	AM	09/13/22	30.5	D
				PM	09/13/22	**>80**	**F**

Notes:

Bold indicates a substandard Level of Service

1. The delay reported for signalized intersections is the average stopped delay for all vehicles entering the intersection. The delay reported for one- and two-way stop controlled intersections is the delay experienced by vehicles on the worst stop controlled approach.

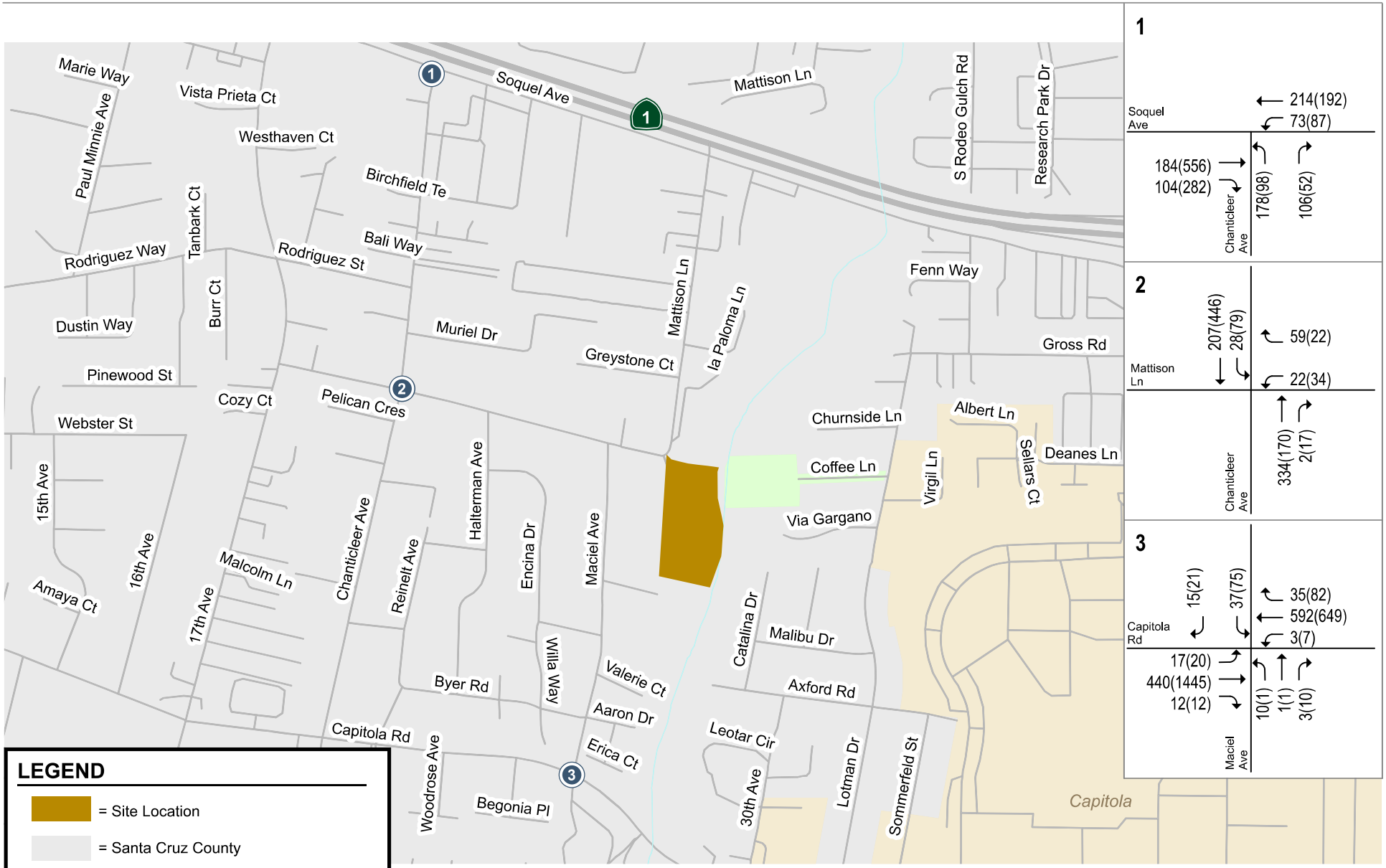


Figure 5
Cumulative Traffic Volumes

Project Trip Generation

Through empirical research, data have been collected that quantify the amount of traffic produced by many types of land uses. The research is compiled in the Institute of Transportation Engineers' (ITE) manual entitled *Trip Generation, 10th Edition* (2017). Under direction from the County Public Works Department, the rates published for Multi-family Housing (Low-Rise) (Land Use 220) were used to estimate the trips generated by the proposed townhouse units that are grouped together. The rates published for Single-Family Detached Housing (Land Use 210) were used to estimate the trips generated by the proposed detached townhouse units and existing single-family homes. Trips generated by the existing uses on the site can be credited against the proposed residential development. Table 4 shows the trips generated by the proposed and existing uses.

After accounting for the trips generated by the existing homes, the proposed residential development is estimated to generate 166 net new daily trips with a net increase of 11 trips in the AM peak hour and a net increase of 12 trips in the PM peak hour. This small number of additional trips would not change the operations of the roads and intersections near the site.

Table 4
Project Trip Generation Estimates

Land Use	Size		Daily		AM Peak Hour						PM Peak Hour					
			Rate	Trips	Rate	In	Out	In	Out	Total	Rate	In	Out	In	Out	Total
Proposed Uses																
Townhouse units (Detached)[1]	1.0	DU	9.44	9	0.74	25%	75%	0	1	1	0.99	63%	37%	1	0	1
Townhouse units (Attached)[2]	24.0	DU	7.32	176	0.46	23%	77%	3	8	11	0.56	63%	37%	8	5	13
Subtotal				**185**				**3**	**9**	**12**				**9**	**5**	**14**
Existing Uses																
Single-Family Homes[1]	2.0	DU	9.44	19	0.74	25%	75%	0	1	1	0.99	63%	37%	1	1	2
Net Project Trips				**166**				**3**	**8**	**11**				**8**	**4**	**12**

Note:
Trip rates for Single-Family detached housing annd Multifamily housing (Low-Rise) are from the ITE Trip Generation Manual, 10th Edition, 2017.
1. Single-Family Detached Housing (Land Use 210) average rates expressed in trips per dwelling units (DU) are used.
2. Multifamily Housing (Low-Rise) (Land Use 220) average rates expressed in trips per dwelling units (DU) are used.

Project Trip Distribution and Assignment

The project trips were assigned to the surrounding roadway network based on existing travel patterns in the study area and the locations of complementary land uses (see figure 6).

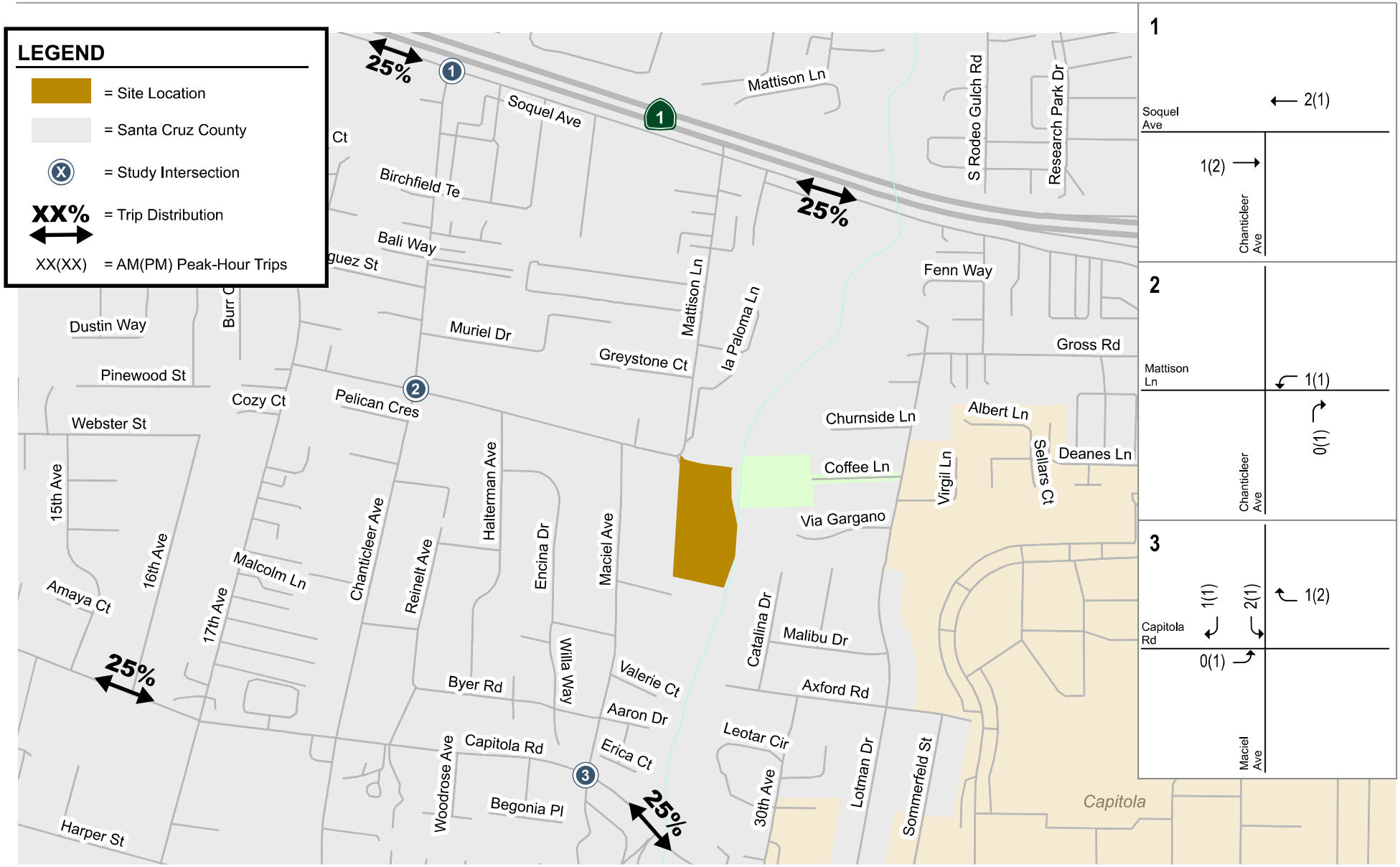


Figure 6
Trip Distribution and Project Assignment

Project Conditions Intersection Levels of Service

Intersection levels of service were evaluated relative to both (1) existing traffic volumes and (2) cumulative traffic volumes. For the existing plus project scenario, the net new trips generated by the proposed developments were added to the existing traffic volumes to derive the existing plus project traffic volumes (see Figure 7). For the cumulative plus project scenario, the net new trips generated by the proposed development were added to the cumulative traffic volumes to derive the cumulative plus project traffic volumes (see Figure 8).

The results of the analysis indicate that the Maciel Avenue/Capitola Road intersection would operate at an unacceptable level of service during the PM peak period under existing plus project conditions at the northbound and southbound approaches. The added project trips to the southbound approach would increase the critical movement by more than 1%, which would create an operational deficiency. However, the intersection would not meet the signal warrant requirements (see next section) and no other feasible improvements are available.

The results also show that the Chanticleer Avenue/Soquel Avenue intersection would operate at an unacceptable level of service during the PM peak period under cumulative plus project conditions at the northbound approach, and the Maciel Avenue/Capitola Road intersection would operate an unacceptable level of service during the PM peak hour under cumulative plus project conditions at the northbound and southbound approaches. The added project trips to the southbound approach at the Maciel Avenue/Capitola Road intersection would increase the critical movement by more than 1%, which would create an operational deficiency. However, neither intersection would meet the signal warrant requirements, and no other feasible improvements are available. Table 5 and Table 6 summarize the results of the peak-hour intersection level of service analysis for the Existing Plus Project and Cumulative Plus Project, respectively. The intersection level of service calculation sheets are included in Appendix B.

Table 5
Existing Plus Project Intersection Level of Service Summary

#	Intersection	Intersection Control	LOS Standard	Peak Hour	Count Date	Existing Conditions Delay[1] (sec)	Existing Conditions LOS	Existing Plus Project Delay[1] (sec)	Existing Plus Project LOS	% Change in Crit Vol.
1	Chanticleer Avenue & Soquel Avenue	One-Way Stop	D	AM	09/13/22	15.0	B	15.0	B	0.00%
				PM	09/13/22	20.8	C	21.0	C	0.00%
2	Chanticleer Avenue & Mattison Lane	One-Way Stop	D	AM	09/13/22	11.6	B	11.7	B	1.37%
				PM	09/13/22	13.1	B	13.2	B	2.17%
3	Maciel Avenue & Capitola Road	Two-Way Stop	D	AM	09/13/22	24.3	C	24.5	C	6.52%
				PM	09/13/22	**>80**	**F**	**>80**	**F**	**2.56%**

Notes:

Bold indicates a substandard Level of Service

1. The delay reported for signalized intersections is the average stopped delay for all vehicles entering the intersection. The delay reported for one- and two-way stop controlled intersections is the delay experienced by vehicles on the worst stop controlled approach.

Table 6
Cumulative Plus Project Intersection Level of Service Summary

#	Intersection	Intersection Control	LOS Standard	Peak Hour	Count Date	Cumulative Conditions Delay[1] (sec)	Cumulative Conditions LOS	Cumulative Plus Project Delay[1] (sec)	Cumulative Plus Project LOS	% Change in Crit Vol.
1	Chanticleer Avenue & Soquel Avenue	One-Way Stop	D	AM	09/13/22	17.4	C	17.5	C	0.00%
				PM	09/13/22	**35.5**	**E**	**35.5**	**E**	**0.00%**
2	Chanticleer Avenue & Mattison Lane	One-Way Stop	D	AM	09/13/22	12.3	B	12.3	B	1.23%
				PM	09/13/22	15.5	C	15.6	C	1.79%
3	Maciel Avenue & Capitola Road	Two-Way Stop	D	AM	09/13/22	30.5	D	30.9	D	5.77%
				PM	09/13/22	**>80**	**F**	**>80**	**F**	**2.08%**

Notes:

Bold indicates a substandard Level of Service

1. The delay reported for signalized intersections is the average stopped delay for all vehicles entering the intersection. The delay reported for one- and two-way stop controlled intersections is the delay experienced by vehicles on the worst stop controlled approach.

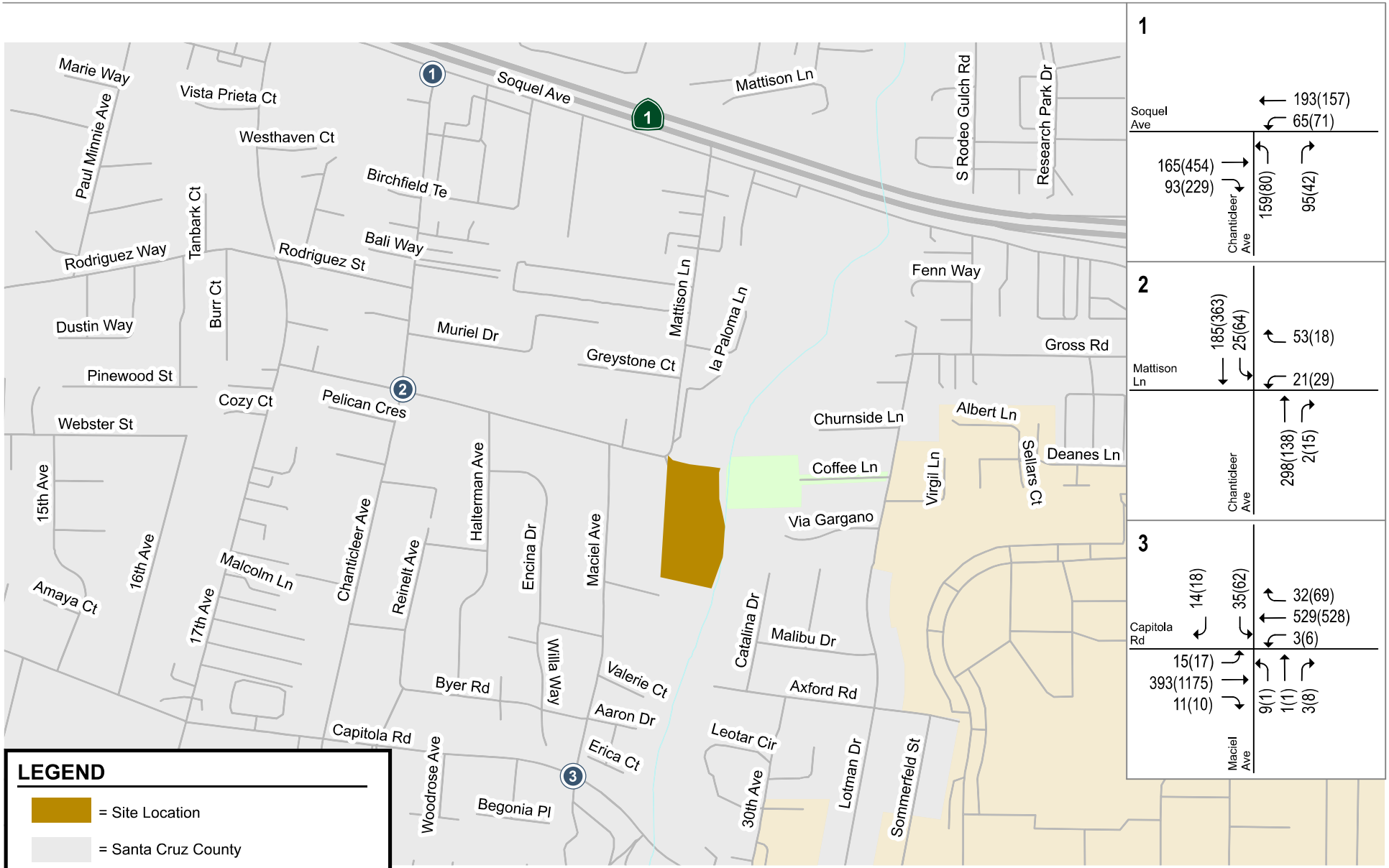


Figure 7
Existing Plus Project Traffic Volumes

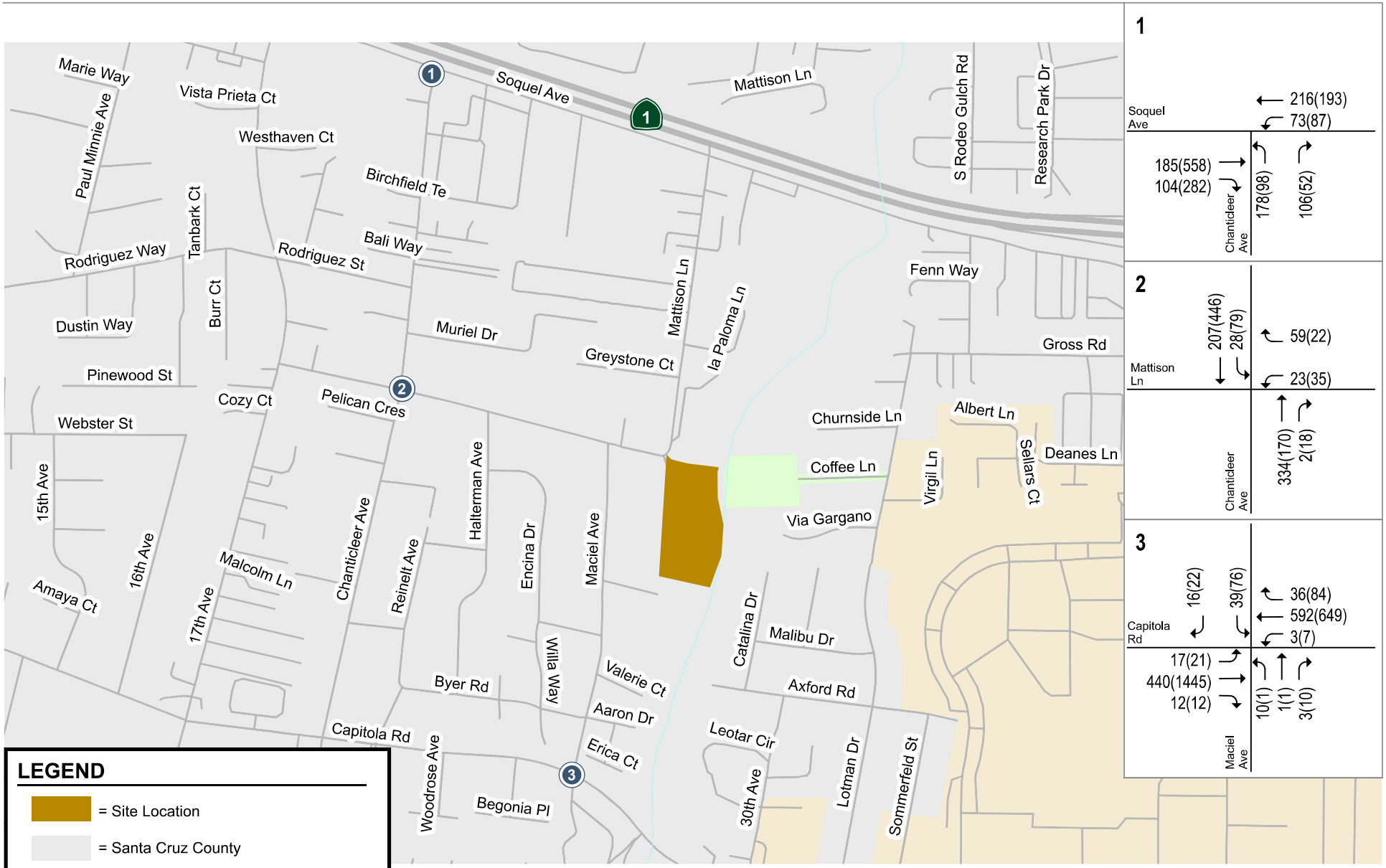


Figure 8
Cumulative Plus Project Traffic Volumes

Peak-Hour Signal Warrant Analysis

The study intersections were evaluated on the basis of the Peak-Hour Volume Signal Warrant, (Warrant #3 – Part B) described in the California *Manual on Uniform Traffic Control Devices* (MUTCD), 2014 Edition. This method provides an indication whether peak-hour traffic volumes are, or would be, sufficient to justify installation of a traffic signal. Intersections that meet the peak hour warrant are subject to further analysis before determining that a traffic signal is necessary. Other options such as traffic control devices, signage, or geometric changes may be preferable based on existing field conditions.

The results of the signal warrant checks indicate that the AM and PM peak-hour volumes at the study intersections would not meet the signal warrant under existing, existing plus project, or cumulative conditions. The peak-hour signal warrant sheets are contained in Appendix C.

Site Access and On-Site Circulation

A review of the project site plan was performed to determine whether adequate site access and onsite circulation would be provided, using commonly accepted transportation planning principles and traffic engineering standards. This review was based on the site plan prepared by Ifland Engineers dated April 30, 2020, shown on Figure 2.

Site Access

Vehicle site access was evaluated to determine the adequacy of the site driveway. The project generated traffic would access the site via a new private street connecting to Mattison Lane. The new street would be located at the 90-degree bend in Mattison Lane, approximately 1,500 feet south of Soquel Avenue. Each townhouse would be provided with its own driveway. The private street generally would be 28 feet wide, which can accommodate two-way traffic and on-street parking on one side.

Sight Distance

The intersection of the new private street with Mattison Lane would be located right at the apex of the 90 degree turn in the road. This location provides unlimited sight distance in each direction.

On-site Circulation

On-site circulation was reviewed in accordance with generally accepted traffic engineering standards. The project would provide a new private street within the project site. Each townhouse would have its own driveway and a garage.

The project also proposes an emergency vehicle and pedestrian lane on the west side of the project, located just south of the commons area. This connection would provide emergency vehicle, bicycle, and pedestrian access to Maciel Avenue when the adjacent property redevelops. However, it is recommended that the connection between the two properties remain as an emergency vehicle and bicycle/pedestrian access lane. A regular vehicle lane would not improve the circulation of traffic on Maciel Avenue. The existing roadway on Mattison Lane provides a connection to Maciel Avenue for vehicles travelling towards Soquel Avenue to the north and Capitola Avenue to the south. Given the existing nearby streets, a through lane would be redundant to the current existing path of travel. The new private street proposed by the project that connects to Mattison Lane would provide adequate circulation to Maciel Avenue and Soquel Avenue. The private street also would be designed with a hammerhead at the end for emergency vehicle turn around.

Potential Impacts to Pedestrians, Bicycles, and Transit

There is an existing sidewalk on Mattison Lane that connects to Soquel Avenue. The project would provide a new sidewalk on the east side of the new road within the project site that would connect to the existing sidewalk on Mattison Lane. Once the adjacent property to the west redevelops, there will be a direct pedestrian connection to Maciel Avenue, which will connect to continuous sidewalks from the site to the Capitola Mall, which is a little less than one mile walking distance.

Bicycle facilities in the study area include bike lanes along Capitola Road and Soquel Avenue. While Mattison Lane and Maciel Avenue in the vicinity of the project site do not have bicycle lanes, they are conducive to bicycle travel due to their low traffic volumes and low speeds. The planned connection through the adjacent property will provide a direct bicycle connection to Maciel Avenue.

Existing transit services near the project site are provided by the Santa Cruz Metro Transit District. The project site is located within ½ mile of a bus stop, which is located on Capitola Road near Maciel Avenue. There are two local bus lines (Route 69A and 69W) that serve the immediate project area. The bus routes run throughout the day with 60-minute headways. Once the adjacent property develops, there will be a continuous pedestrian path between the project site and the bus stops on Capitola Road.

Parking

Parking provided on the site was evaluated based on the Santa Cruz County parking standards. The project proposes 25 3-bedroom townhouse units. According to the Santa Cruz County Municipal Code, the parking requirement for 3-bedroom units is 3 parking spaces per unit for single-family units and 2.5 spaces per unit for multifamily units. Therefore, the project is required to provide a minimum of 60 residential parking spaces for multifamily units and 3 spaces for single-family units, which totals 63 spaces. The project is proposing 80 parking spaces in the garages and driveways of the townhouses and 16 on-street spaces, which totals 96 parking spaces, which meets the requirement.

Conclusions

Based on the trip generation and map-based screening, the project would not meet the VMT screening criteria. However, the project proposes to implement TDM measures that would reduce the VMT impact. The potential mitigations that can be analyzed with the VMT tool would reduce the project VMT to 8.9 VMT/capita, which is still slightly over the threshold. A 20-foot pedestrian and bike easement could be implemented along the north property line of the project site. This pedestrian and bicycle easement would provide access to a future pedestrian and bicycle bridge that would span across the creek located east of the project site and connect to the west side of Coffee Lane Park. The frontage easement mitigation would further reduce the project VMT to 8.7 VMT/capita if at least 8 people per day would use the bridge. These implementations would reduce the project VMT impact to a less-than-significant according to the County's VMT measurement tool.

After accounting for the trips generated by the existing two homes on the site, the proposed residential development is estimated to generate 166 net new daily trips with a net increase of 11 trips in the AM peak hour and a net increase of 12 trips in the PM peak hour. This small number of additional trips would not affect the operation of the streets and intersections in the vicinity of the site.

The project proposes an emergency vehicle hammerhead turn around at the end of the new private street. It also proposes an emergency vehicle and bicycle/pedestrian connection on the west side of

the project, located just south of the commons area. This lane would allow for a future connection to Maciel Avenue when the adjacent property redevelops.

The following study intersections would operate at an unacceptable level of service under the following conditions:

- Chanticleer Avenue and Soquel Avenue – PM period – Cumulative Conditions and Cumulative Plus Project Conditions – Northbound Approach
- Maciel Avenue and Capitola Road – PM peak period – Existing Conditions, Existing Plus project Conditions, Cumulative Conditions, Cumulative Plus Project Conditions – Northbound and Southbound Approaches

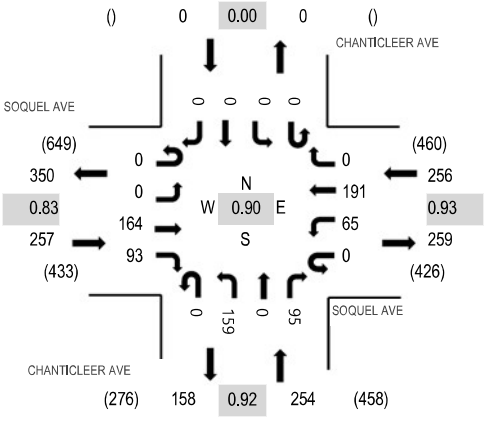
The added project trips to the southbound approach at the Maciel Avenue/Capitola Road intersection would increase the critical movement by more than 1% under project conditions, which would create an operational deficiency. However, the intersection would not meet the signal warrant requirements, and no other feasible improvements are available.

Appendix A
Traffic Counts

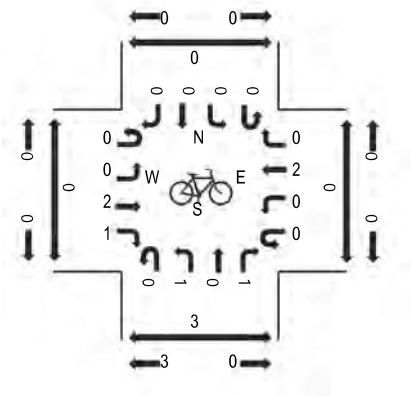
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 1 CHANTICLEER AVE & SOQUEL AVE AM
Date: Tuesday, September 13, 2022
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 08:15 AM - 08:30 AM

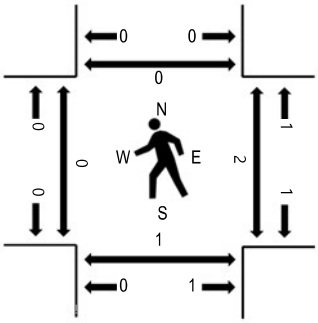
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	SOQUEL AVE Eastbound				SOQUEL AVE Westbound				CHANTICLEER AVE Northbound				CHANTICLEER AVE Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	0	14	10	0	14	27	0	0	29	0	13	0	0	0	0	107	585	0	0	0	0
7:15 AM	0	0	17	15	0	7	41	0	0	42	0	9	0	0	0	0	131	659	0	0	0	0
7:30 AM	0	0	27	25	0	11	43	0	0	47	0	14	0	0	0	0	167	741	0	0	0	0
7:45 AM	0	0	28	18	0	18	45	0	0	46	0	25	0	0	0	0	180	767	0	0	0	0
8:00 AM	0	0	27	21	0	14	55	0	0	38	0	26	0	0	0	0	181	766	0	2	1	0
8:15 AM	0	0	54	30	0	17	48	0	0	44	0	20	0	0	0	0	213		0	0	0	0
8:30 AM	0	0	55	24	0	16	43	0	0	31	0	24	0	0	0	0	193		0	0	0	0
8:45 AM	0	0	49	19	0	17	44	0	0	26	0	24	0	0	0	0	179		0	0	0	0

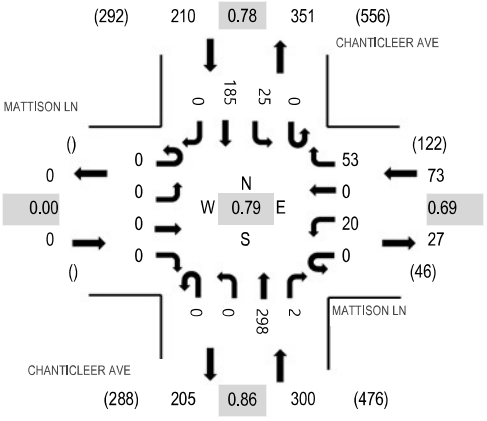
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Lights	0	0	160	93	0	64	188	0	0	159	0	94	0	0	0	0	758
Mediums	0	0	4	0	0	0	3	0	0	0	0	1	0	0	0	0	8
Total	0	0	164	93	0	65	191	0	0	159	0	95	0	0	0	0	767

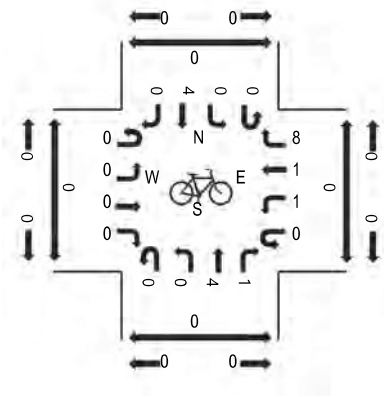
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 2 CHANTICLEER AVE & MATTISON LN AM
Date: Tuesday, September 13, 2022
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 08:15 AM - 08:30 AM

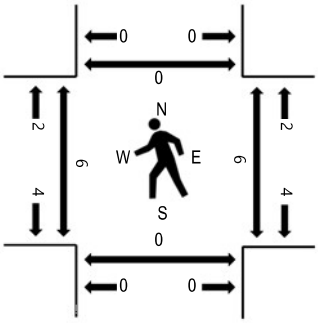
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	MATTISON LN Eastbound				MATTISON LN Westbound				CHANTICLEER AVE Northbound				CHANTICLEER AVE Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	0	0	0	0	2	0	8	0	0	32	0	0	2	10	0	54	336	1	1	0	0
7:15 AM	0	0	0	0	0	5	0	6	0	0	46	0	0	1	13	0	71	417	1	0	0	0
7:30 AM	0	0	0	0	0	2	0	15	0	0	54	2	0	3	13	0	89	531	3	2	0	0
7:45 AM	0	0	0	0	0	6	0	9	0	0	73	1	0	5	28	0	122	583	3	1	0	0
8:00 AM	0	0	0	0	0	7	0	10	0	0	76	0	0	1	41	0	135	554	2	4	0	0
8:15 AM	0	0	0	0	0	6	0	22	0	0	86	1	0	12	58	0	185		0	1	0	0
8:30 AM	0	0	0	0	0	1	0	12	0	0	63	0	0	7	58	0	141		1	0	0	0
8:45 AM	0	0	0	0	0	4	0	7	0	0	37	5	0	6	34	0	93		2	3	0	3

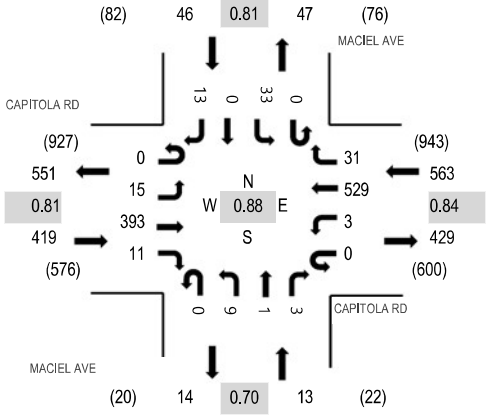
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Lights	0	0	0	0	0	19	0	53	0	0	294	2	0	25	183	0	576
Mediums	0	0	0	0	0	1	0	0	0	0	4	0	0	0	1	0	6
Total	0	0	0	0	0	20	0	53	0	0	298	2	0	25	185	0	583

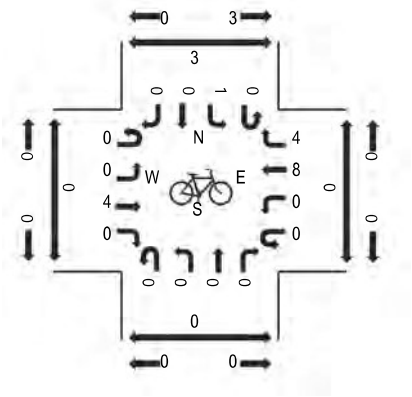
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 3 MACIEL AVE & CAPITOLA RD AM
Date: Tuesday, September 13, 2022
Peak Hour: 08:00 AM - 09:00 AM
Peak 15-Minutes: 08:15 AM - 08:30 AM

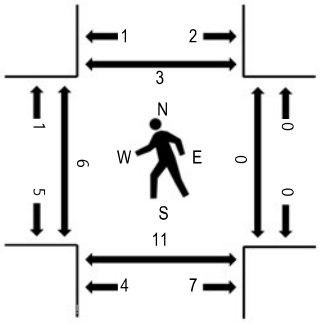
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	CAPITOLA RD Eastbound				CAPITOLA RD Westbound				MACIEL AVE Northbound				MACIEL AVE Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	1	26	0	0	0	65	2	0	1	0	1	0	5	0	0	101	582	0	0	0	1
7:15 AM	0	1	30	0	1	0	76	6	0	2	0	0	0	1	0	1	118	731	0	0	0	1
7:30 AM	0	2	36	1	0	1	106	7	0	3	0	0	0	7	0	6	169	909	2	0	0	4
7:45 AM	0	1	57	2	0	1	106	9	0	1	0	1	0	6	1	9	194	1,004	2	0	0	0
8:00 AM	0	3	67	1	0	1	154	8	0	5	0	0	0	8	0	3	250	1,041	0	0	0	0
8:15 AM	0	4	106	4	0	2	158	8	0	1	0	1	0	9	0	3	296		5	0	5	1
8:30 AM	0	4	121	5	0	0	110	8	0	2	1	2	0	8	0	3	264		1	0	6	1
8:45 AM	0	4	99	1	0	0	107	7	0	1	0	0	0	8	0	4	231		0	0	0	1

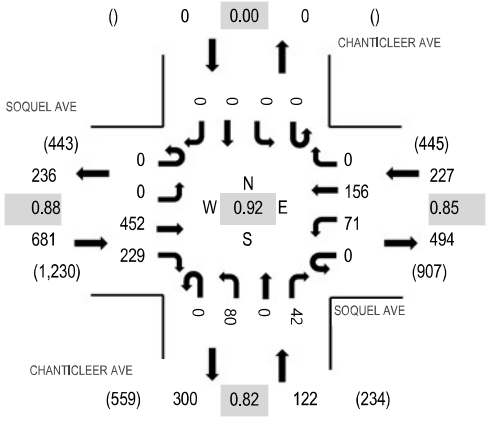
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
Lights	0	15	389	11	0	3	518	31	0	9	1	3	0	33	0	13	1,026
Mediums	0	0	4	0	0	0	9	0	0	0	0	0	0	0	0	0	13
Total	0	15	393	11	0	3	529	31	0	9	1	3	0	33	0	13	1,041

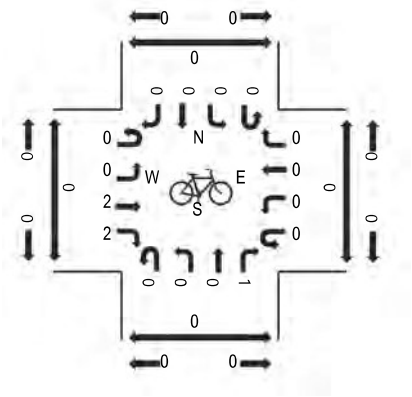
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 1 CHANTICLEER AVE & SOQUEL AVE PM
Date: Tuesday, September 13, 2022
Peak Hour: 04:15 PM - 05:15 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

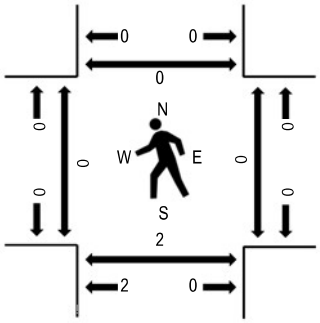
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	SOQUEL AVE Eastbound				SOQUEL AVE Westbound				CHANTICLEER AVE Northbound				CHANTICLEER AVE Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	0	103	54	0	30	41	0	0	24	0	11	0	0	0	0	263	1,014	0	0	0	0
4:15 PM	0	0	119	48	0	16	34	0	0	15	0	9	0	0	0	0	241	1,030	0	0	0	0
4:30 PM	0	0	91	63	0	20	36	0	0	25	0	14	0	0	0	0	249	1,007	0	0	1	0
4:45 PM	0	0	110	56	0	15	50	0	0	20	0	10	0	0	0	0	261	974	0	0	0	0
5:00 PM	0	0	132	62	0	20	36	0	0	20	0	9	0	0	0	0	279	895	0	0	1	0
5:15 PM	0	0	91	45	0	23	35	0	0	20	0	4	0	0	0	0	218		0	0	0	0
5:30 PM	0	0	111	36	0	21	26	0	0	13	0	9	0	0	0	0	216		0	0	0	0
5:45 PM	0	0	73	36	0	14	28	0	0	20	0	11	0	0	0	0	182		0	0	0	0

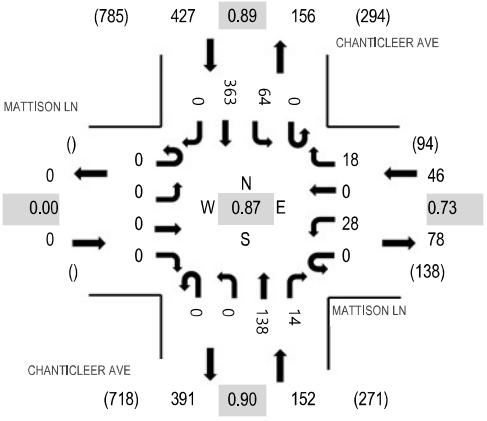
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	3
Lights	0	0	443	227	0	71	154	0	0	80	0	40	0	0	0	0	1,015
Mediums	0	0	7	2	0	0	2	0	0	0	0	1	0	0	0	0	12
Total	0	0	452	229	0	71	156	0	0	80	0	42	0	0	0	0	1,030

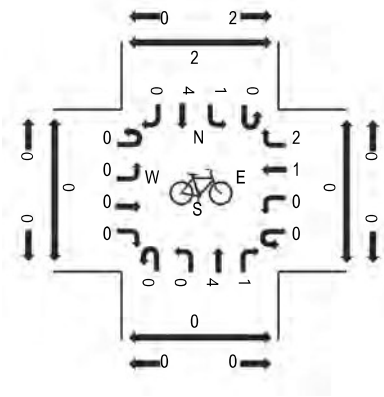
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 2 CHANTICLEER AVE & MATTISON LN PM
Date: Tuesday, September 13, 2022
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 04:45 PM - 05:00 PM

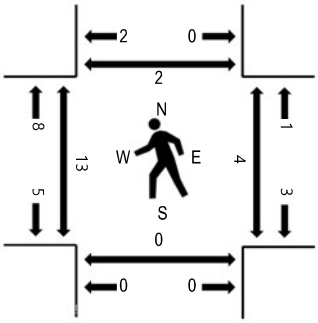
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	MATTISON LN Eastbound				MATTISON LN Westbound				CHANTICLEER AVE Northbound				CHANTICLEER AVE Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	0	0	0	0	9	0	11	0	0	28	3	0	13	96	0	160	622	2	2	0	0
4:15 PM	0	0	0	0	0	1	0	9	0	0	30	1	0	13	80	0	134	612	2	0	0	1
4:30 PM	0	0	0	0	0	6	0	4	0	0	35	5	0	16	82	0	148	625	3	0	0	0
4:45 PM	0	0	0	0	0	10	0	8	0	0	40	2	0	18	102	0	180	588	5	4	0	1
5:00 PM	0	0	0	0	0	3	0	3	0	0	32	2	0	18	92	0	150	528	2	0	0	1
5:15 PM	0	0	0	0	0	9	0	3	0	0	31	5	0	12	87	0	147		3	0	0	0
5:30 PM	0	0	0	0	0	6	0	3	0	0	21	3	0	13	65	0	111		5	0	0	0
5:45 PM	0	0	0	0	0	3	0	6	0	0	30	3	0	11	67	0	120		1	1	0	1

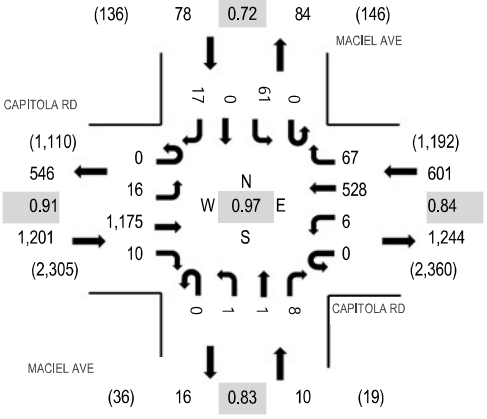
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	0	0	0	0	28	0	17	0	0	137	14	0	64	360	0	620
Mediums	0	0	0	0	0	0	0	1	0	0	1	0	0	0	3	0	5
Total	0	0	0	0	0	28	0	18	0	0	138	14	0	64	363	0	625

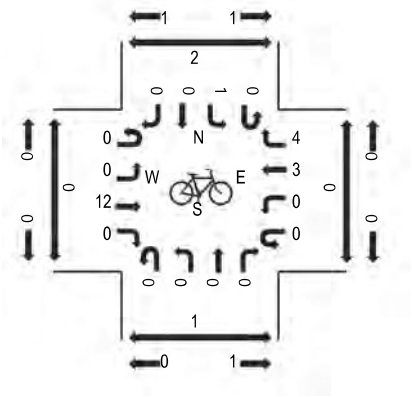
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 3 MACIEL AVE & CAPITOLA RD PM
Date: Tuesday, September 13, 2022
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:45 PM - 05:00 PM

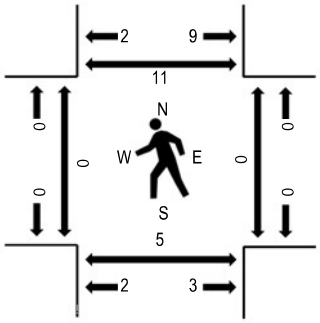
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	CAPITOLA RD Eastbound				CAPITOLA RD Westbound				MACIEL AVE Northbound				MACIEL AVE Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	2	295	3	0	1	127	14	0	1	0	2	0	15	0	5	465	1,890	0	0	1	0
4:15 PM	0	1	295	3	0	0	114	17	0	0	1	2	0	21	0	6	460	1,871	0	0	0	4
4:30 PM	0	11	299	1	0	2	126	19	0	0	0	2	0	11	0	5	476	1,890	0	0	2	6
4:45 PM	0	2	286	3	0	3	161	17	0	0	0	2	0	14	0	1	489	1,840	0	0	2	1
5:00 PM	0	8	266	1	0	0	140	12	0	1	0	1	0	10	0	7	446	1,762	0	0	1	3
5:15 PM	1	6	322	2	0	1	116	12	0	1	0	1	0	11	1	5	479		0	0	0	3
5:30 PM	0	3	262	5	0	3	129	10	0	3	0	0	0	9	0	2	426		1	0	1	0
5:45 PM	0	1	222	5	0	2	156	10	0	2	0	0	0	12	0	1	411		0	0	0	1

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Lights	0	16	1,165	10	0	6	523	67	0	1	1	8	0	61	0	17	1,875
Mediums	0	0	9	0	0	0	5	0	0	0	0	0	0	0	0	0	14
Total	0	16	1,175	10	0	6	528	67	0	1	1	8	0	61	0	17	1,890

Appendix B
Level of Service Calculations

Intersection	
Int Delay, s/veh	5.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	164	93	65	191	159	95
Future Vol, veh/h	164	93	65	191	159	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	175	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	178	101	71	208	173	103

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	279	0	579	229
Stage 1	-	-	-	-	229	-
Stage 2	-	-	-	-	350	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1284	-	477	810
Stage 1	-	-	-	-	809	-
Stage 2	-	-	-	-	713	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1284	-	451	810
Mov Cap-2 Maneuver	-	-	-	-	451	-
Stage 1	-	-	-	-	809	-
Stage 2	-	-	-	-	674	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2	15
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	451	810	-	-	1284	-
HCM Lane V/C Ratio	0.383	0.127	-	-	0.055	-
HCM Control Delay (s)	17.9	10.1	-	-	8	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	1.8	0.4	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	53	298	2	25	185
Future Vol, veh/h	20	53	298	2	25	185
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	58	324	2	27	201

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	580	325	0	0	326	0
Stage 1	325	-	-	-	-	-
Stage 2	255	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	477	716	-	-	1234	-
Stage 1	732	-	-	-	-	-
Stage 2	788	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	465	716	-	-	1234	-
Mov Cap-2 Maneuver	465	-	-	-	-	-
Stage 1	732	-	-	-	-	-
Stage 2	768	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.6	0	1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	624	1234	-
HCM Lane V/C Ratio	-	-	0.127	0.022	-
HCM Control Delay (s)	-	-	11.6	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	393	11	3	529	31	9	1	3	33	0	13
Future Vol, veh/h	15	393	11	3	529	31	9	1	3	33	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	427	12	3	575	34	10	1	3	36	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	609	0	0	439	0	0	1070	1080	433	1065	1069	592
Stage 1	-	-	-	-	-	-	465	465	-	598	598	-
Stage 2	-	-	-	-	-	-	605	615	-	467	471	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	970	-	-	1121	-	-	199	218	623	200	221	506
Stage 1	-	-	-	-	-	-	578	563	-	489	491	-
Stage 2	-	-	-	-	-	-	485	482	-	576	560	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	970	-	-	1121	-	-	191	214	623	195	217	506
Mov Cap-2 Maneuver	-	-	-	-	-	-	191	214	-	195	217	-
Stage 1	-	-	-	-	-	-	569	554	-	481	490	-
Stage 2	-	-	-	-	-	-	470	481	-	562	551	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	21.7	24.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	230	970	-	-	1121	-	-	236
HCM Lane V/C Ratio	0.061	0.017	-	-	0.003	-	-	0.212
HCM Control Delay (s)	21.7	8.8	-	-	8.2	-	-	24.3
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	0.8

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	452	229	71	156	80	42
Future Vol, veh/h	452	229	71	156	80	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	175	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	491	249	77	170	87	46

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	740	0	940	616
Stage 1	-	-	-	-	616	-
Stage 2	-	-	-	-	324	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	867	-	293	491
Stage 1	-	-	-	-	539	-
Stage 2	-	-	-	-	733	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	867	-	267	491
Mov Cap-2 Maneuver	-	-	-	-	267	-
Stage 1	-	-	-	-	539	-
Stage 2	-	-	-	-	668	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	20.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	267	491	-	-	867	-
HCM Lane V/C Ratio	0.326	0.093	-	-	0.089	-
HCM Control Delay (s)	24.9	13.1	-	-	9.6	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	1.4	0.3	-	-	0.3	-

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	18	138	14	64	363
Future Vol, veh/h	28	18	138	14	64	363
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	20	150	15	70	395

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	693	158	0	0	165	0
Stage 1	158	-	-	-	-	-
Stage 2	535	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	409	887	-	-	1413	-
Stage 1	871	-	-	-	-	-
Stage 2	587	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	383	887	-	-	1413	-
Mov Cap-2 Maneuver	383	-	-	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	550	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.1	0	1.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	493	1413	-
HCM Lane V/C Ratio	-	-	0.101	0.049	-
HCM Control Delay (s)	-	-	13.1	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.2	-

Intersection	
Int Delay, s/veh	17.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	1175	10	6	528	67	1	1	8	61	0	17
Future Vol, veh/h	16	1175	10	6	528	67	1	1	8	61	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	1277	11	7	574	73	1	1	9	66	0	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	647	0	0	1288	0	0	1951	1978	1283	1947	1947	611
Stage 1	-	-	-	-	-	-	1317	1317	-	625	625	-
Stage 2	-	-	-	-	-	-	634	661	-	1322	1322	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	939	-	-	538	-	-	48	62	202	~ 49	65	494
Stage 1	-	-	-	-	-	-	194	227	-	473	477	-
Stage 2	-	-	-	-	-	-	467	460	-	193	226	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	939	-	-	538	-	-	45	60	202	~ 45	63	494
Mov Cap-2 Maneuver	-	-	-	-	-	-	45	60	-	~ 45	63	-
Stage 1	-	-	-	-	-	-	191	223	-	464	471	-
Stage 2	-	-	-	-	-	-	444	454	-	180	222	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	36	$ 424
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	127	939	-	-	538	-	-	56
HCM Lane V/C Ratio	0.086	0.019	-	-	0.012	-	-	1.514
HCM Control Delay (s)	36	8.9	-	-	11.8	-	-	$ 424
HCM Lane LOS	E	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	7.7

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	5.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	165	93	65	193	159	95
Future Vol, veh/h	165	93	65	193	159	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	175	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	179	101	71	210	173	103

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	280	0	582	230
Stage 1	-	-	-	-	230	-
Stage 2	-	-	-	-	352	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1283	-	475	809
Stage 1	-	-	-	-	808	-
Stage 2	-	-	-	-	712	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1283	-	449	809
Mov Cap-2 Maneuver	-	-	-	-	449	-
Stage 1	-	-	-	-	808	-
Stage 2	-	-	-	-	673	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2	15
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	449	809	-	-	1283	-
HCM Lane V/C Ratio	0.385	0.128	-	-	0.055	-
HCM Control Delay (s)	17.9	10.1	-	-	8	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	1.8	0.4	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	21	53	298	2	25	185
Future Vol, veh/h	21	53	298	2	25	185
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	23	58	324	2	27	201

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	580	325	0	0	326	0
Stage 1	325	-	-	-	-	-
Stage 2	255	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	477	716	-	-	1234	-
Stage 1	732	-	-	-	-	-
Stage 2	788	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	465	716	-	-	1234	-
Mov Cap-2 Maneuver	465	-	-	-	-	-
Stage 1	732	-	-	-	-	-
Stage 2	768	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	621	1234	-
HCM Lane V/C Ratio	-	-	0.13	0.022	-
HCM Control Delay (s)	-	-	11.7	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	393	11	3	529	32	9	1	3	35	0	14
Future Vol, veh/h	15	393	11	3	529	32	9	1	3	35	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	427	12	3	575	35	10	1	3	38	0	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	610	0	0	439	0	0	1071	1081	433	1066	1070	593
Stage 1	-	-	-	-	-	-	465	465	-	599	599	-
Stage 2	-	-	-	-	-	-	606	616	-	467	471	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	969	-	-	1121	-	-	198	218	623	200	221	506
Stage 1	-	-	-	-	-	-	578	563	-	488	490	-
Stage 2	-	-	-	-	-	-	484	482	-	576	560	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	969	-	-	1121	-	-	189	214	623	195	217	506
Mov Cap-2 Maneuver	-	-	-	-	-	-	189	214	-	195	217	-
Stage 1	-	-	-	-	-	-	568	553	-	480	489	-
Stage 2	-	-	-	-	-	-	468	481	-	562	550	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	21.8	24.5
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	228	969	-	-	1121	-	-	237
HCM Lane V/C Ratio	0.062	0.017	-	-	0.003	-	-	0.225
HCM Control Delay (s)	21.8	8.8	-	-	8.2	-	-	24.5
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	0.8

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	454	229	71	157	80	42
Future Vol, veh/h	454	229	71	157	80	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	175	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	493	249	77	171	87	46

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	742	0	943	618
Stage 1	-	-	-	-	618	-
Stage 2	-	-	-	-	325	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	865	-	291	489
Stage 1	-	-	-	-	538	-
Stage 2	-	-	-	-	732	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	865	-	265	489
Mov Cap-2 Maneuver	-	-	-	-	265	-
Stage 1	-	-	-	-	538	-
Stage 2	-	-	-	-	667	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	21
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	265	489	-	-	865	-
HCM Lane V/C Ratio	0.328	0.093	-	-	0.089	-
HCM Control Delay (s)	25.1	13.1	-	-	9.6	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	1.4	0.3	-	-	0.3	-

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	29	18	138	15	64	363
Future Vol, veh/h	29	18	138	15	64	363
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	20	150	16	70	395

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	693	158	0	0	166	0
Stage 1	158	-	-	-	-	-
Stage 2	535	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	409	887	-	-	1412	-
Stage 1	871	-	-	-	-	-
Stage 2	587	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	383	887	-	-	1412	-
Mov Cap-2 Maneuver	383	-	-	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	550	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.2	0	1.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	490	1412	-
HCM Lane V/C Ratio	-	-	0.104	0.049	-
HCM Control Delay (s)	-	-	13.2	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.2	-

Intersection	
Int Delay, s/veh	19.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	1175	10	6	528	69	1	1	8	62	0	18
Future Vol, veh/h	17	1175	10	6	528	69	1	1	8	62	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	1277	11	7	574	75	1	1	9	67	0	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	649	0	0	1288	0	0	1955	1982	1283	1950	1950	612
Stage 1	-	-	-	-	-	-	1319	1319	-	626	626	-
Stage 2	-	-	-	-	-	-	636	663	-	1324	1324	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	937	-	-	538	-	-	48	61	202	~ 48	64	493
Stage 1	-	-	-	-	-	-	193	227	-	472	477	-
Stage 2	-	-	-	-	-	-	466	459	-	192	225	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	937	-	-	538	-	-	45	59	202	~ 44	62	493
Mov Cap-2 Maneuver	-	-	-	-	-	-	45	59	-	~ 44	62	-
Stage 1	-	-	-	-	-	-	189	223	-	463	471	-
Stage 2	-	-	-	-	-	-	442	453	-	179	221	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	36	$ 453.5
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	127	937	-	-	538	-	-	55
HCM Lane V/C Ratio	0.086	0.02	-	-	0.012	-	-	1.581
HCM Control Delay (s)	36	8.9	-	-	11.8	-	-	$ 453.5
HCM Lane LOS	E	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	8

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	6.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	184	104	73	214	178	106
Future Vol, veh/h	184	104	73	214	178	106
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	175	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	200	113	79	233	193	115

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	313	0	648	257
Stage 1	-	-	-	-	257	-
Stage 2	-	-	-	-	391	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1247	-	435	782
Stage 1	-	-	-	-	786	-
Stage 2	-	-	-	-	683	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1247	-	408	782
Mov Cap-2 Maneuver	-	-	-	-	408	-
Stage 1	-	-	-	-	786	-
Stage 2	-	-	-	-	640	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	17.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	408	782	-	-	1247	-
HCM Lane V/C Ratio	0.474	0.147	-	-	0.064	-
HCM Control Delay (s)	21.5	10.4	-	-	8.1	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	2.5	0.5	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	22	59	334	2	28	207
Future Vol, veh/h	22	59	334	2	28	207
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	64	363	2	30	225

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	649	364	0	0	365	0
Stage 1	364	-	-	-	-	-
Stage 2	285	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	434	681	-	-	1194	-
Stage 1	703	-	-	-	-	-
Stage 2	763	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	421	681	-	-	1194	-
Mov Cap-2 Maneuver	421	-	-	-	-	-
Stage 1	703	-	-	-	-	-
Stage 2	741	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.3	0	1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	583	1194	-
HCM Lane V/C Ratio	-	-	0.151	0.025	-
HCM Control Delay (s)	-	-	12.3	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	440	12	3	592	35	10	1	3	37	0	15
Future Vol, veh/h	17	440	12	3	592	35	10	1	3	37	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	478	13	3	643	38	11	1	3	40	0	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	681	0	0	491	0	0	1197	1208	485	1191	1195	662
Stage 1	-	-	-	-	-	-	521	521	-	668	668	-
Stage 2	-	-	-	-	-	-	676	687	-	523	527	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	912	-	-	1072	-	-	163	183	582	164	186	462
Stage 1	-	-	-	-	-	-	539	532	-	448	456	-
Stage 2	-	-	-	-	-	-	443	447	-	537	528	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	912	-	-	1072	-	-	155	179	582	160	182	462
Mov Cap-2 Maneuver	-	-	-	-	-	-	155	179	-	160	182	-
Stage 1	-	-	-	-	-	-	528	521	-	439	455	-
Stage 2	-	-	-	-	-	-	426	446	-	522	517	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	26.1	30.5
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	186	912	-	-	1072	-	-	197
HCM Lane V/C Ratio	0.082	0.02	-	-	0.003	-	-	0.287
HCM Control Delay (s)	26.1	9	-	-	8.4	-	-	30.5
HCM Lane LOS	D	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	1.1

Intersection	
Int Delay, s/veh	4.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	556	282	87	192	98	52
Future Vol, veh/h	556	282	87	192	98	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	175	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	604	307	95	209	107	57

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	911	0	1157	758
Stage 1	-	-	-	-	758	-
Stage 2	-	-	-	-	399	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	748	-	217	407
Stage 1	-	-	-	-	463	-
Stage 2	-	-	-	-	678	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	748	-	189	407
Mov Cap-2 Maneuver	-	-	-	-	189	-
Stage 1	-	-	-	-	463	-
Stage 2	-	-	-	-	592	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.3	35.5
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	189	407	-	-	748	-
HCM Lane V/C Ratio	0.564	0.139	-	-	0.126	-
HCM Control Delay (s)	46.2	15.3	-	-	10.5	-
HCM Lane LOS	E	C	-	-	B	-
HCM 95th %tile Q(veh)	3	0.5	-	-	0.4	-

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	34	22	170	17	79	446
Future Vol, veh/h	34	22	170	17	79	446
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	24	185	18	86	485

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	851	194	0	0	203	0
Stage 1	194	-	-	-	-	-
Stage 2	657	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	330	847	-	-	1369	-
Stage 1	839	-	-	-	-	-
Stage 2	516	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	302	847	-	-	1369	-
Mov Cap-2 Maneuver	302	-	-	-	-	-
Stage 1	839	-	-	-	-	-
Stage 2	472	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.5	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	404	1369	-
HCM Lane V/C Ratio	-	-	0.151	0.063	-
HCM Control Delay (s)	-	-	15.5	7.8	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.2	-

Intersection	
Int Delay, s/veh	72.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	1445	12	7	649	82	1	1	10	75	0	21
Future Vol, veh/h	20	1445	12	7	649	82	1	1	10	75	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	1571	13	8	705	89	1	1	11	82	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	794	0	0	1584	0	0	2399	2432	1578	2394	2394	750
Stage 1	-	-	-	-	-	-	1622	1622	-	766	766	-
Stage 2	-	-	-	-	-	-	777	810	-	1628	1628	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	827	-	-	415	-	-	23	32	135	~ 23	34	411
Stage 1	-	-	-	-	-	-	129	161	-	395	412	-
Stage 2	-	-	-	-	-	-	390	393	-	128	160	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	827	-	-	415	-	-	21	31	135	~ 20	32	411
Mov Cap-2 Maneuver	-	-	-	-	-	-	21	31	-	~ 20	32	-
Stage 1	-	-	-	-	-	-	126	157	-	384	404	-
Stage 2	-	-	-	-	-	-	361	386	-	114	156	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	60.2	$ 1746.6
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	78	827	-	-	415	-	-	25
HCM Lane V/C Ratio	0.167	0.026	-	-	0.018	-	-	4.174
HCM Control Delay (s)	60.2	9.5	-	-	13.8	-	-	$ 1746.6
HCM Lane LOS	F	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0.1	-	-	12.9

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	6.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	185	104	73	216	178	106
Future Vol, veh/h	185	104	73	216	178	106
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	175	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	201	113	79	235	193	115

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	314	0	651	258
Stage 1	-	-	-	-	258	-
Stage 2	-	-	-	-	393	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1246	-	433	781
Stage 1	-	-	-	-	785	-
Stage 2	-	-	-	-	682	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1246	-	406	781
Mov Cap-2 Maneuver	-	-	-	-	406	-
Stage 1	-	-	-	-	785	-
Stage 2	-	-	-	-	639	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2	17.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	406	781	-	-	1246	-
HCM Lane V/C Ratio	0.477	0.148	-	-	0.064	-
HCM Control Delay (s)	21.7	10.4	-	-	8.1	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	2.5	0.5	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	23	59	334	2	28	207
Future Vol, veh/h	23	59	334	2	28	207
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	64	363	2	30	225

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	649	364	0	0	365	0
Stage 1	364	-	-	-	-	-
Stage 2	285	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	434	681	-	-	1194	-
Stage 1	703	-	-	-	-	-
Stage 2	763	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	421	681	-	-	1194	-
Mov Cap-2 Maneuver	421	-	-	-	-	-
Stage 1	703	-	-	-	-	-
Stage 2	741	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.3	0	1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	580	1194	-
HCM Lane V/C Ratio	-	-	0.154	0.025	-
HCM Control Delay (s)	-	-	12.3	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	440	12	3	592	36	10	1	3	39	0	16
Future Vol, veh/h	17	440	12	3	592	36	10	1	3	39	0	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	478	13	3	643	39	11	1	3	42	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	682	0	0	491	0	0	1198	1209	485	1192	1196	663
Stage 1	-	-	-	-	-	-	521	521	-	669	669	-
Stage 2	-	-	-	-	-	-	677	688	-	523	527	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	911	-	-	1072	-	-	162	183	582	164	186	461
Stage 1	-	-	-	-	-	-	539	532	-	447	456	-
Stage 2	-	-	-	-	-	-	443	447	-	537	528	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	911	-	-	1072	-	-	153	179	582	160	182	461
Mov Cap-2 Maneuver	-	-	-	-	-	-	153	179	-	160	182	-
Stage 1	-	-	-	-	-	-	528	521	-	438	455	-
Stage 2	-	-	-	-	-	-	425	446	-	522	517	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	26.3	30.9
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	184	911	-	-	1072	-	-	198
HCM Lane V/C Ratio	0.083	0.02	-	-	0.003	-	-	0.302
HCM Control Delay (s)	26.3	9	-	-	8.4	-	-	30.9
HCM Lane LOS	D	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	1.2

Intersection	
Int Delay, s/veh	4.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	558	282	87	193	98	52
Future Vol, veh/h	558	282	87	193	98	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	175	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	607	307	95	210	107	57

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	914	0	1161	761
Stage 1	-	-	-	-	761	-
Stage 2	-	-	-	-	400	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	746	-	216	405
Stage 1	-	-	-	-	461	-
Stage 2	-	-	-	-	677	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	746	-	189	405
Mov Cap-2 Maneuver	-	-	-	-	189	-
Stage 1	-	-	-	-	461	-
Stage 2	-	-	-	-	591	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.3	35.5
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	189	405	-	-	746	-
HCM Lane V/C Ratio	0.564	0.14	-	-	0.127	-
HCM Control Delay (s)	46.2	15.3	-	-	10.5	-
HCM Lane LOS	E	C	-	-	B	-
HCM 95th %tile Q(veh)	3	0.5	-	-	0.4	-

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	22	170	18	79	446
Future Vol, veh/h	35	22	170	18	79	446
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	38	24	185	20	86	485

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	852	195	0	0	205	0
Stage 1	195	-	-	-	-	-
Stage 2	657	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	330	846	-	-	1366	-
Stage 1	838	-	-	-	-	-
Stage 2	516	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	302	846	-	-	1366	-
Mov Cap-2 Maneuver	302	-	-	-	-	-
Stage 1	838	-	-	-	-	-
Stage 2	472	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.6	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	402	1366	-
HCM Lane V/C Ratio	-	-	0.154	0.063	-
HCM Control Delay (s)	-	-	15.6	7.8	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.2	-

Intersection	
Int Delay, s/veh	75.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	1445	12	7	649	84	1	1	10	76	0	22
Future Vol, veh/h	21	1445	12	7	649	84	1	1	10	76	0	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	1571	13	8	705	91	1	1	11	83	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	796	0	0	1584	0	0	2403	2436	1578	2397	2397	751
Stage 1	-	-	-	-	-	-	1624	1624	-	767	767	-
Stage 2	-	-	-	-	-	-	779	812	-	1630	1630	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	826	-	-	415	-	-	23	32	135	~ 23	34	411
Stage 1	-	-	-	-	-	-	129	161	-	395	411	-
Stage 2	-	-	-	-	-	-	389	392	-	128	160	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	826	-	-	415	-	-	21	31	135	~ 20	32	411
Mov Cap-2 Maneuver	-	-	-	-	-	-	21	31	-	~ 20	32	-
Stage 1	-	-	-	-	-	-	125	156	-	384	403	-
Stage 2	-	-	-	-	-	-	359	385	-	114	156	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	60.2	$ 1785.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	78	826	-	-	415	-	-	25
HCM Lane V/C Ratio	0.167	0.028	-	-	0.018	-	-	4.261
HCM Control Delay (s)	60.2	9.5	-	-	13.8	-	-	$ 1785.1
HCM Lane LOS	F	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0.1	-	-	13.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Appendix C
Signal Warrants

Mattison Lane Residential

TRAFFIC SIGNAL WARRANTS WORKSHEET

Analyst: JW date: 9/15/22

Major Street: Soquel Avenue — Critical Approach Speed* (mph) 35

Minor Street: Chanticleer Avenue — Critical Approach Speed* (mph) 25

**Posted Speed.*

Critical speed of major street traffic > 50 mph (64 km/h)……… ☑ or
In built up area of isolated community of < 10,000 population……… ☐ } **Rural (R)**

☐ **Urban (U)**

AM PEAK PERIOD

Warrant 3 - Peak Hour

PART A
(All parts 1, 2, and 3 below must be satisfied)

AM PEAK PERIOD

	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0:00	0:00	0:00	
Minor Street Approach Direction w/ Highest Delay	NB	NB	NB	NB				
Highest Minor Street Average Delay (sec/veh)	15.0	15.0	17.4	17.5				
Corresponding Minor Street Approach Volume (veh/hr)	254	254	284	284				
Minor Street Total Delay (veh-hrs)	1.1	1.1	1.4	1.4				
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds 4 vehicle-hours for a 1-lane approach and 5 vehicle-hours for a 2-lane approach; AND	No	No	No	No				
2. The volume on the same minor street approach equals or exceeds 100 vph for 1 moving lane of traffic or 150 vph for 2 moving lanes; AND	Yes	Yes	Yes	Yes				
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with 4 or more approaches or 650 vph for intersections with 3 approaches.	Yes	Yes	Yes	Yes				
Signal Warranted based on Part A?	**No**	**No**	**No**	**No**				

PART B

AM PEAK PERIOD

		Approach Lanes: One	Approach Lanes: 2 or More	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0:00	0:00		
Major Street - Both Approaches	Soquel Avenue	X		513	516	575	578	0	0		
Minor Street - Highest Approach	Chanticleer Avenue	X		254	254	284	284	0	0		
Signal Warranted based on Part B?				**No**	**No**	**No**	**No**	**0**	**No**		

The Warrant is satisfied if the plotted point for vehicles per hour on the major street (both approaches) and the corresponding per hour higher vehicle volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) fall above the applicable curves in California MUTCD Figure 4C-3 or 4C-4.

Source: California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD 2010 Edition, as amended for use in California).
Notes:

Mattison Lane Residential

TRAFFIC SIGNAL WARRANTS WORKSHEET

Analyst: JW date: 9/15/22

Major Street: Soquel Avenue — Critical Approach Speed* (mph) 35

Minor Street: Chanticleer Avenue — Critical Approach Speed* (mph) 25

*Posted Speed.

Critical speed of major street traffic > 50 mph (64 km/h)…… ☑ or ☐ **Rural (R)**

In built up area of isolated community of < 10,000 population…… ☐ **Urban (U)**

PM PEAK HOUR

Warrant 3 - Peak Hour

PART A

(All parts 1, 2, and 3 below must be satisfied)

	PM PEAK HOUR							
	Existing	Existing + Proj	Cum No Proj	Cum + Proj				
Minor Street Approach Direction w/ Highest Delay	NB	NB	NB	NB				
Highest Minor Street Average Delay (sec/veh)	20.8	21.0	35.5	35.5				
Corresponding Minor Street Approach Volume (veh/hr)	122	122	150	150				
Minor Street Total Delay (veh-hrs)	0.7	0.7	1.5	1.5				
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds 4 vehicle-hours for a 1-lane approach and 5 vehicle-hours for a 2-lane approach; AND	No	No	No	No				
2. The volume on the same minor street approach equals or exceeds 100 vph for 1 moving lane of traffic or 150 vph for 2 moving lanes; AND	Yes	Yes	Yes	Yes				
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with 4 or more approaches or 650 vph for intersections with 3 approaches.	Yes	Yes	Yes	Yes				
Signal Warranted based on Part A?	**No**	**No**	**No**	**No**				

PART B

		Approach Lanes		PM PEAK HOUR							
		One	2 or More	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0:00	0:00	0:00	
Major Street - Both Approaches	Soquel Avenue	X		908	911	1117	1120	0	0	0	
Minor Street - Highest Approach	Chanticleer Avenue	X		122	122	150	150	0	0	0	
Signal Warranted based on Part B?				**No**	**No**	**No**	**No**	**0**	**0**	**0**	

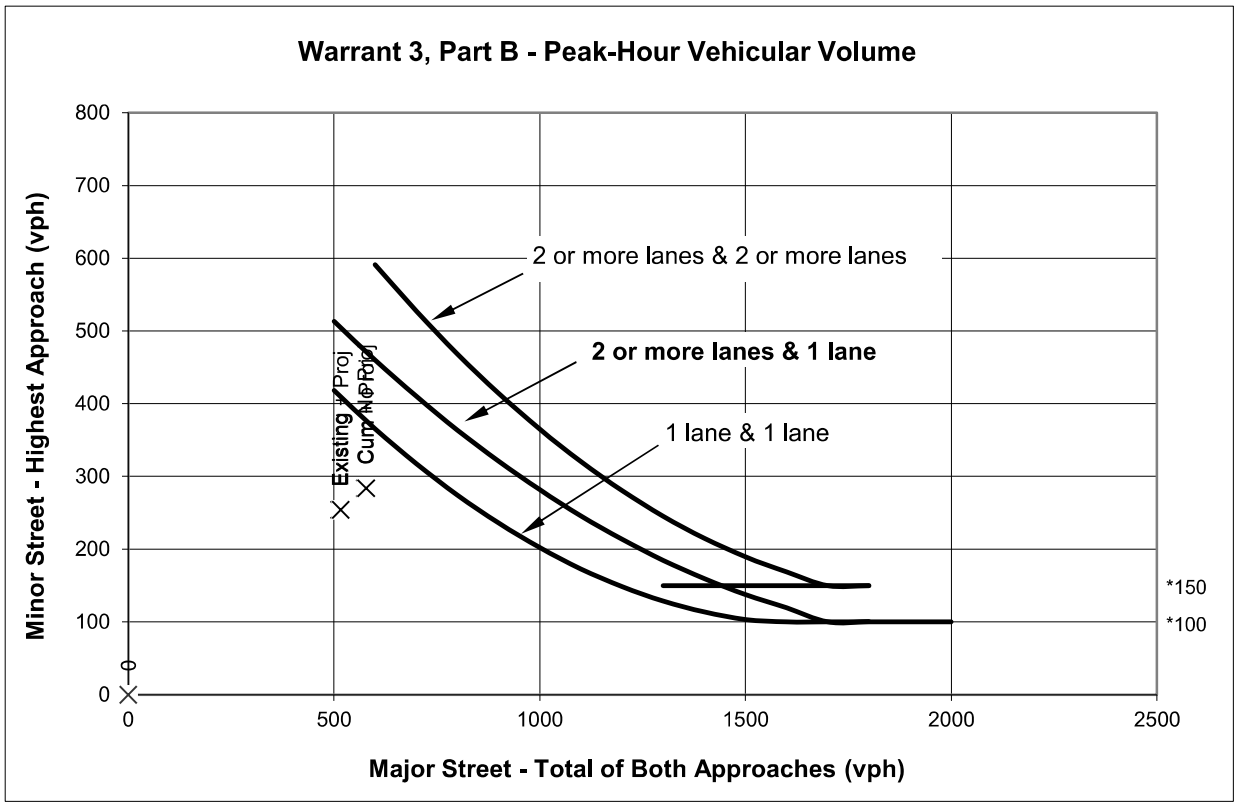
The Warrant is satisfied if the plotted point for vehicles per hour on the major street (both approaches) and the corresponding per hour higher vehicle volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) fall above the applicable curves in California MUTCD Figure 4C-3 or 4C-4.

Source: California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD 2010 Edition, as amended for use in California).

Notes:

Mattison Lane Residential

Chanticleer Avenue And Soquel Avenue **AM PEAK PERIOD**



Source: Figure 4C-3 *California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD 2010 Edition, as amended for use in California)* .

* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

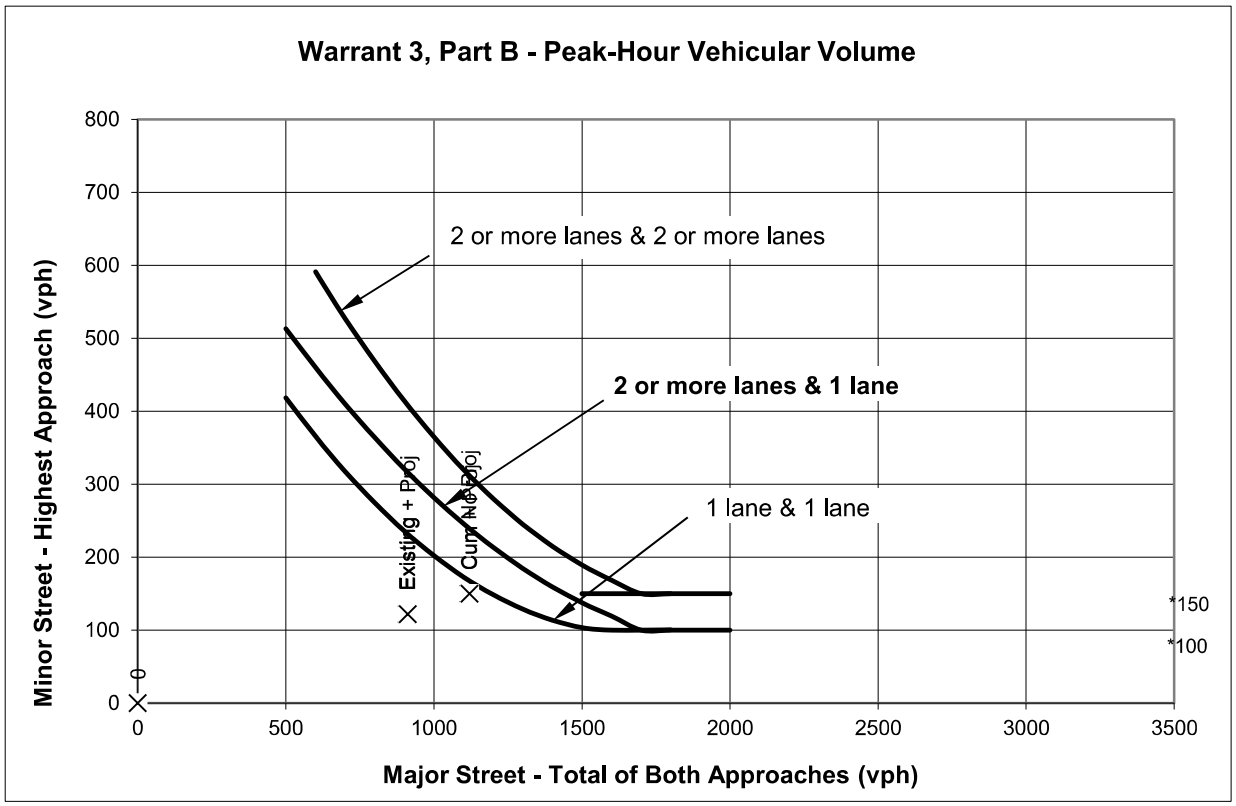
Warrant 3, Part B - Peak-Hour Vehicular Volume

		Approach Lanes		AM PEAK PERIOD							
		One	2 or More	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0	0	0	
Major Street - Both Approaches	Soquel Avenue	X		513	516	575	578	0	0	0	
Minor Street - Highest Approach	Chanticleer Avenue	X		254	254	284	284	0	0	0	
Signal Warranted Based on Part B - Peak-Hour Volumes?				**No**	**No**	**No**	**No**				

*Warrant is satisfied if plotted points fall above the appropriate curve in graph above.

Mattison Lane Residential

Chanticleer Avenue And Soquel Avenue **PM PEAK HOUR**



Source: Figure 4C-3 *California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD 2010 Edition, as amended for use in California)* .

* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Warrant 3, Part B - Peak-Hour Vehicular Volume

		Approach Lanes		PM PEAK HOUR							
		One	2 or More	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0	0		
Major Street - Both Approaches	Soquel Avenue	X		908	911	1117	1120	0	0		
Minor Street - Highest Approach	Chanticleer Avenue	X		122	122	150	150	0	0		
Signal Warranted Based on Part B - Peak-Hour Volumes?				**No**	**No**	**No**	**No**				

*Warrant is satisfied if plotted points fall above the appropriate curve in graph above.

Mattison Lane Residential

TRAFFIC SIGNAL WARRANTS WORKSHEET

Analyst: JW date: 9/15/22

Major Street: Chanticleer Avenue — Critical Approach Speed* (mph) 25

Minor Street: Mattison Lane — Critical Approach Speed* (mph) 25

**Posted Speed.*

Critical speed of major street traffic > 50 mph (64 km/h)………………………. ☑ or Rural (R)

In built up area of isolated community of < 10,000 population……………………. ☐

☐ Urban (U)

AM PEAK PERIOD

Warrant 3 - Peak Hour

PART A

(All parts 1, 2, and 3 below must be satisfied)

AM PEAK PERIOD

	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0:00	0:00	0:00	
Minor Street Approach Direction w/ Highest Delay	WB	WB	WB	WB				
Highest Minor Street Average Delay (sec/veh)	11.6	11.7	12.3	12.3				
Corresponding Minor Street Approach Volume (veh/hr)	73	74	81	82				
Minor Street Total Delay (veh-hrs)	0.2	0.2	0.3	0.3				
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds 4 vehicle-hours for a 1-lane approach and 5 vehicle-hours for a 2-lane approach; AND	No	No	No	No				
2. The volume on the same minor street approach equals or exceeds 100 vph for 1 moving lane of traffic or 150 vph for 2 moving lanes; AND	No	No	No	No				
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with 4 or more approaches or 650 vph for intersections with 3 approaches.	No	No	Yes	Yes				
Signal Warranted based on Part A?	**No**	**No**	**No**	**No**				

PART B

AM PEAK PERIOD

		Approach Lanes: One	Approach Lanes: 2 or More	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0:00	0:00		
Major Street - Both Approaches	Chanticleer Avenue	X		510	510	571	571	0	0		
Minor Street - Highest Approach	Mattison Lane	X		73	74	81	82	0	0		
Signal Warranted based on Part B?				**No**	**No**	**No**	**No**	**0**	**No**		

The Warrant is satisfied if the plotted point for vehicles per hour on the major street (both approaches) and the corresponding per hour higher vehicle volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) fall above the applicable curves in California MUTCD Figure 4C-3 or 4C-4.

Source: California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD 2010 Edition, as amended for use in California).

Notes:

Mattison Lane Residential

TRAFFIC SIGNAL WARRANTS WORKSHEET

Analyst: JW date: 9/15/22

Major Street: Chanticleer Avenue — Critical Approach Speed* (mph) 25

Minor Street: Mattison Lane — Critical Approach Speed* (mph) 25

**Posted Speed.*

Critical speed of major street traffic > 50 mph (64 km/h)…… ☑ or ☐ **Rural (R)**

In built up area of isolated community of < 10,000 population…… ☐ **Urban (U)**

PM PEAK HOUR

Warrant 3 - Peak Hour

PART A

(All parts 1, 2, and 3 below must be satisfied)

PM PEAK HOUR

	Existing	Existing + Proj	Cum No Proj	Cum + Proj				
Minor Street Approach Direction w/ Highest Delay	WB	WB	WB	WB				
Highest Minor Street Average Delay (sec/veh)	13.1	13.2	15.5	15.6				
Corresponding Minor Street Approach Volume (veh/hr)	46	47	56	57				
Minor Street Total Delay (veh-hrs)	0.2	0.2	0.2	0.2				
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds 4 vehicle-hours for a 1-lane approach and 5 vehicle-hours for a 2-lane approach; AND	No	No	No	No				
2. The volume on the same minor street approach equals or exceeds 100 vph for 1 moving lane of traffic or 150 vph for 2 moving lanes; AND	No	No	No	No				
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with 4 or more approaches or 650 vph for intersections with 3 approaches.	No	No	Yes	Yes				
Signal Warranted based on Part A?	**No**	**No**	**No**	**No**				

PART B

PM PEAK HOUR

		Approach Lanes: One	Approach Lanes: 2 or More	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0:00	0:00	0:00	
Major Street - Both Approaches	Chanticleer Avenue	X		579	580	712	713	0	0	0	
Minor Street - Highest Approach	Mattison Lane	X		46	47	56	57	0	0	0	
Signal Warranted based on Part B?				**No**	**No**	**No**	**No**	**0**	**0**	**0**	

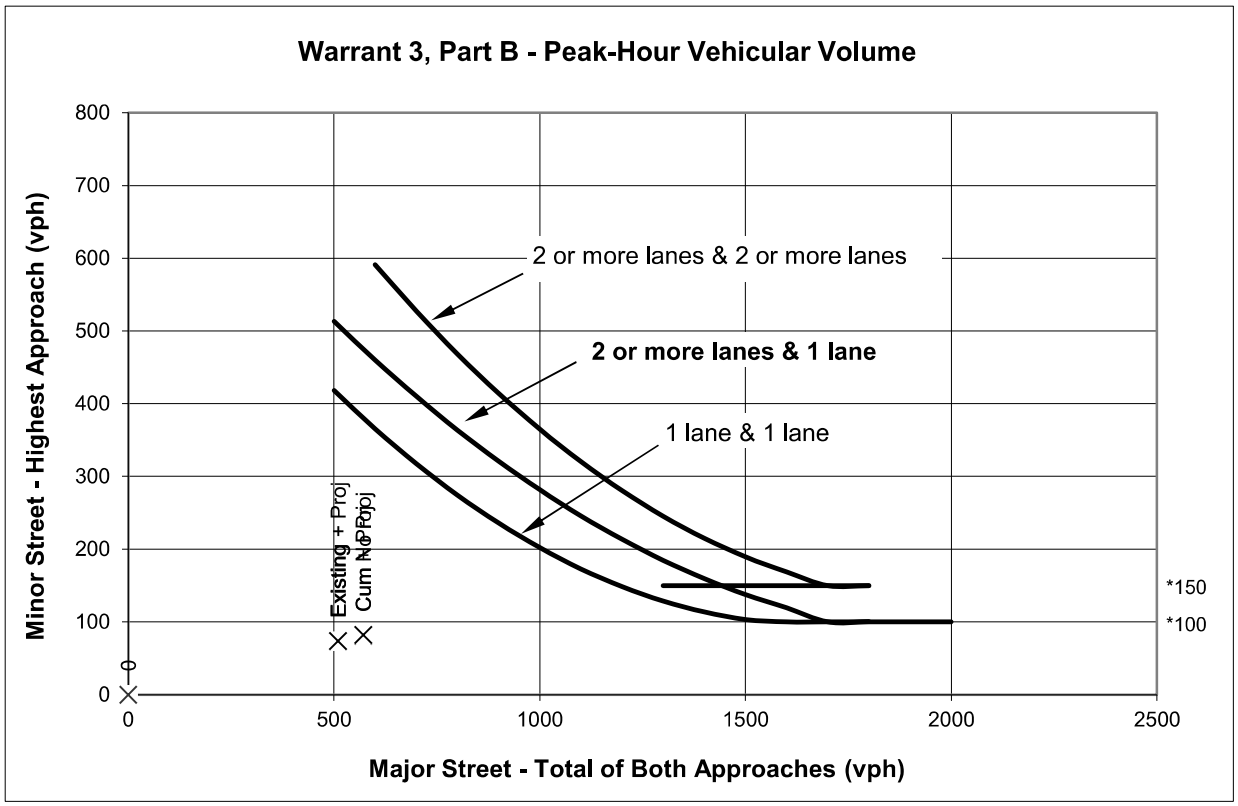
The Warrant is satisfied if the plotted point for vehicles per hour on the major street (both approaches) and the corresponding per hour higher vehicle volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) fall above the applicable curves in California MUTCD Figure 4C-3 or 4C-4.

Source: California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD 2010 Edition, as amended for use in California).

Notes:

Mattison Lane Residential

Chanticleer Avenue And Mattison Lane **AM PEAK PERIOD**



Source: Figure 4C-3 *California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD 2010 Edition, as amended for use in California)* .

* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

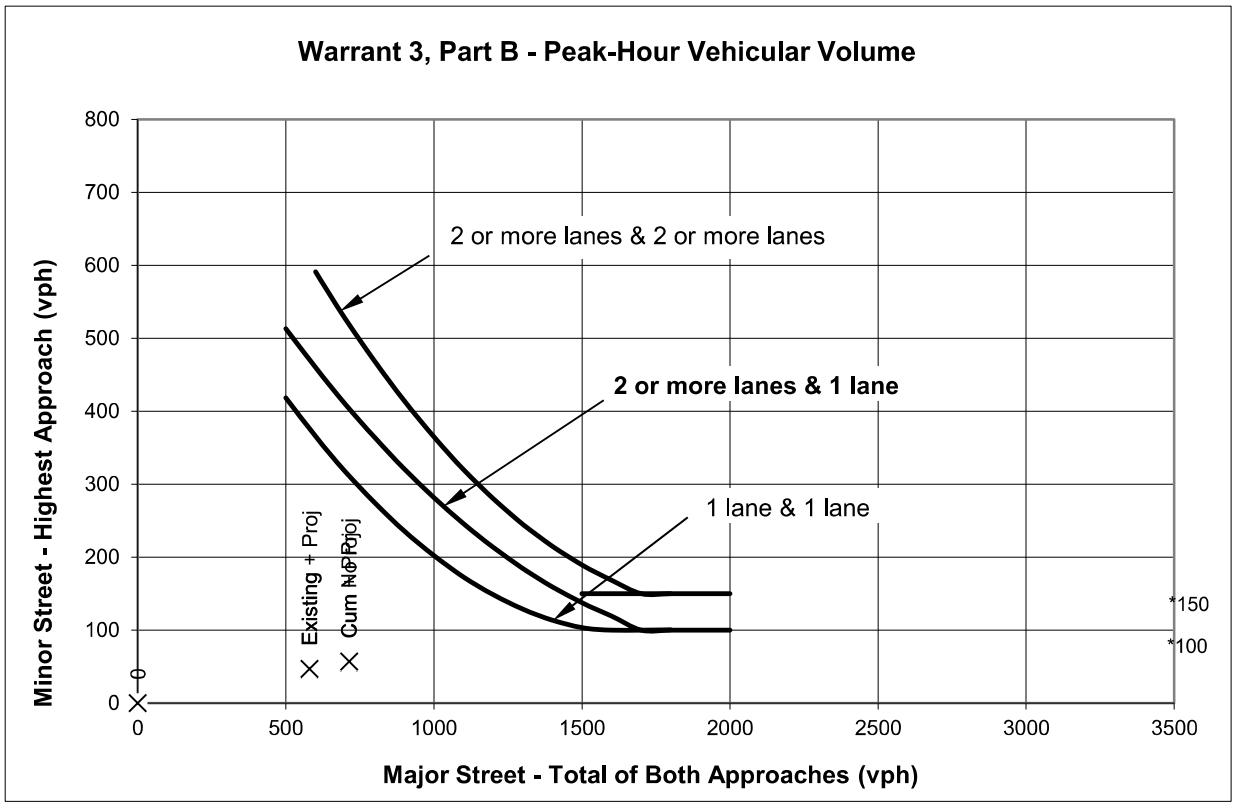
Warrant 3, Part B - Peak-Hour Vehicular Volume

		Approach Lanes		AM PEAK PERIOD							
		One	2 or More	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0	0	0	
Major Street - Both Approaches	Chanticleer Avenue	X		510	510	571	571	0	0	0	
Minor Street - Highest Approach	Mattison Lane	X		73	74	81	82	0	0	0	
Signal Warranted Based on Part B - Peak-Hour Volumes?				**No**	**No**	**No**	**No**				

*Warrant is satisfied if plotted points fall above the appropriate curve in graph above.

Mattison Lane Residential

Chanticleer Avenue And Mattison Lane **PM PEAK HOUR**



Source: Figure 4C-3 *California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD 2010 Edition, as amended for use in California)* .

* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Warrant 3, Part B - Peak-Hour Vehicular Volume

		PM PEAK HOUR									
		Approach Lanes		Existing	Existing + Proj	Cum No Proj	Cum + Proj	0	0		
		One	2 or More								
Major Street - Both Approaches	Chanticleer Avenue	X		579	580	712	713	0	0		
Minor Street - Highest Approach	Mattison Lane	X		46	47	56	57	0	0		
Signal Warranted Based on Part B - Peak-Hour Volumes?				**No**	**No**	**No**	**No**				

*Warrant is satisfied if plotted points fall above the appropriate curve in graph above.

Mattison Lane Residential

TRAFFIC SIGNAL WARRANTS WORKSHEET

Analyst: JW date: 9/15/22

Major Street: Capitola Road Critical Approach Speed* (mph) 30

Minor Street: Maciel Avenue Critical Approach Speed* (mph) 25

*Posted Speed.

Critical speed of major street traffic > 50 mph (64 km/h)………………………… ☑ or
In built up area of isolated community of < 10,000 population………………………… ☐ } **Rural (R)**

☐ **Urban (U)**

AM PEAK PERIOD

Warrant 3 - Peak Hour

PART A
(All parts 1, 2, and 3 below must be satisfied)

AM PEAK PERIOD

	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0:00	0:00	0:00	
Minor Street Approach Direction w/ Highest Delay	SB	SB	SB	SB				
Highest Minor Street Average Delay (sec/veh)	24.3	24.5	30.5	30.9				
Corresponding Minor Street Approach Volume (veh/hr)	46	49	52	55				
Minor Street Total Delay (veh-hrs)	0.3	0.3	0.4	0.5				
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds 4 vehicle-hours for a 1-lane approach and 5 vehicle-hours for a 2-lane approach; AND	No	No	No	No				
2. The volume on the same minor street approach equals or exceeds 100 vph for 1 moving lane of traffic or 150 vph for 2 moving lanes; AND	No	No	No	No				
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with 4 or more approaches or 650 vph for intersections with 3 approaches.	Yes	Yes	Yes	Yes				
Signal Warranted based on Part A?	**No**	**No**	**No**	**No**				

PART B

AM PEAK PERIOD

		Approach Lanes: One	Approach Lanes: 2 or More	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0:00	0:00		
Major Street - Both Approaches	Capitola Road	X		982	983	1099	1100	0	0		
Minor Street - Highest Approach	Maciel Avenue	X		46	49	52	55	0	0		
Signal Warranted based on Part B?				**No**	**No**	**No**	**No**	**0**	**No**		

The Warrant is satisfied if the plotted point for vehicles per hour on the major street (both approaches) and the corresponding per hour higher vehicle volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) fall above the applicable curves in California MUTCD Figure 4C-3 or 4C-4.

Source: California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD 2010 Edition, as amended for use in California).

Notes:

Mattison Lane Residential

TRAFFIC SIGNAL WARRANTS WORKSHEET

Analyst: JW date: 9/15/22

Major Street: Capitola Road — Critical Approach Speed* (mph) 30

Minor Street: Maciel Avenue — Critical Approach Speed* (mph) 25

*Posted Speed.

Critical speed of major street traffic > 50 mph (64 km/h)…… ☑ or ☐ **Rural (R)**

In built up area of isolated community of < 10,000 population…… ☐ **Urban (U)**

PM PEAK HOUR

Warrant 3 - Peak Hour

PART A

(All parts 1, 2, and 3 below must be satisfied)

PM PEAK HOUR

	Existing	Existing + Proj	Cum No Proj	Cum + Proj				
Minor Street Approach Direction w/ Highest Delay	SB	SB	SB	SB				
Highest Minor Street Average Delay (sec/veh)	424.0	453.5	1746.6	1785.1				
Corresponding Minor Street Approach Volume (veh/hr)	78	80	96	98				
Minor Street Total Delay (veh-hrs)	9.2	10.1	46.6	48.6				
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds 4 vehicle-hours for a 1-lane approach and 5 vehicle-hours for a 2-lane approach; AND	Yes	Yes	Yes	Yes				
2. The volume on the same minor street approach equals or exceeds 100 vph for 1 moving lane of traffic or 150 vph for 2 moving lanes; AND	No	No	No	No				
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with 4 or more approaches or 650 vph for intersections with 3 approaches.	Yes	Yes	Yes	Yes				
Signal Warranted based on Part A?	**No**	**No**	**No**	**No**				

PART B

PM PEAK HOUR

		Approach Lanes: One	Approach Lanes: 2 or More	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0:00	0:00	0:00	
Major Street - Both Approaches	Capitola Road	X		1802	1805	2215	2218	0	0	0	
Minor Street - Highest Approach	Maciel Avenue	X		78	80	96	98	0	0	0	
Signal Warranted based on Part B?				**No**	**No**	**No**	**No**	**0**	**0**	**0**	

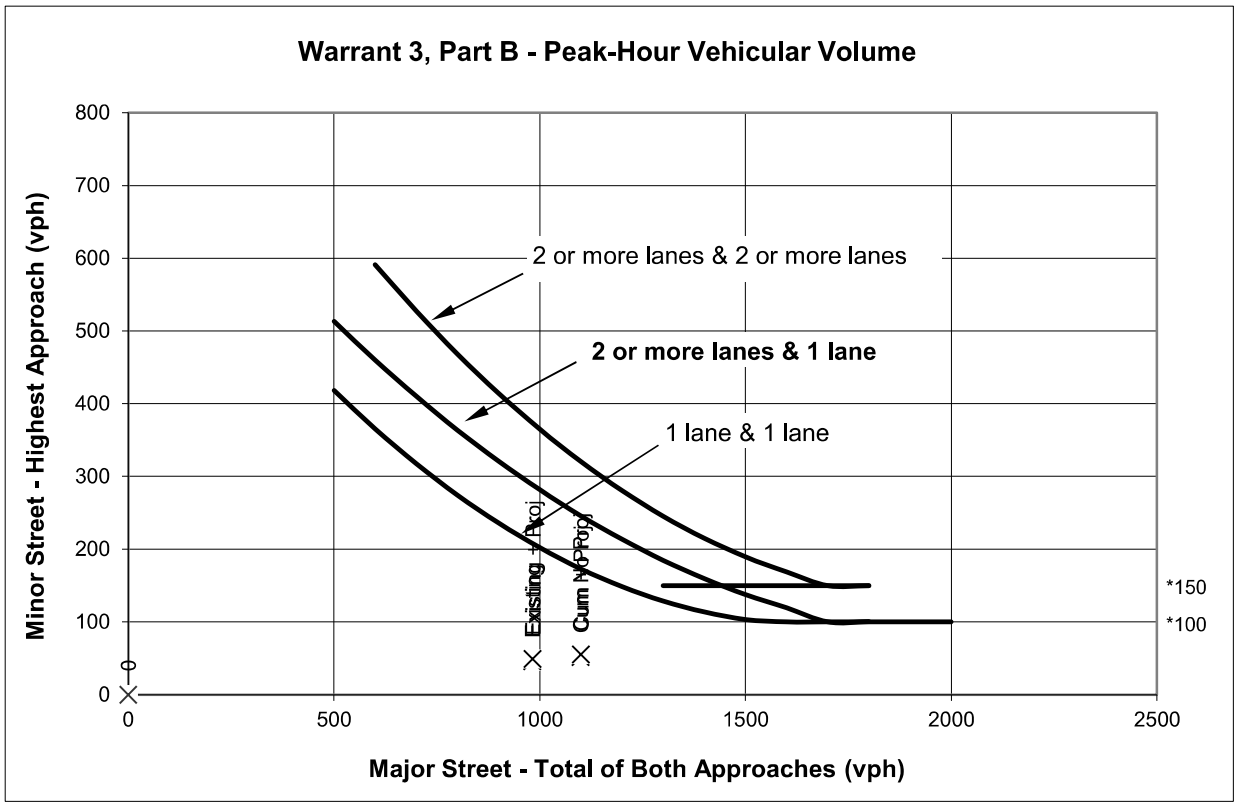
The Warrant is satisfied if the plotted point for vehicles per hour on the major street (both approaches) and the corresponding per hour higher vehicle volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) fall above the applicable curves in California MUTCD Figure 4C-3 or 4C-4.

Source: California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD 2010 Edition, as amended for use in California).

Notes:

Mattison Lane Residential

Maciel Avenue And Capitola Road **AM PEAK PERIOD**



Source: Figure 4C-3 *California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD 2010 Edition, as amended for use in California)* .

* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

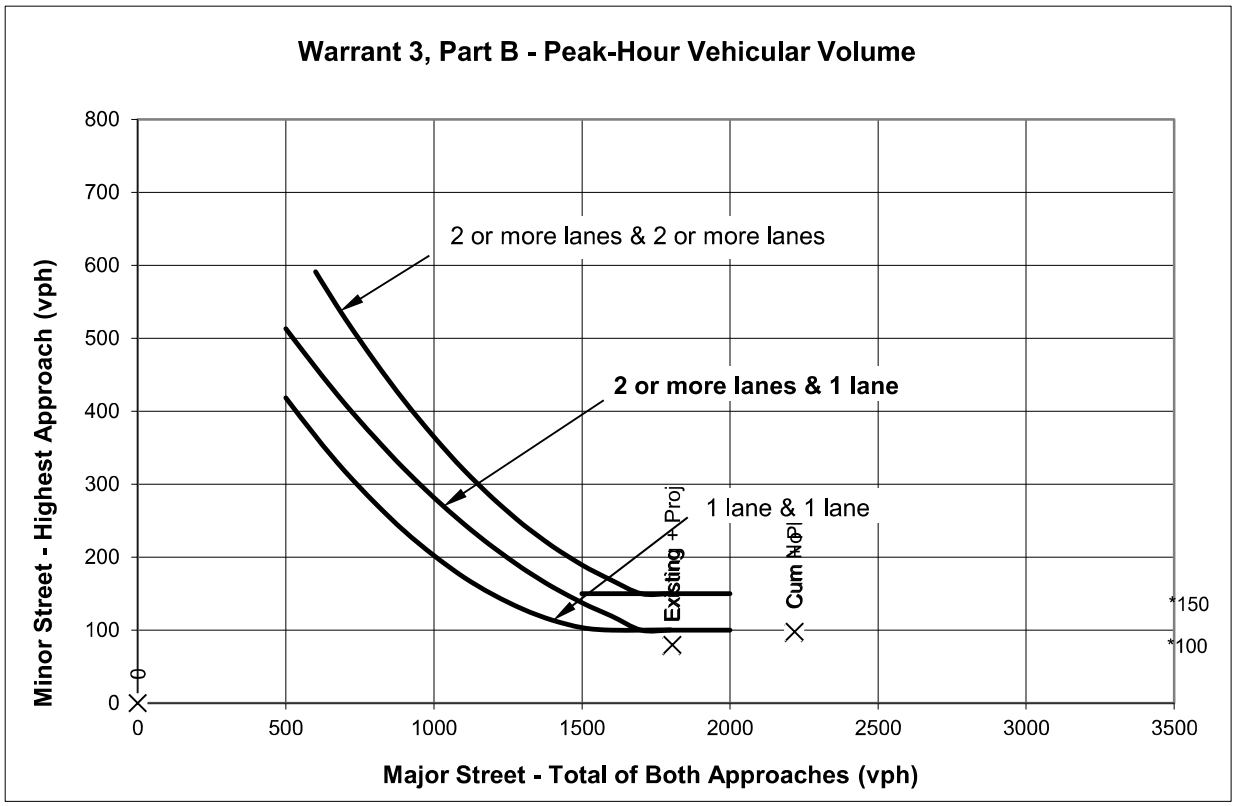
Warrant 3, Part B - Peak-Hour Vehicular Volume

		Approach Lanes		AM PEAK PERIOD							
		One	2 or More	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0	0	0	
Major Street - Both Approaches	Capitola Road	X		982	983	1099	1100	0	0	0	
Minor Street - Highest Approach	Maciel Avenue	X		46	49	52	55	0	0	0	
Signal Warranted Based on Part B - Peak-Hour Volumes?				**No**	**No**	**No**	**No**				

*Warrant is satisfied if plotted points fall above the appropriate curve in graph above.

Mattison Lane Residential

Maciel Avenue And Capitola Road **PM PEAK HOUR**



Source: Figure 4C-3 *California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA's MUTCD 2010 Edition, as amended for use in California)* .

* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Warrant 3, Part B - Peak-Hour Vehicular Volume

		Approach Lanes		PM PEAK HOUR							
		One	2 or More	Existing	Existing + Proj	Cum No Proj	Cum + Proj	0	0		
Major Street - Both Approaches	Capitola Road	X		1802	1805	2215	2218	0	0		
Minor Street - Highest Approach	Maciel Avenue	X		78	80	96	98	0	0		
Signal Warranted Based on Part B - Peak-Hour Volumes?				**No**	**No**	**No**	**No**				

*Warrant is satisfied if plotted points fall above the appropriate curve in graph above.

Preliminary
Stormwater Control Plan

For

Locatelli Subdivision

2444, 2450 and 2452 Mattison Lane
Santa Cruz, California
APNS: 029-391-01, 029-03902,
029-039-03, 029-061-19

Prepared By: David Draeger

Reviewed By: Richard Tso, RCE #60628

September, 2020
Revised: January, 2023

Job # 13001.01

IFLAND ENGINEERS
Civil Engineering ▪ Structural Design ▪ Land Development

5300 Soquel Avenue Suite 101
Santa Cruz, CA 95062
(831) 426-5313 FAX (831) 426-1763
www.iflandengineers.com

Table of Contents

Appendices

Existing Site Conditions

The existing site conditions are represented on C2.0 of the preliminary improvement plans. The project site has two dwellings, two greenhouses and miscellaneous out buildings. The development site is relatively level, gently sloping from the northwest to the southeast. The eastern portion of the property, which will remain undeveloped, slopes down to Rodeo Creek.

Upstream Runoff

The site does not receive upstream runoff.

Downstream Runoff

Runoff from the development site currently flows towards Rodeo Creek. With the construction of the proposed development and drainage improvements, drainage will be directed to Rodeo Creek via a new collection pipe network and outfall structure after passing through an array of bioretention/detention facilities with outlet control structures. See Appendix F for Downstream Analysis.

Minimizing Impervious Surfaces

Impervious surfaces are minimized through the combination of the following elements:

- Private road is narrower than County standards and the minimal width required for fire access.
- Certain units will have pervious decks rather than impervious patios.
- Minimal private impervious areas outside each unit.
- *Note: pervious pavements are not proposed due to infeasibility of on-site retention (see percolation study in Appendix E).*

On-Site Treatment and Detention

As noted in the Percolation Report by Dees and Associates (Appendix E), the percolation rates on the site are very poor. In addition, the soils report stipulates that any attempt at retention must take place at least 120 feet from the top of bank to Rodeo Gulch, forcing allowable retention sites to the westerly (higher elevation) portion of the site. However, the very low perc rates preclude any attempt at retention anywhere on the property.

Onsite retention of design storm volumes is infeasible as 48-hour drawdown is not achievable within the areas available and required for both treatment and detention of runoff from tributary impervious surfaces. Biofiltration facilities are proposed to be dispersed across the project area with a minimum size of 4% of the associated tributary impervious areas for stormwater quality treatment. In addition, each will feature a rock bed and outlet control structure to accommodate 10-year/15-minute design storm detention volumes. All detention volumes were calculated using County standard form SWM-17 (Appendix C). Biofiltration facilities outside the percolation limit will have open bottom(s) with 12" minimum rock below the sub-drain to promote percolation and minimize pollutants. Biofiltration facilities inside the percolation limit will have impermeable liners and as such cannot have 12" of rock below the sub-drain.

Operations and Maintenance Requirements

Prior to completion and issuance of the certificate of occupancy for this project, an Operation and Maintenance Agreement with the County of Santa Cruz shall be prepared. This agreement shall be recorded against the property with the County Recorder's Office, and it will be binding on all subsequent owners of property within the development site. This Maintenance Agreement shall remain in place for the life of the project.

The maintenance agreement will set forth a schedule of maintenance tasks, to be performed by the responsible party(ies), which are required for safe and efficient function of the onsite stormwater treatment and detention facilities. It will also specify procedures for yearly inspections and record keeping of inspections, maintenance and repairs performed. Refer to the County of Santa Cruz Design Criteria for more information regarding the Operation and Maintenance Agreement requirements.

Pollution Source	Applicable?	Source Control Measures
Accidental Spills or Leaks	N	- Owner/operator shall prepare a spill prevention plan to be located onsite - Tenants shall be trained on spill prevention and cleanup - Spill cleanup materials shall be located onsite
Interior Floor Drains	N	- All interior floor drains will be connected to sanitary sewer system
Parking/Storage Area Maintenance	Y	- Parking area shall be maintained per project O&M Manual and CASQA BMP Fact Sheets SC-43 Parking Area Maintenance & SC-74 Drainage System Maintenance
Indoor and Structural Pest Control	N	- Owner/operator shall incorporate integrated pest management practices into maintenance plan
Landscape/Outdoor Pesticide Use	Y	- Owner/operator shall incorporate integrated pest management practices into maintenance plan - Owner/operator shall minimize pesticide use onsite - Pesticides shall be applied with a handheld sprayer to minimize quantity used and spray drift - Pesticides shall not be applied prior to rain - Landscape areas shall be maintained per project O&M Manual and CASQA BMP Fact Sheets SC-41 Building Grounds & Maintenance & SC-73 Landscape Maintenance
Pools, Spas, Ponds, Decorative Fountains and Other Water Features	N	- No water features onsite
Restaurants, Grocery Stores, and Other Food Service Operations	N	- No food service operations onsite
Refuse Areas	N	- Refuse area will be covered and drained to sanitary sewer
Industrial Processes	N	- No industrial processes will occur onsite
Outdoor Storage of Equipment or Materials	N	- No outdoor storage of equipment or materials will occur onsite
Vehicle and Equipment Cleaning	Y	- No vehicle or equipment cleaning will occur onsite
Vehicle and Equipment Repair and Maintenance	Y	- No vehicle or equipment maintenance will occur onsite
Fuel Dispensing Areas	Y	- No vehicle or equipment fueling will occur onsite
Loading Docks	N	- No loading dock onsite

Fire Sprinkler Test Water	N	- Fire sprinkler test water shall not be released to the storm drain system - A fire sprinkler test drain will be installed and connected to the sanitary sewer system
Drain or Wash Water from Boiler Drain Lines, Condensate Drain Lines, Rooftop Equipment, Drainage Sumps and Other Sources	N	- Condensate lines will discharge to the sanitary sewer or landscape areas
Unauthorized Non-stormwater Discharges	Y	- Storm drains will be painted "NO DUMPING - DRAINS TO BAY. NO TIRE - DESECHO CORRE AL MAR"
Buildings and Ground Maintenance	Y	- Buildings and landscape shall be maintained per project O&M Manual and CASQA BMP Fact Sheets SD-20 Pervious Pavement, SC-41 Building Grounds & Maintenance, SC-43 Parking Area Maintenance, SC-73 Landscape Maintenance & SC-74 Drainage System Maintenance

Table 2 – Source Control Measures (CSCDC Part 3, Section C)

APPENDIX A
THRESHOLD FORM

Appendix A - Project Information & Threshold Determination Form

STORMWATER CONTROL PLAN (SWP) - Project Information & Threshold Determination Form

Completion of this form shall be used as guidance by the applicant

All projects shall maintain pre-development runoff rates & patterns

For any questions on this form, please contact DPW Stormwater Management at 831-454-2160.

PROJECT & CONTACT INFORMATION

MATTISON LANE, SANTA CRUZ	TBD
Project Street Address	*Building Permit No. / Discretionary Application*
CLAUDIO LOCATELLI	LOCATELLI SUBDIVISION
Property Owner's/Representative Name	*Project Name (Alias)*
029-391-01, 02, 03 & 029-061-19	LOCATELLI RENTALS LLC
Assesso's Parcel No. (APN)	*Property Owner's/Representative Firm*
RICH TSO	619 871 8885
Applicant's Name (i.e. design professional)	*Property Owner's/Representative Phone No.*
ZONE 5	IFLAN ENGINEERS INC.
Flood Control District (if applicable)	*Applicant's Firm Name*
Date: 1/6/2023	831 295 5197
	Applicant's Phone Number

PROJECT DESCRIPTION

Lot Coverage (measured in squire feet)	Actual (sq. ft)	Adjusted (sq. ft)*
A. Total lot size:	230512	
B. Existing Permitted Impervious Area:	23876	
C. Replaced permitted impervious Area:	23876	
D. Replaced permitted semi-impervious aera:	0	0
D. Proposed new self-treating area:	0	
E. Proposed new impervious area:	46506	
F. Proposed new semi-impervious area*:	0	0

if 70382 **is > than** 23876 **project shall be required to mitigate the entire site.**

Total replaced impervious & semi-pervious area: 23876 sq. ft.

Total proposed impervious & semi-pervious area: 46506 sq. ft.

Project Threshold Classification

- ☐ **Small Project** (less than 500 sq.ft. created and/or replaced) - Use Appendix B *'Small Project Submittal Requirements'* for submittal requirement guidance.
- ☐ **Medium Project** (500 sq.ft. but less than 5,000 sq.ft. created and/or replaced) - Use Appendix C *'Medium Project Submittal Requirements'* for submittal requirement guidance.
- ☑ **Large Project** (5,000 sq.ft. or more created and/or replaced OR 50% increase in permitted impervious area**) - Use Appendix D *'Large Project Submittal Requirements'* for submittal requirement guidance.

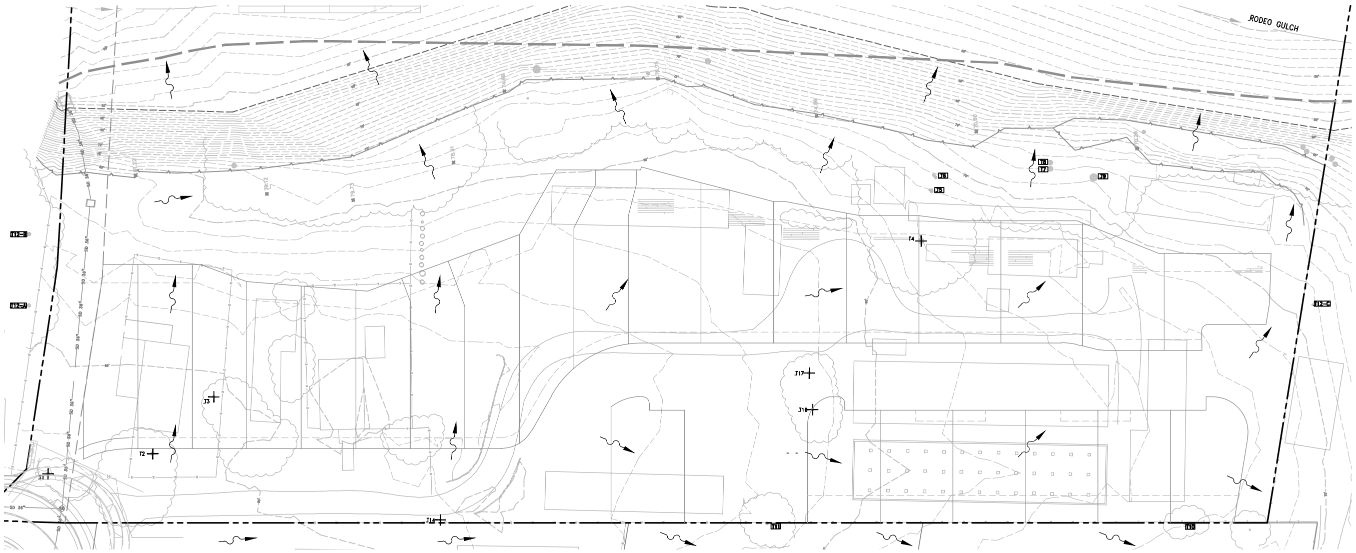
Application is part of a phased project OR master plan?	*Yes* ☑	*No* ☐
Application will maintain pre-development runoff patterns?	*Yes* ☑	*No* ☐
Application is unable to comply with Part 3 of the Design Criteria requirements & is electing to request a waiver(s) Please provide a brief description (below):	*Yes* ☐	*No* ☑

*Form will apply a 50% credit for semi-impervious areas as final count. Applicant shall not apply the credit.

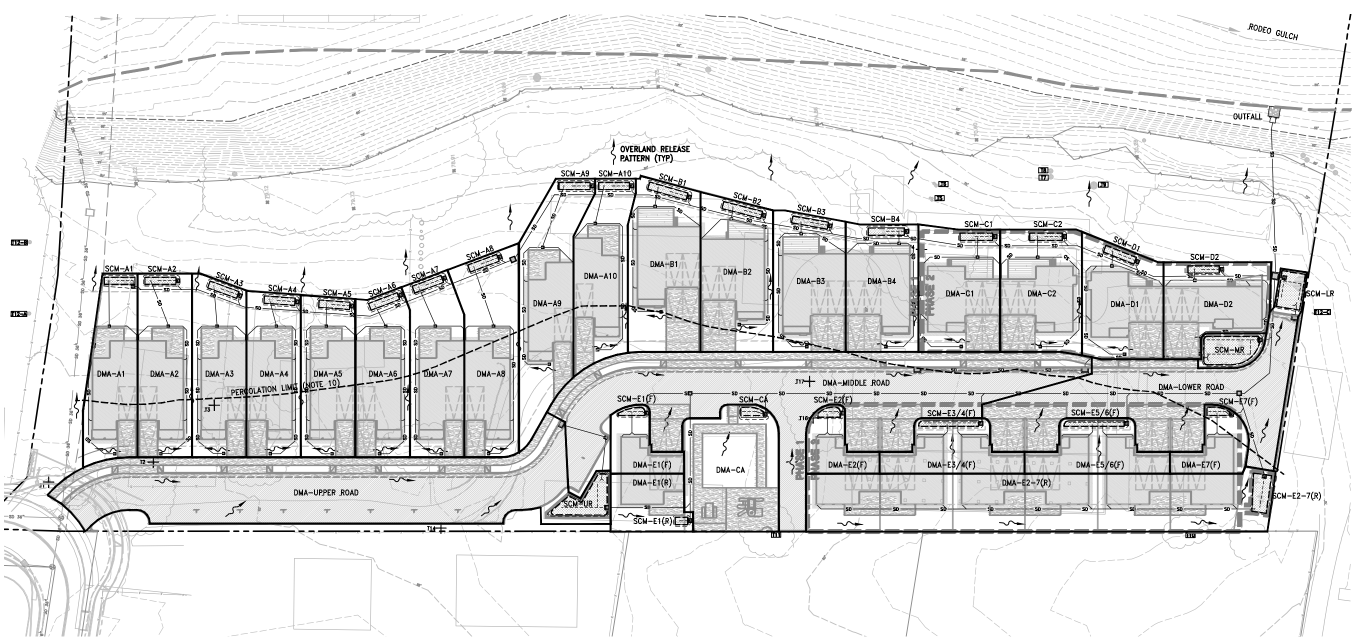
** Projects that add more than 50% impervious area coverage are required to mitigate the entire site.

***Disclaimer: Permit review is based the information provided, additional clarification may be required for undisclosed/unidentified areas. Unaccounted areas may reclassify the project threshold.

APPENDIX B
STORMWATER CONTROL PLAN



EXISTING DRAINAGE MAP



PROPOSED DRAINAGE MAP

NOTES

1. RUNOFF FROM UNIT ROOFS, DRIVEWAYS, AND PATIOS WILL BE MITIGATED VIA FRONT AND REAR YARD RAINGARDENS WITH BELOW GRADE DETENTION BEDS.
6. RUNOFF FROM THE UPPER ROAD (TO CURB INLET NEAR UNIT A8) WILL BE MITIGATED VIA A RAINGARDEN WITH BELOW GRADE DETENTION BED LOCATED IN BETWEEN THE ROAD AND UNIT E1.
7. RUNOFF FROM THE MIDDLE ROAD (FROM A8 TO D1) WILL BE MITIGATED VIA A RAINGARDEN WITH BELOW GRADE DETENTION LOCATED IN FRONT OF UNIT D2.
8. RUNOFF FROM THE LOWER ROAD (FROM D1 TO THE SOUTH) WILL BE MITIGATED VIA A RAINGARDEN WITH BELOW GRADE DETENTION LOCATED NEXT TO UNIT D2 (TO IT'S SOUTH).
9. ALL SITE RUNOFF WILL BE DISCHARGED TO RODEO GULCH THROUGH AN ENERGY DISSIPATING OUTFALL ASSEMBLY AS SHOWN HEREON.
10. PER SOILS REPORT: CONCENTRATED RUNOFF SHALL BE PERCOLATED AT LEAST 120 FEET FROM THE TOP OF RAVINE OR DISCHARGED AT THE BASE OF SLOPE. ALL SCM'S ON DOWN-SLOPE SIDE OF RETENTION LIMIT LINE TO HAVE IMPERMEABLE LINER (TYPE A) AND ALL SCM'S ON UP-SLOPE SIDE TO HAVE OPEN BOTTOM (TYPE B).

LEGEND

ROOF AREA

ASPHALT CONCRETE AREA

CONCRETE AREA

DMA BOUNDARY

SCM — STORMWATER CONTROL MEASURE, DTL 1, C6.1

OUTFALL — STORMWATER OUTFALL, DTL 2, C6.1

PROJECT IMPERVIOUS SURFACE TABULATION (SF)

UNIT - PHASE	ROOF	DRIVE/ROAD	PATIO/SIDEWALK	DECK (PERV.)
A1 - 1	1383	167	158	
A2 - 1	1383	166	158	
A3 - 1	1383	166	158	
A4 - 1	1383	166	158	
A5 - 1	1383	166	158	
A6 - 1	1383	166	158	
A7 - 1	1383	166	158	
A8 - 1	1383	166	158	
A9 - 1	1383	221	158	
A10 - 1	1383	234	158	
B1 - 1	1619	572		160
B2 - 1	1619	453		132
B3 - 1	1605	309		146
B4 - 1	1605	309		52
E1 - 1	1317	494	144	
COM. AREA - 1			1659	
UPPER RD. - 1		6669	2486	
MID. RD - 1		6793	2817	
PHASE 1 TOTAL	21601	17386	8683	490
C1 - 2	1400	310		140
C2 - 2	1400	471		140
D1 - 2	1400	496		29
D2 - 2	1437	324		45
E2 - 2	1269	471	144	
E3 - 2	1269	496	144	
E4 - 2	1269	500	144	
E5 - 2	1269	496	144	
E6 - 2	1269	500	144	
E7 - 2	1269	464	144	
LOW. RD - 2		3884	568	
PHASE 2 TOTAL	13252	8413	1432	354
PROJECT TOTAL	**34853**	**25798**	**10115**	**843**

THESE PRELIMINARY IMPERVIOUS SURFACE AREAS ARE ACTUAL BASED ON THE PRELIMINARY PROJECT SITE DESIGN LIFEWORK. IMPERVIOUS SURFACE AREAS AND ASSOCIATED MITIGATION WILL BE FINALIZED IN CONSTRUCTION DOCUMENT PHASE. THOSE FINAL NUMBERS WILL ALSO REPRESENT THE LIMIT OF ALLOWABLE IMPERVIOUS SURFACES.

DMA & SCM AREAS

DMA AREA	IMP. AREA	SCM AREA
DMA-A1	1624 SF	65 SF
DMA-A2	1624 SF	65 SF
DMA-A3	1624 SF	65 SF
DMA-A4	1624 SF	65 SF
DMA-A5	1624 SF	65 SF
DMA-A6	1624 SF	65 SF
DMA-A7	1624 SF	65 SF
DMA-A8	1624 SF	65 SF
DMA-A9	1692 SF	68 SF
DMA-A10	1692 SF	68 SF
DMA-B1	2191 SF	88 SF
DMA-B2	2191 SF	88 SF
DMA-B3	1914 SF	80 SF
DMA-B4	1914 SF	80 SF
DMA-C1	1710 SF	72 SF
DMA-C2	1710 SF	72 SF
DMA-D1	1711 SF	72 SF
DMA-D2	1761 SF	72 SF
DMA-E1(F)	657 SF	26 SF
DMA-E1(R)	804 SF	32 SF
DMA-E2(F)	633 SF	25 SF
DMA-E3/4(F)	1266 SF	98 SF
DMA-E5/6(F)	1266 SF	98 SF
DMA-E7(F)	633 SF	25 SF
DMA-E2/7(R)	4680 SF	187 SF
DMA-CA	1659 SF	66 SF
DMA-UR	9823 SF	393 SF
DMA-MR	11071 SF	443 SF
DMA-LR	6412 SF	260 SF
TOTALS	65557 SF	2912 SF

30' 0 15' 30' 60'
GRAPHIC SCALE: 1 INCH = 30 FEET

NOT FOR CONSTRUCTION

BY	REVISION	DATE

IFLAND ENGINEERS
CIVIL ENGINEERING ■ LAND PLANNING ■ STRUCTURAL DESIGN
5300 SOQUEL AVE, SUITE 101
SANTA CRUZ, CA 95062
TEL (831) 426-5313
FAX (831) 426-1763
www.iflandengineers.com

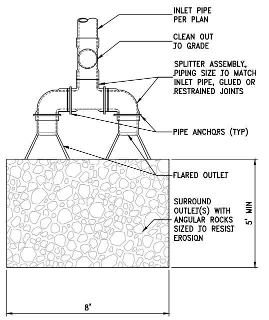
PRELIMINARY
STORMWATER CONTROL PLAN
LOCATELLI SUBDIVISION
MATTISON LANE, SANTA CRUZ COUNTY, CALIFORNIA

APN 029-391-01, 02, 03 & APN 029-061-19
DESIGN DEVELOPMENT PHASE

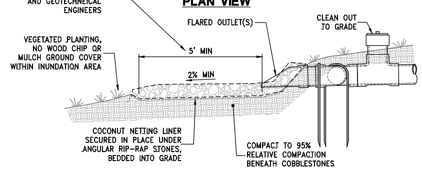
DATE	DESIGN	DRAWN
1/10/2023	DD	DD

SHEET C6.0
JOB NO. 13001.01

NOTE:
OUTFALL SHOWN HEREON REPRESENTS PRELIMINARILY DESIGN. FINAL DESIGN TO BE INCLUDED WITH BUILDING PERMIT SUBMITTAL SHALL INCLUDE INFORMATION NECESSARY TO DEMONSTRATE CONFORMANCE TO SANTA CRUZ COUNTY DESIGN CRITERIA SECTION J.5 (HEADWALLS, DOWN DRAINS, RIP-RAP AND/OR OTHER ADEQUATE CHANNEL SLOPE AND BOTTOM PROTECTION MEASURES SHALL BE REQUIRED AT THE INLET AND OUTLET OF ALL PROPOSED DRAINAGE FACILITIES THAT PRODUCE VELOCITIES GREATER THAN THOSE SHOWN IN SWM-19B FOR THE CORRESPONDING SOIL TYPE. EROSION PROTECTION FACILITIES SHALL BE INCORPORATED FOR THE DESIGN FLOOD OVERFLOW CONDITIONS WHERE REASONABLY POSSIBLE).



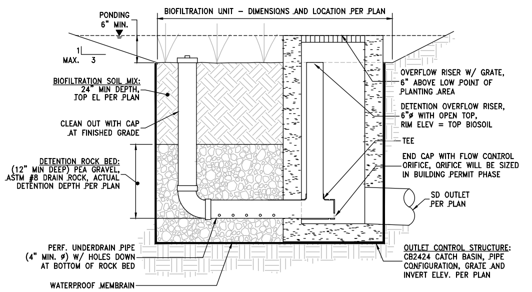
PLAN VIEW



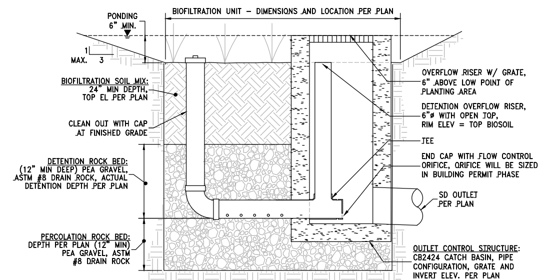
SIDE VIEW

STORMWATER OUTFALL
(NOT TO SCALE)

2



SCM TYPE A - BIOFILTRATION, DETENTION ROCK BED WITH IMPERMEABLE LINE & OUTLET CONTROL STRUCTURE



SCM TYPE B - BIOFILTRATION, DETENTION ROCK BED, 12" PERCOLATION ROCK BED & OUTLET CONTROL STRUCTURE

NOTES
1. RETENTION IS INFEASIBLE ON THIS SITE. ADDITIONALLY CONCENTRATED RUNOFF SHALL BE PERCOLATED AT LEAST 120 FEET FROM THE TOP OF RAVINE OR DISCHARGED AT THE BASE OF SLOPE (REFERENCE PROJECT SOILS REPORT AND PERCOLATION TEST RESULTS).
2. ALL SCM'S WITHIN THE 120' RETENTION LIMIT ARE DESIGNED FOR BIOFILTRATION AND DETENTION ONLY AND FEATURE AN IMPERMEABLE LINER (SCM TYPE A) SEE STORMWATER CONTROL PLAN (C6.0) FOR PERCOLATION LIMIT BOUNDARY.
3. ALL SCM'S OUTSIDE THE 120' PERCOLATION LIMIT ARE DESIGNED FOR BIOFILTRATION AND DETENTION ONLY BUT FEATURE OPEN BOTTOM AND 12" MINIMUM ROCK BED BELOW SUB-DRAIN PIPE PER COUNTY DESIGN CRITERIA (SCM TYPE B) SEE STORMWATER CONTROL PLAN (C6.0) FOR PERCOLATION LIMIT BOUNDARY.
4. SURFACE OF THE PLANTING BED SHALL BE RELATIVELY LEVEL BUT MAY HAVE A SLIGHT SLOPE TO DISTRIBUTE WATER THROUGHOUT SURFACE AREA.

UNDER DRAIN AND OVERFLOW
1. INSTALL WATERPROOFING MEMBRAIN AT SCM EDGES AND BOTTOM.
2. UNDER DRAIN SHALL CONSIST OF A MINIMUM 4" INCH DIAMETER PERFORATED PIPE WITH CLEANOUTS AND CONNECTION TO THE SCM'S OUTLET CONTROL STRUCTURE. PLACE UNDER DRAIN WITH PERFORATIONS FACING DOWNWARD. OUTLET CONTROL STRUCTURE'S FLOW CONTROL ORIFICE SIZE SHALL BE PROVIDED IN THE FINAL DRAINAGE REPORT.
3. THE UNDER DRAIN TRENCH SHALL INCLUDE A MINIMUM 12 INCH THICK LAYER OF PEA GRAVEL, ASTM #8 DRAIN ROCK. ACTUAL DEPTH OF ROCK BED SHALL BE AS INDICATED ON THE PLANS.
4. A CLEANOUT FOR THE UNDER DRAIN SHALL BE PROVIDED, CONSISTING OF A VERTICAL, RIGID, NON PERFORATED PVC PIPE, WITH A MINIMUM DIAMETER OF 4 INCHES AND A WATERTIGHT CAP FIT FLUSH WITH THE PLANTER BED SURFACE.
5. TO AVOID CLOGGING, FILTER FABRIC SHALL NOT BE USED IN OR AROUND THE THE UNDER DRAIN OR BETWEEN THE BIOTREATMENT SOIL MIX AND THE DRAIN ROCK. IF DESIRED.

SOIL REQUIREMENTS
1. PLANTING SOILS SHALL MEET THE BIOTREATMENT SOIL MIX SPECIFICATIONS APPROPRIATE FOR THE JURISDICTION. A MINIMUM INFILTRATION RATE OF 5 IN/HR AND A MAXIMUM INFILTRATION RATE OF 10 IN/HR ARE REQUIRED.

VEGETATION
1. PLANT SPECIES SELECTED SHALL BE SUITABLE FOR BIORETENTION AREA LOCATION, BIOTREATMENT SOILS AND OCCASIONAL INUNDATION.
2. VEGETATION SHOULD NOT BLOCK INFLOW, CREATE SAFETY ISSUES OR OBSTRUCT FACILITIES.
3. PLANTING SELECTIONS ARE SUBJECT TO THE LANDSCAPING REQUIREMENTS OF THE LOCAL JURISDICTION AND SHALL BE SELECTED BY A LICENSED LANDSCAPE ARCHITECT OR ARCHITECT.

CONSTRUCTION REQUIREMENTS
1. BIORETENTION AREAS ARE NOT INTENDED TO WORK AS CONSTRUCTION PHASE BMP'S. PROTECT THE AREA FROM CONSTRUCTION SITE RUNOFF; DIVERT RUNOFF FROM UNSTABILIZED AREAS AWAY FROM COMPLETED BIORETENTION AREAS.

MAINTENANCE
1. CONDUCT BIANNUAL EVALUATION OF THE HEALTH OF THE VEGETATION AND REMOVE AND REPLACE DEAD OR DYING PLANTS.
2. MAINTAIN VEGETATION AND THE IRRIGATION SYSTEM.
3. AVOID THE USE OF PESTICIDES AND QUICK RELEASE SYNTHETIC FERTILIZERS.
4. BEFORE THE WET SEASON BEGINS, VERIFY THAT THERE IS SUFFICIENT BIOTREATMENT SOIL MEDIA TO EFFECTIVELY FILTER STORMWATER. REMOVE ACCUMULATIONS OF SEDIMENT, LITTER AND DEBRIS AS NECESSARY.
5. PERIODICALLY CHECK DOWNSPOUTS, INLETS AND OVERFLOW PIPING. REMOVE DEBRIS AND REPAIR/REPLACE DAMAGED OR DISCONNECTED PIPES.

SCM - BIOFILTRATION UNIT
NTS

1

NOT FOR CONSTRUCTION

BY	REVISION	DATE

IFLAND ENGINEERS
6300 SOQUEL AVE, SUITE 101
SANTA CRUZ, CA 95062
TEL (831) 426-5313
FAX (831) 426-1763
www.iflandengineers.com
CIVIL ENGINEERING ■ LAND PLANNING ■ STRUCTURAL DESIGN

PRELIMINARY
STORMWATER DETAILS
LOCATELLI SUBDIVISION
MATTISON LANE, SANTA CRUZ COUNTY, CALIFORNIA

APN 029-391-01, 02, 03
& APN 029-061-19
DESIGN DEVELOPMENT PHASE

DATE	DESIGN	DRAWN
1/10/2023	DD	DD

SHEET C6.1

JOB NO. 13001.01

APPENDIX C
CALCULATIONS

STORMWATER MITIGATION SUMMARY

IFLAND ENGINEERS INC.

LOCATELLI SUDIVISION — 1/6/2023

APN 029-061-19 — BY: DD

all rates and volumes shown obtained from project detention sizing spreadsheet(s) (SWM-17).

DMA-A1 thru A8 (ea) (8)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf)		0	1293	1293
PATIO (sf)		0	158	158
DRIVEWAY (sf) (max)		0	173	173
AREA TO TREAT (sf)		0	1624	1624
MIN BIORETENTION AREA (sf) (4%)	(4x17)			65
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.4
QPRE 10 RELEASE RATE (cfs)				0.02
QPOST 25 RELEASE RATE (cfs)				0.094

DMA-A9 & A10 (ea) (2)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf)		0	1293	1293
PATIO (sf)		0	158	158
DRIVEWAY (sf) (max)		0	241	241
AREA TO TREAT (sf)		0	1692	1692
MIN BIORETENTION AREA (sf) (4%)	(4x17)			68
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.40
QPRE 10 RELEASE RATE (cfs)				0.02
QPOST 25 RELEASE RATE (cfs)				0.098

DMA-B1 & B2 (ea) (2)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf)		0	1619	1619
PATIO (sf)		0	0	0
DRIVEWAY (sf) (max)		0	572	572
AREA TO TREAT (sf)		0	2191	2191
MIN BIORETENTION AREA (sf) (4%)	(4x22)			88
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.4
QPRE 10 RELEASE RATE (cfs)				0.026
QPOST 25 RELEASE RATE (cfs)				0.127

DMA-B3 & B4 (ea) (2)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf)		0	1605	1605
PATIO (sf) (max)		0	0	0
DRIVEWAY (sf) (max)		0	309	309
AREA TO TREAT (sf)		0	1914	1914
MIN BIORETENTION AREA (sf) (4%)	(4x20)			77
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.30
QPRE 10 RELEASE RATE (cfs)				0.023
QPOST 25 RELEASE RATE (cfs)				0.133

DMA-C1 & C2 (ea) (2)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf) (max)		0	1400	1400
PATIO (sf) (max)		0	0	0
DRIVEWAY (sf) (max)		0	310	310
AREA TO TREAT (sf)		0	1710	1710
MIN BIORETENTION AREA (sf) (4%)	(4x18)			68
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.40
QPRE 10 RELEASE RATE (cfs)				0.021
QPOST 25 RELEASE RATE (cfs)				0.119

DMA-D1		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf) (max)		0	1400	1400
PATIO (sf) (max)		0	0	0
DRIVEWAY (sf) (max)		0	311	311
AREA TO TREAT (sf)		0	1711	1711
MIN BIORETENTION AREA (sf) (4%)	(4x18)			68
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.30
QPRE 10 RELEASE RATE (cfs)				0.021
QPOST 25 RELEASE RATE (cfs)				0.119

DMA-D2		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf) (max)		0	1437	1437
PATIO (sf) (max)		0	0	0
DRIVEWAY (sf) (max)		0	324	324
AREA TO TREAT (sf)		0	1761	1761
MIN BIORETENTION AREA (sf) (4%)	(4x18)			70
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.30
QPRE 10 RELEASE RATE (cfs)				0.021
QPOST 25 RELEASE RATE (cfs)				0.102

DMA-E1(F)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf)		0	657	657
PATIO(S) (2) (sf)		0	0	0
DRIVEWAY (sf) (max)		0	0	0
AREA TO TREAT (sf)		0	657	657
MIN BIORETENTION AREA (sf) (4%)	(3x9)			26
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.00
QPRE 10 RELEASE RATE (cfs)				0.008
QPOST 25 RELEASE RATE (cfs)				0.046

DMA-E1(R)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf)		0	660	660
PATIO(S) (2) (sf)		0	144	144
DRIVEWAY (sf) (max)		0	0	0
AREA TO TREAT (sf)		0	804	804
MIN BIORETENTION AREA (sf) (4%)	(4x8)			32
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.40
QPRE 10 RELEASE RATE (cfs)				0.01
QPOST 25 RELEASE RATE (cfs)				0.047

DMA-E2(F) & E7(F) (ea) (2)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf)		0	633	633
PATIO(S) (2) (sf)		0	0	0
DRIVEWAY (sf) (max)		0	0	0
AREA TO TREAT (sf)		0	633	633
MIN BIORETENTION AREA (sf) (4%)	(2.5x10)			25
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.5
QPRE 10 RELEASE RATE (cfs)				0.008
QPOST 25 RELEASE RATE (cfs)				0.037

DMA-E3/4(F) & E5/6(F) (ea) (2)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf)		0	1266	1266
PATIO(S) (2) (sf)		0	0	0
DRIVEWAY (sf) (max)		0	0	0
AREA TO TREAT (sf)		0	1266	1266
MIN BIORETENTION AREA (sf) (4%)	(2.5x20)			51
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.0
QPRE 10 RELEASE RATE (cfs)				0.015
QPOST 25 RELEASE RATE (cfs)				0.088

DMA-E2/7(R)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf)		0	3816	3816
PATIO(S) (2) (sf)		0	864	864
DRIVEWAY (sf) (max)		0	0	0
AREA TO TREAT (sf)		0	4680	4680
MIN BIORETENTION AREA (sf) (4%)	(10x20)			187
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.30
QPRE 10 RELEASE RATE (cfs)				0.057
QPOST 25 RELEASE RATE (cfs)				0.326

DMA-CA (common area)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
BUILDING (sf) (max)		0	0	0
SIDEWALK		0	1659	1659
ROADWAY		0	0	0
AREA TO TREAT (sf)		0	1659	1659
MIN BIORETENTION AREA (sf) (4%)	(5x13)			66
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.3
QPRE 10 RELEASE RATE (cfs)				0.017
QPOST 25 RELEASE RATE (cfs)				0.08

DMA-UR (upper road)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
DRIVEWAY(S)		0	668	668
GUTTER, SIDEWALK, APRON(S)		0	2486	2486
ROADWAY		0	6669	6669
AREA TO TREAT (sf)		0	9823	9823
MIN BIORETENTION AREA (sf) (4%)	(10x40)			393
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.40
QPRE 10 RELEASE RATE (cfs)				0.119
QPOST 25 RELEASE RATE (cfs)				0.684

DMA-MR (middle road)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
DRIVEWAY(S)		0	1461	1461
GUTTER, SIDEWALK, APRON(S)		0	2817	2817
ROADWAY		0	6793	6793
AREA TO TREAT (sf)		0	11071	11071
MIN BIORETENTION AREA (sf) (4%)	(30x15)			443
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.40
QPRE 10 RELEASE RATE (cfs)				0.134
QPOST 25 RELEASE RATE (cfs)				0.771

DMA-LR (lower road)		SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
DRIVEWAY(S)		0	1960	1960
GUTTER, SIDEWALK, APRON(S)		0	568	568
ROADWAY		0	3884	3884
AREA TO TREAT (sf)		0	6412	6412
MIN BIORETENTION AREA (sf) (4%)	(21x12)			256
DETENTION DEPTH (SWM17 RESULTS) (ft)				2.40
QPRE 10 RELEASE RATE (cfs)				0.077
QPOST 25 RELEASE RATE (cfs)				0.447

PROJECT SUMMARY	QTY	SEMI-PERV	IMPERVIOS	TOTAL IMPERVIOUS
DMA-A1 thru A8 (ea) (8)	8	0	1624	12992
DMA-A9 & A10 (ea) (2)	2	0	1692	3384
DMA-B1 & B2 (ea) (2)	2	0	2191	4382
DMA-B3 & B4 (ea) (2)	2	0	1914	3828
DMA-C1 & C2 (ea) (2)	2	0	1710	3420
DMA-D1	1	0	1711	1711
DMA-D2	1	0	1761	1761
DMA-E1(F)	1	0	657	657
DMA-E1(R)	1	0	804	804
DMA-E2(F) & E7(F) (ea) (2)	2	0	633	1266
DMA-E3/4(F) & E5/6(F) (ea) (2)	2	0	1266	2532
DMA-E2/7(R)	1	0	4680	4680
DMA-CA (common area)	1	0	1659	1659
DMA-UR (upper road)	1	0	9823	9823
DMA-MR (middle road)	1	0	11071	11071
DMA-LR (lower road)	1	0	6412	6412
PROJECT TOTAL IMPERVIOUS				70382
PROJECT TOTAL MIN BIORETENTION AREA (sf) (4%)				2815
PROJECT TOTAL QPRE 10 RELEASE RATE (cfs)				0.85
PROJECT TOTAL QPOST 25 RELEASE RATE (cfs)				3.807

COLLECTION MAINS QPOST 25 YR. FLOW RATE

all rates shown obtained from project detention sizing spreadsheet(s) (SWM-17).

EASTERN COLLECTION MAIN	NODE	RATE (cfs)	CAPACITY (cfs)
6" @ 1% (min)	DMA-A1 thru A8 (ea) (8)	0.752	0.871
8" @ 1% (min)	DMA-A9 & A10 (ea) (2)	1.006	1.856
8" @ 1% (min)	DMA-B1 & B2 (ea) (2)	1.260	1.856
8" @ 1% (min)	DMA-B3 & B4 (ea) (2)	1.526	1.856
8" @ 1% (min)	DMA-C1 & C2 (ea) (2)	1.764	1.856
8" @ 2% (min)	DMA-D1	1.883	2.700
8" @ 2% (min)	DMA-D2	1.985	2.700
			OK

ROADWAY COLLECTION MAIN	NODE	RATE (cfs)	CAPACITY (cfs)
12" @ 1% (min)	DMA-E1(F)	0.046	3.860
12" @ 1% (min)	DMA-UR (upper road)	0.73	3.860
12" @ 1% (min)	DMA-CA (common area)	0.810	3.860
12" @ 1% (min)	DMA-E2(F) & E7(F) (ea) (2)	0.847	3.860
12" @ 1% (min)	DMA-E3/4(F) & E5/6(F) (ea) (2)	0.935	3.860
12" @ 1% (min)	DMA-E3/4(F) & E5/6(F) (ea) (2)	1.023	3.860
12" @ 1% (min)	DMA-E2(F) & E7(F) (ea) (2)	1.060	3.860
12" @ 1% (min)	DMA-E2/7(R)	1.386	3.860
12" @ 1% (min)	DMA-MR (middle road)	2.157	3.860
12" @ 2% (min)	DMA-LR (lower road)	2.604	5.458
			OK

OUTFALL MAIN TO CREEK	NODE	RATE (cfs)	CAPACITY (cfs)
12" @ 2% (min)	JB @ WM/RM/LR	4.589	5.458
			OK

Q25 POST - HYDRAULIC PROFILE

All pipes flow below 100% gravity capacity (with zero head). Hydraulic profile not necessary.

PROJECT: LOCATELLI SUBD. - APN: 029-061-19 - SCM-A1 thru A8 (ea) **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

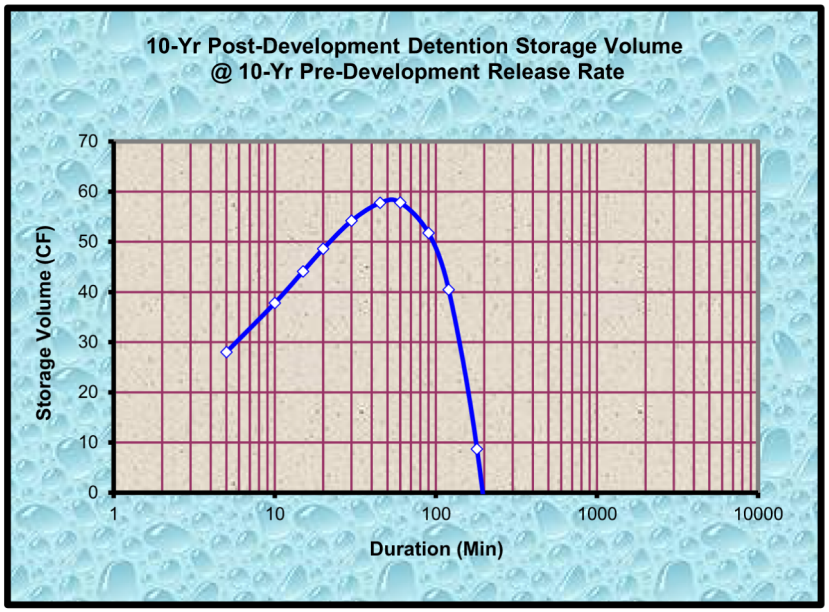
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	1624	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

58	ft^3 storage volume calculated			
38	% void space assumed			
152	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	17.00	4.00	2.30	root of the sectional area
Dimen. (ft)	**16.84**	**3.96**	**2.28**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.003	0.008	-0.011	-1221
1200	0.27	0.003	0.009	-0.011	-957
960	0.29	0.003	0.010	-0.010	-701
720	0.33	0.004	0.011	-0.008	-455
480	0.39	0.004	0.013	-0.006	-227
360	0.44	0.005	0.015	-0.005	-123
240	0.53	0.006	0.018	-0.002	-31
180	0.60	0.007	0.020	0.001	9
120	0.71	0.008	0.024	0.004	40
90	0.81	0.009	0.027	0.008	52
60	0.96	0.011	0.032	0.013	**58**
45	1.09	0.012	0.037	0.017	58
30	1.29	0.015	0.044	0.024	54
20	1.54	0.017	0.052	0.032	49
15	1.74	**0.020**	0.059	0.039	44
10	2.07	0.023	0.070	0.050	38
5	2.79	0.031	**0.094**	0.075	28



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUBDIVISION - APN: 029-061-19 - SCM-A9 & A10 (ea) **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

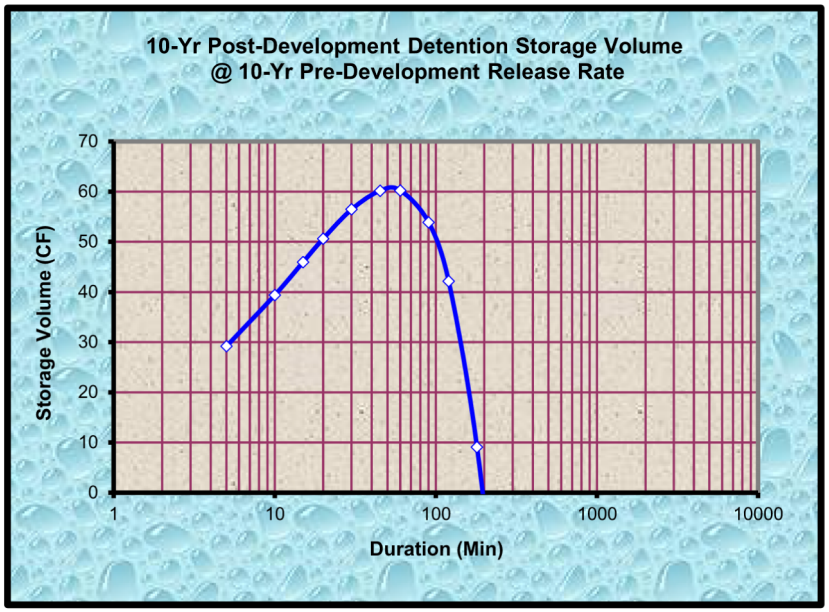
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	1692	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

60	ft^3 storage volume calculated			
38	% void space assumed			
158	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	17.00	4.00	2.40	root of the sectional area
Dimen. (ft)	**16.83**	**3.96**	**2.38**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.003	0.009	-0.012	-1273
1200	0.27	0.003	0.009	-0.011	-997
960	0.29	0.003	0.010	-0.010	-730
720	0.33	0.004	0.012	-0.009	-475
480	0.39	0.005	0.014	-0.007	-237
360	0.44	0.005	0.016	-0.005	-128
240	0.53	0.006	0.019	-0.002	-32
180	0.60	0.007	0.021	0.001	9
120	0.71	0.008	0.025	0.005	42
90	0.81	0.009	0.028	0.008	54
60	0.96	0.011	0.034	0.013	**60**
45	1.09	0.013	0.038	0.018	60
30	1.29	0.015	0.046	0.025	56
20	1.54	0.018	0.054	0.034	51
15	1.74	**0.020**	0.061	0.041	46
10	2.07	0.024	0.073	0.053	39
5	2.79	0.033	**0.098**	0.078	29



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUBD. APN: 029-061-19 - SCM-B1 & B2 (ea) **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	2191	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

78 ft^3 storage volume calculated

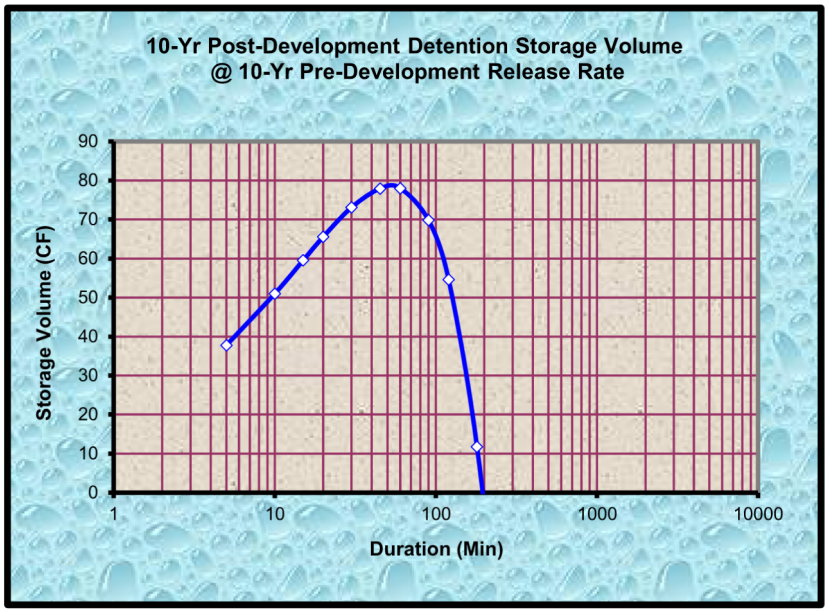
38 % void space assumed

205 ft^3 excavated volume needed

Structure	Length	Width*	Depth*
Ratios	22.00	4.00	2.40
Dimen. (ft)	**21.79**	**3.96**	**2.38**

*For pipe, use the square root of the sectional area

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.004	0.011	-0.015	-1648
1200	0.27	0.004	0.012	-0.014	-1291
960	0.29	0.004	0.013	-0.013	-945
720	0.33	0.005	0.015	-0.011	-615
480	0.39	0.006	0.018	-0.009	-307
360	0.44	0.007	0.020	-0.006	-166
240	0.53	0.008	0.024	-0.002	-41
180	0.60	0.009	0.027	0.001	12
120	0.71	0.011	0.033	0.006	55
90	0.81	0.012	0.037	0.010	70
60	0.96	0.015	0.044	0.017	**78**
45	1.09	0.017	0.050	0.023	78
30	1.29	0.020	0.059	0.032	73
20	1.54	0.023	0.070	0.044	66
15	1.74	**0.026**	0.079	0.053	60
10	2.07	0.031	0.094	0.068	51
5	2.79	0.042	**0.127**	0.101	38



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUBD. APN: 029-061-19 - SCM-B3 & 4 (ea) (2) **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

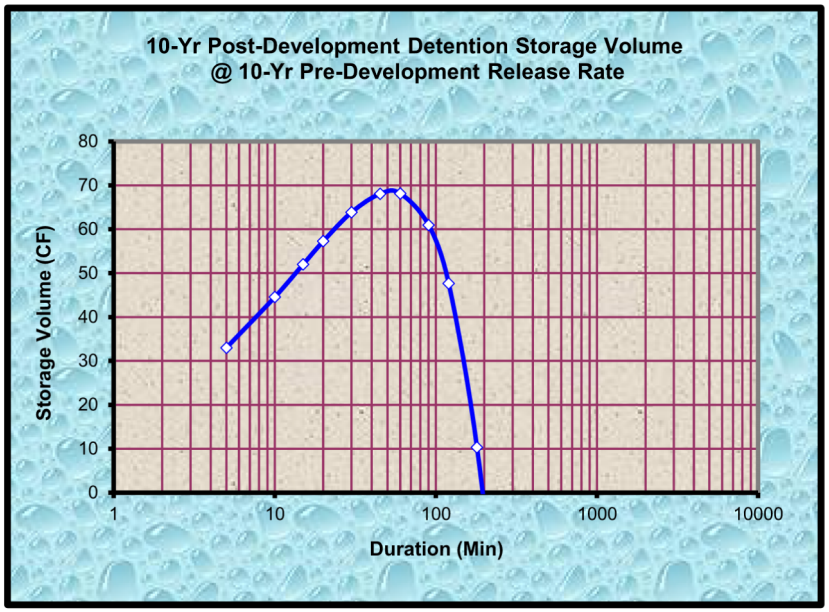
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	1914	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

68	ft^3 storage volume calculated			
38	% void space assumed			
179	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	19.00	4.00	2.30	root of the sectional area
Dimen. (ft)	**19.16**	**4.03**	**2.32**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.003	0.010	-0.013	-1440
1200	0.27	0.004	0.011	-0.013	-1128
960	0.29	0.004	0.012	-0.011	-826
720	0.33	0.004	0.013	-0.010	-537
480	0.39	0.005	0.016	-0.007	-268
360	0.44	0.006	0.018	-0.005	-145
240	0.53	0.007	0.021	-0.002	-36
180	0.60	0.008	0.024	0.001	10
120	0.71	0.009	0.028	0.005	48
90	0.81	0.011	0.032	0.009	61
60	0.96	0.013	0.038	0.015	**68**
45	1.09	0.014	0.043	0.020	68
30	1.29	0.017	0.051	0.028	64
20	1.54	0.020	0.061	0.038	57
15	1.74	**0.023**	0.069	0.046	52
10	2.07	0.028	0.083	0.059	45
5	2.79	0.037	**0.111**	0.088	33



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUBD. APN: 029-061-19 - SCM-C1 & 2 (ea) (2) **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

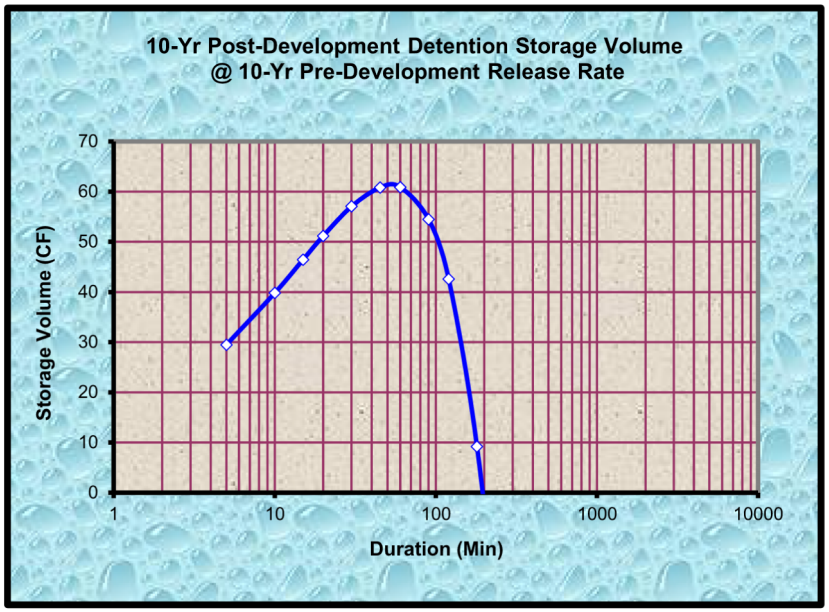
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	1710	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

61	ft^3 storage volume calculated			
38	% void space assumed			
160	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	17.00	4.00	2.40	root of the sectional area
Dimen. (ft)	**16.89**	**3.97**	**2.38**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.003	0.009	-0.012	-1286
1200	0.27	0.003	0.009	-0.011	-1008
960	0.29	0.003	0.010	-0.010	-738
720	0.33	0.004	0.012	-0.009	-480
480	0.39	0.005	0.014	-0.007	-239
360	0.44	0.005	0.016	-0.005	-130
240	0.53	0.006	0.019	-0.002	-32
180	0.60	0.007	0.021	0.001	9
120	0.71	0.008	0.025	0.005	43
90	0.81	0.010	0.029	0.008	54
60	0.96	0.011	0.034	0.014	**61**
45	1.09	0.013	0.039	0.018	61
30	1.29	0.015	0.046	0.025	57
20	1.54	0.018	0.055	0.034	51
15	1.74	**0.021**	0.062	0.041	46
10	2.07	0.025	0.074	0.053	40
5	2.79	0.033	**0.099**	0.079	29



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUBD. APN: 029-061-19 - SCM-D1 **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

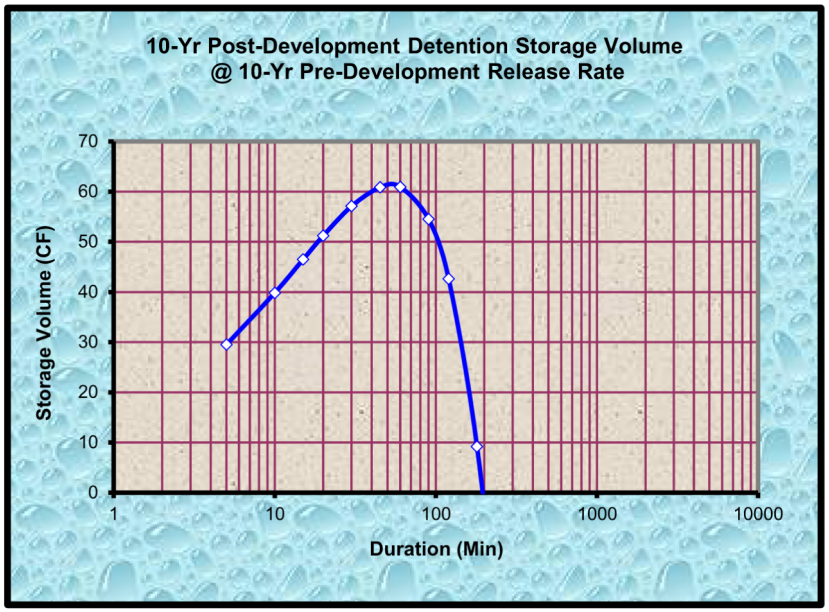
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	1711	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

61	ft^3 storage volume calculated			
38	% void space assumed			
160	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	17.00	4.00	2.30	root of the sectional area
Dimen. (ft)	**17.14**	**4.03**	**2.32**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.003	0.009	-0.012	-1287
1200	0.27	0.003	0.009	-0.011	-1008
960	0.29	0.003	0.010	-0.010	-738
720	0.33	0.004	0.012	-0.009	-480
480	0.39	0.005	0.014	-0.007	-239
360	0.44	0.005	0.016	-0.005	-130
240	0.53	0.006	0.019	-0.002	-32
180	0.60	0.007	0.021	0.001	9
120	0.71	0.008	0.025	0.005	43
90	0.81	0.010	0.029	0.008	54
60	0.96	0.011	0.034	0.014	**61**
45	1.09	0.013	0.039	0.018	61
30	1.29	0.015	0.046	0.025	57
20	1.54	0.018	0.055	0.034	51
15	1.74	**0.021**	0.062	0.041	46
10	2.07	0.025	0.074	0.053	40
5	2.79	0.033	**0.099**	0.079	29



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUBD. APN: 029-061-19 - SCM-D2 **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

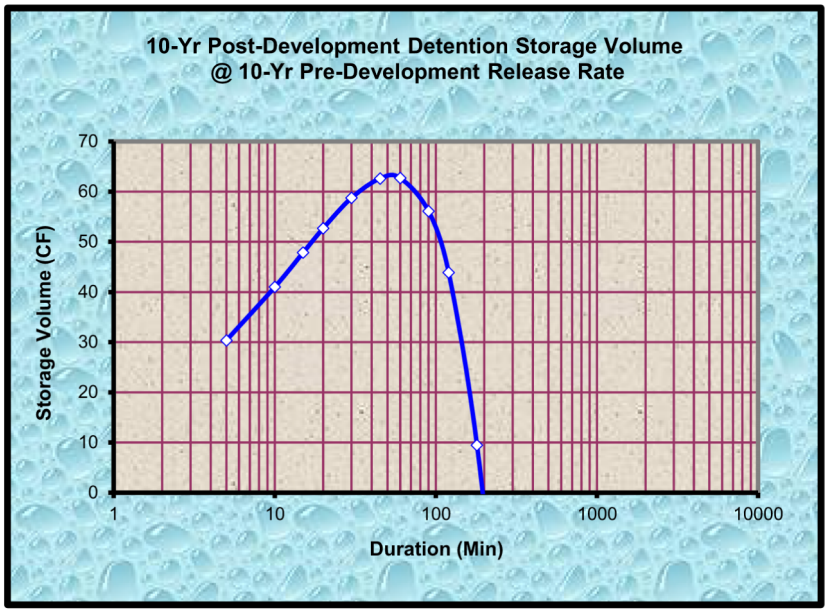
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	1761	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

63	ft^3 storage volume calculated			
38	% void space assumed			
165	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	18.00	4.00	2.30	root of the sectional area
Dimen. (ft)	**17.98**	**3.99**	**2.30**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.003	0.009	-0.012	-1324
1200	0.27	0.003	0.010	-0.012	-1038
960	0.29	0.004	0.011	-0.011	-760
720	0.33	0.004	0.012	-0.009	-494
480	0.39	0.005	0.014	-0.007	-246
360	0.44	0.005	0.016	-0.005	-134
240	0.53	0.006	0.019	-0.002	-33
180	0.60	0.007	0.022	0.001	9
120	0.71	0.009	0.026	0.005	44
90	0.81	0.010	0.030	0.008	56
60	0.96	0.012	0.035	0.014	**63**
45	1.09	0.013	0.040	0.019	63
30	1.29	0.016	0.047	0.026	59
20	1.54	0.019	0.056	0.035	53
15	1.74	**0.021**	0.064	0.043	48
10	2.07	0.025	0.076	0.055	41
5	2.79	0.034	**0.102**	0.081	30



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUBD. APN: 029-061-19 - SCM-E1 (F) **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

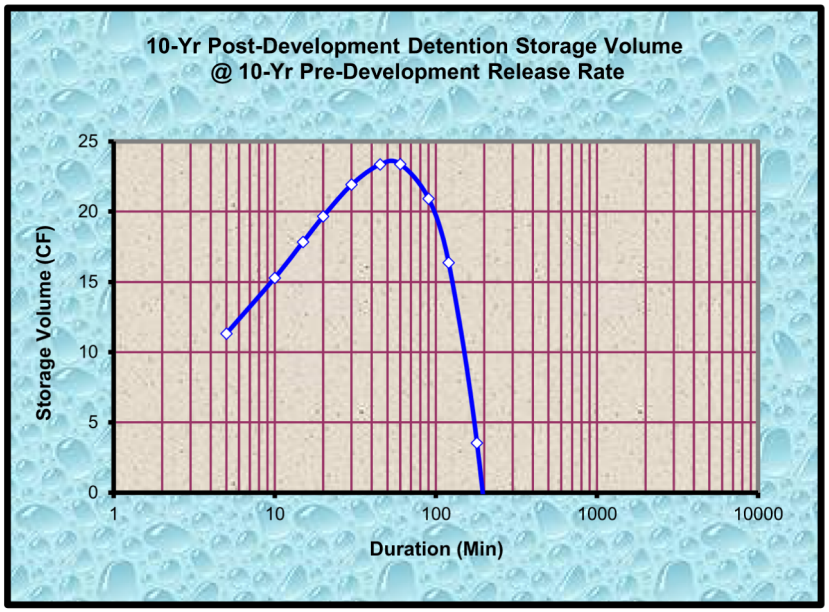
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	657	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

23	ft^3 storage volume calculated			
38	% void space assumed			
62	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	7.00	4.00	2.00	root of the sectional area
Dimen. (ft)	**7.22**	**4.13**	**2.06**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.001	0.003	-0.005	-494
1200	0.27	0.001	0.004	-0.004	-387
960	0.29	0.001	0.004	-0.004	-283
720	0.33	0.002	0.005	-0.003	-184
480	0.39	0.002	0.005	-0.003	-92
360	0.44	0.002	0.006	-0.002	-50
240	0.53	0.002	0.007	-0.001	-12
180	0.60	0.003	0.008	0.000	4
120	0.71	0.003	0.010	0.002	16
90	0.81	0.004	0.011	0.003	21
60	0.96	0.004	0.013	0.005	**23**
45	1.09	0.005	0.015	0.007	23
30	1.29	0.006	0.018	0.010	22
20	1.54	0.007	0.021	0.013	20
15	1.74	**0.008**	0.024	0.016	18
10	2.07	0.009	0.028	0.020	15
5	2.79	0.013	**0.038**	0.030	11



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUBD. APN: 029-061-19 - SCM-E1 (R) **Calc by:** DD **Date:** 1/6/2023

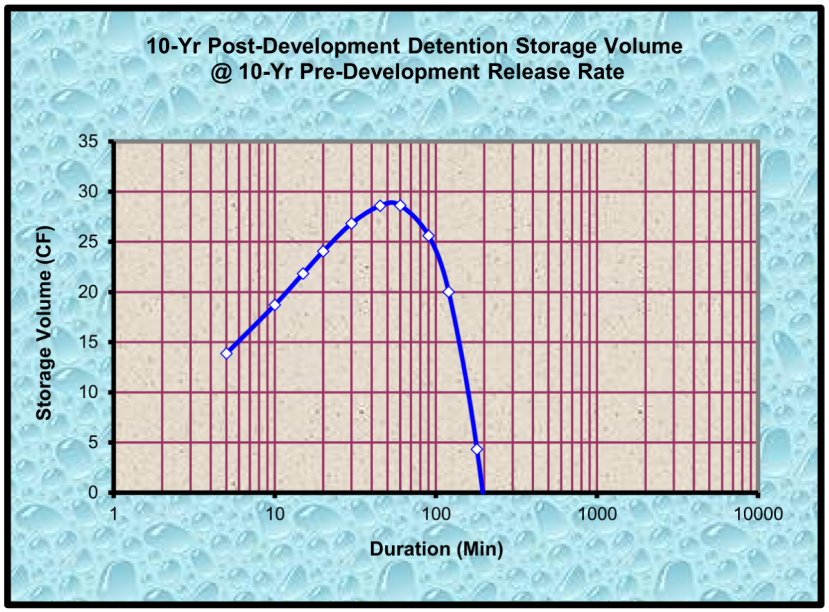
RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	804	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

29	ft^3 storage volume calculated			
38	% void space assumed			
75	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	8.00	4.00	2.40	root of the sectional area
Dimen. (ft)	**7.95**	**3.97**	**2.38**	



10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.001	0.004	-0.006	-605
1200	0.27	0.001	0.004	-0.005	-474
960	0.29	0.002	0.005	-0.005	-347
720	0.33	0.002	0.006	-0.004	-226
480	0.39	0.002	0.007	-0.003	-112
360	0.44	0.002	0.007	-0.002	-61
240	0.53	0.003	0.009	-0.001	-15
180	0.60	0.003	0.010	0.000	4
120	0.71	0.004	0.012	0.002	20
90	0.81	0.005	0.014	0.004	26
60	0.96	0.005	0.016	0.006	**29**
45	1.09	0.006	0.018	0.008	29
30	1.29	0.007	0.022	0.012	27
20	1.54	0.009	0.026	0.016	24
15	1.74	**0.010**	0.029	0.019	22
10	2.07	0.012	0.035	0.025	19
5	2.79	0.016	**0.047**	0.037	14

Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUBD. APN: 029-061-19 - SCM-E2 & E7 (F) (ea) (2) **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

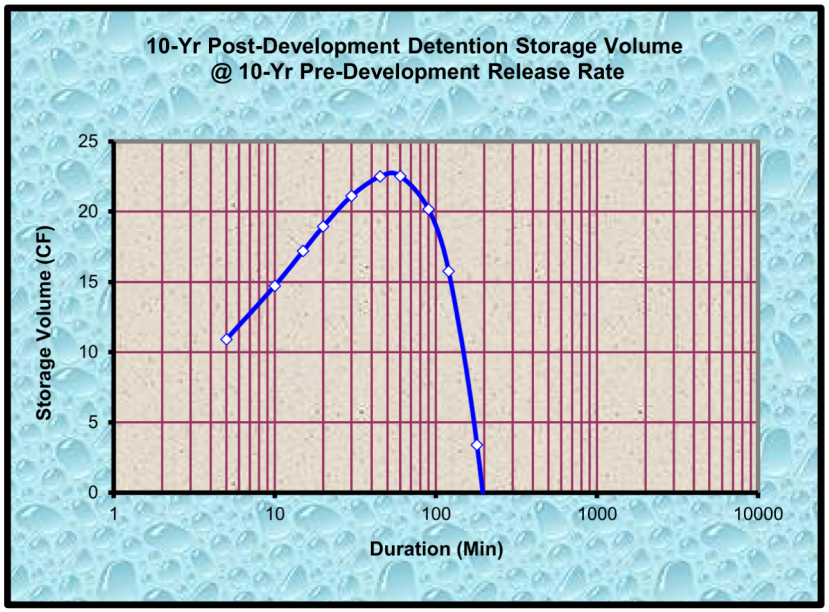
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	633	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

23	ft^3 storage volume calculated			
38	% void space assumed			
59	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	6.00	4.00	2.50	root of the sectional area
Dimen. (ft)	**5.98**	**3.98**	**2.49**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.001	0.003	-0.004	-476
1200	0.27	0.001	0.003	-0.004	-373
960	0.29	0.001	0.004	-0.004	-273
720	0.33	0.001	0.004	-0.003	-178
480	0.39	0.002	0.005	-0.002	-89
360	0.44	0.002	0.006	-0.002	-48
240	0.53	0.002	0.007	-0.001	-12
180	0.60	0.003	0.008	0.000	3
120	0.71	0.003	0.009	0.002	16
90	0.81	0.004	0.011	0.003	20
60	0.96	0.004	0.013	0.005	**23**
45	1.09	0.005	0.014	0.007	23
30	1.29	0.006	0.017	0.009	21
20	1.54	0.007	0.020	0.013	19
15	1.74	**0.008**	0.023	0.015	17
10	2.07	0.009	0.027	0.020	15
5	2.79	0.012	**0.037**	0.029	11



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUBD. APN: 029-061-19 - SCM-E3/4 & E5/6 (F) (ea) (2) **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

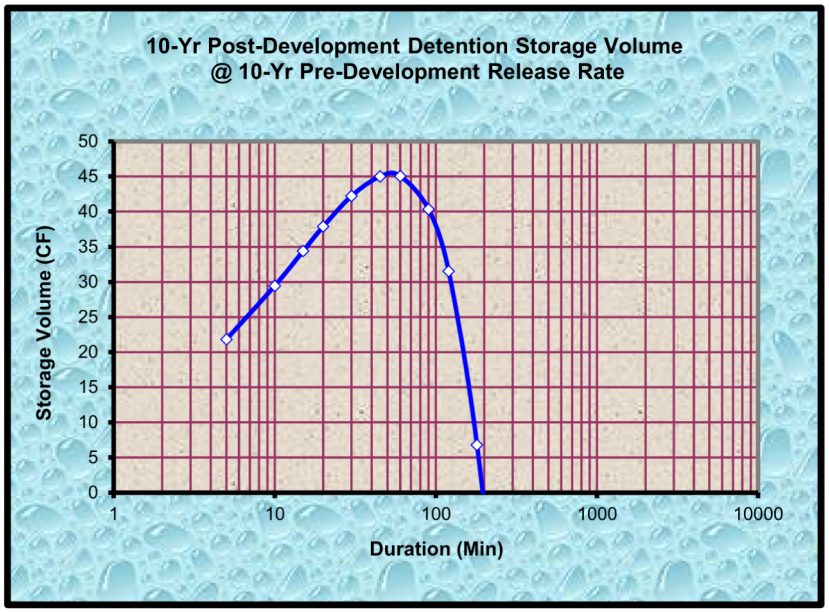
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	1266	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

45	ft^3 storage volume calculated			
38	% void space assumed			
119	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	30.00	3.00	2.00	root of the sectional area
Dimen. (ft)	**26.10**	**2.61**	**1.74**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.002	0.006	-0.009	-952
1200	0.27	0.002	0.007	-0.008	-746
960	0.29	0.003	0.008	-0.008	-546
720	0.33	0.003	0.009	-0.007	-355
480	0.39	0.003	0.010	-0.005	-177
360	0.44	0.004	0.012	-0.004	-96
240	0.53	0.005	0.014	-0.001	-24
180	0.60	0.005	0.016	0.001	7
120	0.71	0.006	0.019	0.004	32
90	0.81	0.007	0.021	0.006	40
60	0.96	0.008	0.025	0.010	**45**
45	1.09	0.010	0.029	0.013	45
30	1.29	0.011	0.034	0.019	42
20	1.54	0.014	0.041	0.025	38
15	1.74	**0.015**	0.046	0.031	34
10	2.07	0.018	0.055	0.039	29
5	2.79	0.024	**0.073**	0.058	22



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUB. APN: 029-061-19 - SCM-E2-7 (R) **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

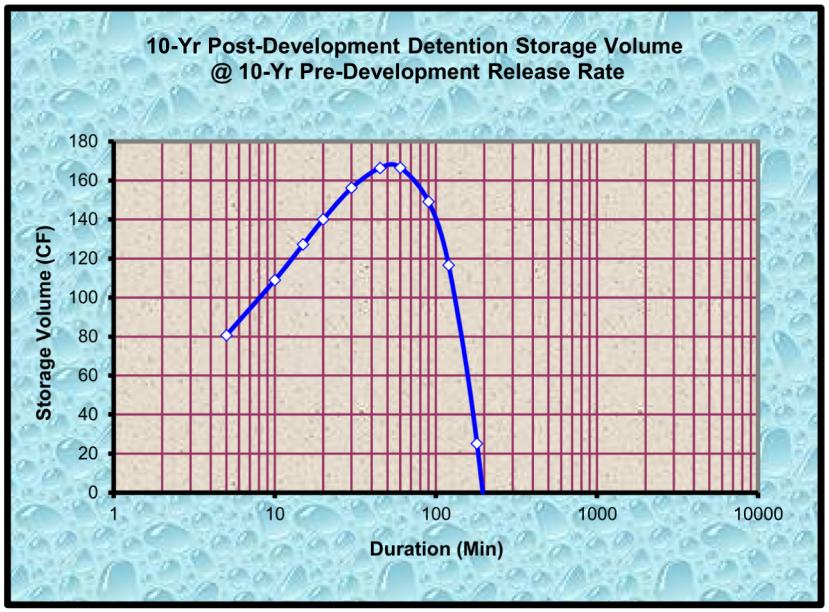
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	4680	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

167	ft^3 storage volume calculated			
38	% void space assumed			
438	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	19.00	10.00	2.30	root of the sectional area
Dimen. (ft)	**19.02**	**10.01**	**2.30**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.008	0.024	-0.033	-3520
1200	0.27	0.009	0.026	-0.031	-2758
960	0.29	0.009	0.028	-0.028	-2019
720	0.33	0.011	0.032	-0.024	-1313
480	0.39	0.013	0.038	-0.018	-655
360	0.44	0.014	0.043	-0.013	-355
240	0.53	0.017	0.052	-0.005	-88
180	0.60	0.019	0.058	0.002	25
120	0.71	0.023	0.069	0.013	117
90	0.81	0.026	0.079	0.022	149
60	0.96	0.031	0.094	0.037	**167**
45	1.09	0.035	0.106	0.049	166
30	1.29	0.042	0.126	0.069	156
20	1.54	0.050	0.150	0.093	140
15	1.74	**0.057**	0.170	0.113	127
10	2.07	0.067	0.202	0.145	109
5	2.79	0.091	**0.272**	0.215	81



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUB. APN: 029-061-19 - COMMON AREA **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

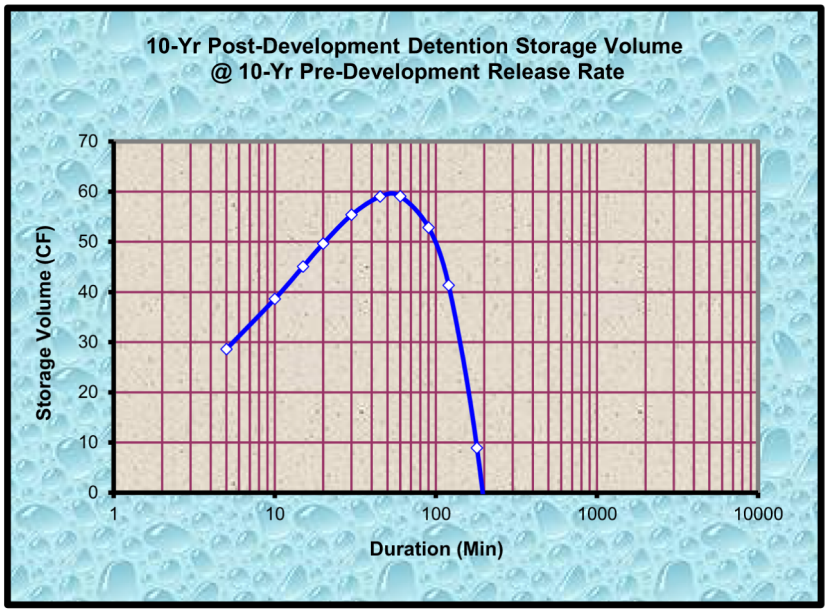
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	1659	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

59	ft^3 storage volume calculated			
38	% void space assumed			
155	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	13.00	5.00	2.30	root of the sectional area
Dimen. (ft)	**13.17**	**5.06**	**2.33**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.003	0.008	-0.012	-1248
1200	0.27	0.003	0.009	-0.011	-978
960	0.29	0.003	0.010	-0.010	-716
720	0.33	0.004	0.011	-0.009	-465
480	0.39	0.005	0.014	-0.006	-232
360	0.44	0.005	0.015	-0.005	-126
240	0.53	0.006	0.018	-0.002	-31
180	0.60	0.007	0.021	0.001	9
120	0.71	0.008	0.025	0.005	41
90	0.81	0.009	0.028	0.008	53
60	0.96	0.011	0.033	0.013	**59**
45	1.09	0.013	0.038	0.017	59
30	1.29	0.015	0.045	0.025	55
20	1.54	0.018	0.053	0.033	50
15	1.74	**0.020**	0.060	0.040	45
10	2.07	0.024	0.072	0.051	39
5	2.79	0.032	**0.096**	0.076	29



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUB. APN: 029-061-19 - SCM-UR **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

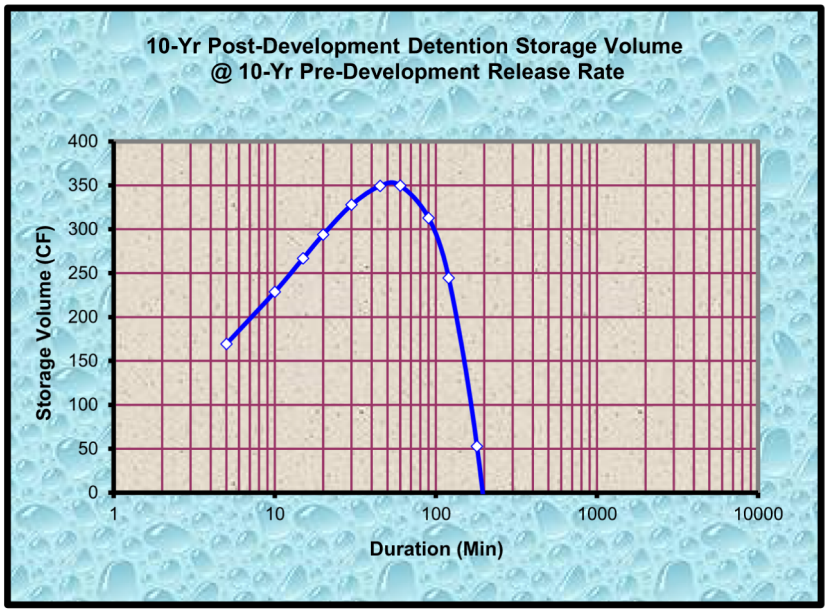
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	9823	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

350	ft^3 storage volume calculated			
38	% void space assumed			
920	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	39.00	10.00	2.40	root of the sectional area
Dimen. (ft)	**38.78**	**9.94**	**2.39**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.017	0.050	-0.068	-7388
1200	0.27	0.018	0.054	-0.064	-5789
960	0.29	0.020	0.060	-0.059	-4239
720	0.33	0.023	0.068	-0.051	-2755
480	0.39	0.027	0.080	-0.038	-1374
360	0.44	0.030	0.091	-0.028	-745
240	0.53	0.036	0.108	-0.010	-186
180	0.60	0.041	0.123	0.004	53
120	0.71	0.049	0.146	0.027	245
90	0.81	0.055	0.165	0.046	313
60	0.96	0.065	0.196	0.078	**350**
45	1.09	0.074	0.222	0.103	349
30	1.29	0.088	0.264	0.146	328
20	1.54	0.105	0.315	0.196	294
15	1.74	**0.119**	0.356	0.237	267
10	2.07	0.141	0.423	0.305	229
5	2.79	0.190	**0.570**	0.451	169



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUB. APN: 029-061-19 - SCM-MR **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

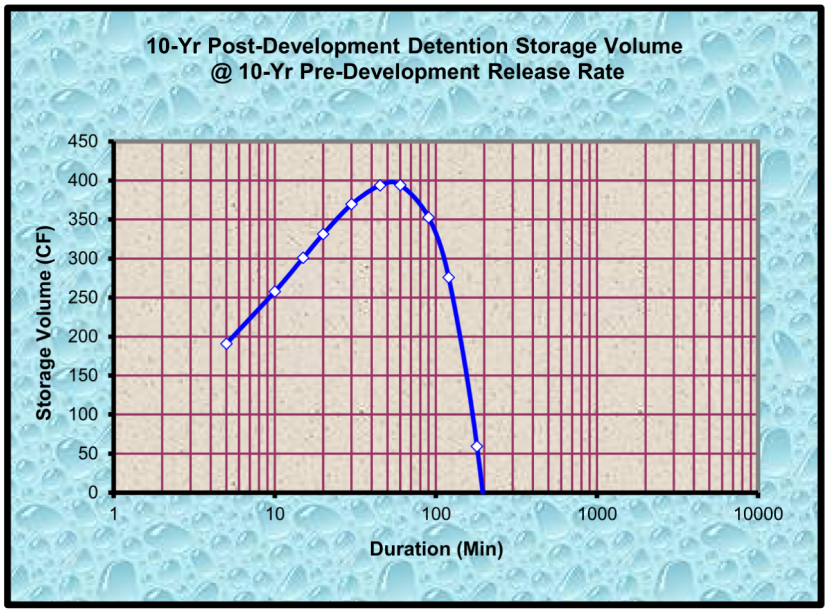
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	11071	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

394	ft^3 storage volume calculated			
38	% void space assumed			
1037	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	30.00	15.00	2.40	root of the sectional area
Dimen. (ft)	**29.60**	**14.80**	**2.37**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.019	0.057	-0.077	-8327
1200	0.27	0.020	0.061	-0.072	-6525
960	0.29	0.022	0.067	-0.066	-4777
720	0.33	0.025	0.076	-0.058	-3105
480	0.39	0.030	0.091	-0.043	-1549
360	0.44	0.034	0.103	-0.031	-840
240	0.53	0.041	0.122	-0.012	-209
180	0.60	0.046	0.138	0.004	59
120	0.71	0.055	0.164	0.031	276
90	0.81	0.062	0.186	0.052	353
60	0.96	0.074	0.221	0.088	**394**
45	1.09	0.083	0.250	0.117	394
30	1.29	0.099	0.298	0.164	369
20	1.54	0.118	0.354	0.221	331
15	1.74	**0.134**	0.401	0.267	301
10	2.07	0.159	0.477	0.344	258
5	2.79	0.214	**0.643**	0.509	191



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

PROJECT: LOCATELLI SUB. APN: 029-061-19 - SCM-LR **Calc by:** DD **Date:** 1/6/2023

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

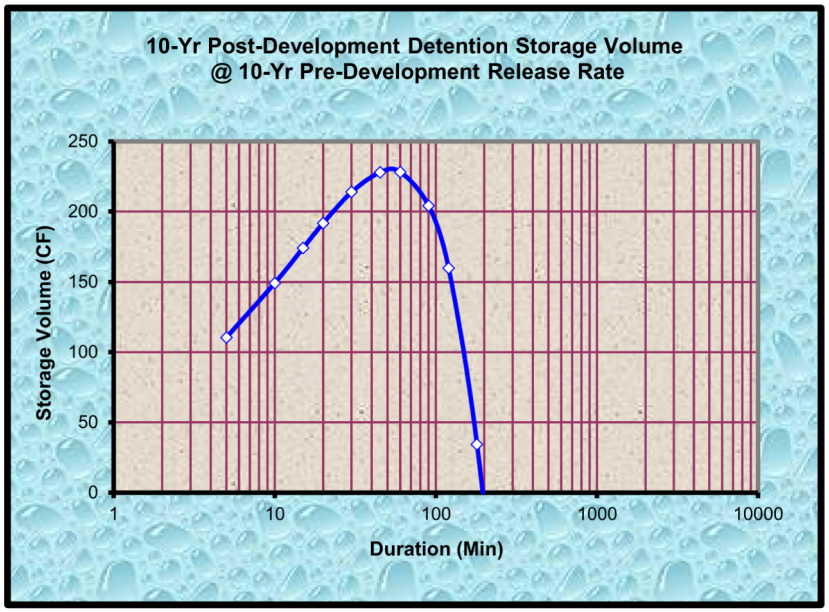
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.45		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.30		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	6412	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

228	ft^3 storage volume calculated			
38	% void space assumed			
601	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	21.00	12.00	2.40	root of the sectional area
Dimen. (ft)	**20.95**	**11.97**	**2.39**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	10 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.25	0.011	0.033	-0.045	-4823
1200	0.27	0.012	0.035	-0.042	-3779
960	0.29	0.013	0.039	-0.038	-2767
720	0.33	0.015	0.044	-0.033	-1798
480	0.39	0.018	0.053	-0.025	-897
360	0.44	0.020	0.059	-0.018	-487
240	0.53	0.024	0.071	-0.007	-121
180	0.60	0.027	0.080	0.003	34
120	0.71	0.032	0.095	0.018	160
90	0.81	0.036	0.108	0.030	204
60	0.96	0.043	0.128	0.051	**228**
45	1.09	0.048	0.145	0.068	228
30	1.29	0.058	0.173	0.095	214
20	1.54	0.068	0.205	0.128	192
15	1.74	**0.077**	0.232	0.155	174
10	2.07	0.092	0.276	0.199	149
5	2.79	0.124	**0.372**	0.295	111



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious areas, both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

This method is available from the County Public Works web site in a computerized Excel spreadsheet format to simplify usage. http://www.dpw.co.santa-cruz.ca.us/drainage.htm

APPENDIX D
SOILS REPORT

GEOTECHNICAL INVESTIGATION
For
PROPOSED 12-LOT SUBDIVISION
Mattison lane
APN 029-391-01, 02 and 03
Santa Cruz County, California

Prepared
For
CLAUDIO LOCATELLI
% Steve Elmore
Santa Cruz, California

Prepared By
DEES & ASSOCIATES, INC.
Geotechnical Engineers
Project No. SCR-0636
MARCH 2013

Dees & Associates, Inc.
Geotechnical Engineers
501 Mission Street, Suite 8A, Santa Cruz, CA 95060

Phone: 831 427-1770
Fax: 831 427-1794

March 5, 2013 Project No. SCR-0636

CLAUDIO LOCATELLI
% Steve Elmore
1557 Taylor Lane
Santa Cruz, California 95062

Subject: Geotechnical Investigation

Reference: Proposed 12-Lot Subdivision
Mattison Lane
APN 029-391-01, 02 and 03
Santa Cruz County, California

Dear Mr. Locatelli:

As requested, we have completed a Geotechnical Investigation for the 12-lot subdivision proposed at the referenced site. The purpose of our investigation was to evaluate the soil conditions at the site and provide geotechnical recommendations for the proposed improvements.

This report presents the results, conclusions and recommendations of our investigation. If you have any questions regarding this report, please call our office.

Very truly yours,

DEES & ASSOCIATES, INC.

Rebecca L. Dees
Geotechnical Engineer
G.E. 2623

Copies: 6 to Addressee

Dees & Associates, Inc.
Geotechnical Engineers
501 Mission Street, Suite 8A, Santa Cruz, CA 95060
Phone: 831 427-1770
Fax: 831 427-1794

TABLE OF CONTENTS

Introduction

This report presents the results of our Geotechnical Investigation for the 12-lot subdivision proposed at APN 029-391-01, 02 and 03 on Mattison Lane in Santa Cruz County, California.

Purpose and Scope

The purpose of our investigation was to explore and evaluate surface and near surface soil at the site and provide geotechnical recommendations for its design and construction.

The specific scope of our services was as follows:

1. Site reconnaissance and review of available data in our files pertinent to the site and vicinity.

2. Exploration of subsurface conditions consisting of logging and sampling of ten (10) exploratory borings drilled between 4 and 21.5 feet below grade.

3. Laboratory testing to evaluate the engineering properties of the subsoils.

4. Liquefaction Analysis.

5. Engineering analysis and evaluation of the resulting field and laboratory test data. Based on our findings, we have developed geotechnical design criteria for general site grading, foundations, retaining walls, concrete slabs-on-grade and general site drainage.

6. Preparation of this report presenting the results of our investigation.

Project Location and Description

The site is located on Mattison Lane, APN 029-391-01, 02 and 03, in Santa Cruz County, California. The combined 4.8 acre site is located at the southeast corner of Mattison Lane along the eastern edge of Rodeo Creek Gulch. The majority of the site is nearly level to very gently sloping with slope gradients on the order of 1 to 2 percent. The 40 foot high creek bank along the western edge of the site slopes at about a 20 percent slope gradient with locally steeper slopes along the top 15 to 20 feet of the slope where slope gradients are on the order of 50 to 70 percent.

The site is developed with three single family residences, a nursery and a dirt road. The nursery has a small office building, two large sheds, a green house and several covered terraces.

The project consists of removing the existing improvements and constructing up to 12

single family residences and a road at the site. The road will come off Mattison Lane and provide access to the residences. The road will be located along the eastern edge of the site and the 12 lots will be located along the western edge of the roadway with the exception of one lot located at the south end of the road. Most of the lots will have one single family residence with an attached garage. Several of the parcels will also include accessory dwellings located behind the main residence. The lots will be setback at least 60 feet from the top edge of the western slope.

Field Investigation

Subsurface conditions at the site were explored on January 30, 2013 with ten (10) exploratory borings drilled with 6-inch diameter continuous flight augers advanced with tractor mounted drilling equipment. Our borings were drilled to depths of 4 to 21.5 feet. The approximate locations of our exploratory borings are indicated on Figure 2.

The soils observed in the test borings were logged in the field and described in accordance with the Unified Soil Classification System (D2487 and D2488), Figures 3. The Test Boring Log denotes subsurface conditions at the locations and times observed, and it is not warranted it is representative of subsurface conditions at other locations or times.

Representative soil samples were obtained from the exploratory borings at selected depths, or at major strata changes. These samples were recovered using the 3.0-inch O.D. Modified California Sampler (L) or the Standard Terzaghi Sampler (T). The penetration resistance blow counts for the (L) and (T) noted on the boring logs were obtained as the sampler was dynamically driven into the in situ soil. The process was performed by dropping a 140-pound hammer a 30-inch free fall distance and driving the sampler 6 to 18 inches and recording the number of blows for each 6-inch penetration interval. The blows recorded on the boring logs present the accumulated number of blows that were required to drive the last 12 inches. **The blow counts indicated on the logs have been converted to equivalent standard penetration test (SPT) values.**

Laboratory Testing

The laboratory testing program was directed toward a determination of the physical and engineering properties of the soils underlying the site. Moisture content and dry densities were performed on representative soil samples to determine the consistency of the soil and the moisture variation throughout the explored soil profile. Grain size analysis and Atterberg Limits were performed on select samples to aid in soil classification and to evaluate the relative shrink/swell potential of the foundation zone soils. A direct shear test was performed to evaluate the shear strength properties of the foundation zone soil. The results of our field and laboratory testing appear on the "Log of Test Borings", opposite the sample tested.

Subsurface Soil Conditions

The Santa Cruz County Geologic Map indicates the site is underlain by Purisima Formation, Figure 3. The Purisima Formation (Pliocene and upper Miocene) is

described as, “Very thick bedded yellowish-gray tuffaceous and diatomaceous siltstone containing thick interbeds of bluish-gray, semifriable, fine-grained andesitic sandstone”.

Our borings indicate the entire site is underlain by Lowest Emergent Coastal terrace Deposits. The soils generally consisted of 2 to 2.5 feet of silty sand over clayey sand which is further underlain by silty sand with thin gravelly sand lenses. The top 2 to 5 feet of soil is loose in the area of the proposed improvements. The loose soil is deeper as you move towards the western slope where loose soil extended about 3 to 5 feet below grade along the west side of the proposed homesites.

Five (5) to 12 feet of loose to very loose soil exists along the top of the eastern slope. Based on our borings, the loose soil extends about 25 to 30 feet back from the top edge of the slope. The loose soil lies west of the proposed improvements and did not extend into the proposed homesites.

The soils below the site are classified as a Site Class “D” for analysis using the 2010 California Building Code.

Groundwater

Perched groundwater was encountered in Borings 1, 2, 3 and 9. Borings 5, 8 and 10 were not drilled deep enough to encounter groundwater. Groundwater was encountered 10 to 14 feet below grade where it was encountered. The soils near the groundwater level were wet and the soils below the groundwater zone were moist.

The groundwater levels encountered in our borings denote groundwater conditions at the locations and times observed, and it is not warranted it is representative of groundwater conditions at other locations or times. Groundwater levels may vary with seasonal variations and other factors not evident during our investigation.

Seismicity

The project site is located about 9.3 kilometers (5.7 miles) southwest of the Zayante-Vergeles Fault zone, 14.5 kilometers (8.9 miles) southwest of the San Andreas Fault zone, 14.6 kilometers (9.0 miles) northeast of the offshore Monterey Bay-Tularcitos Fault zone and 20.7 kilometers (12.7 miles) northeast of the offshore San Gregorio Fault zone.

The San Andreas Fault is the largest and most active of the faults, however, each fault is considered capable of generating moderate to severe ground shaking. It is reasonable to assume that the proposed development will be subject to at least one moderate to severe earthquake from one of the faults during the next fifty years.

The Seismic Design Category (SDC) for structures with an occupancy category of I or II is “D” for analysis using the 2010 California Building Code. The following ground motion parameters may be used in seismic design and were determined using the USGS Ground Motion Parameter Calculator: Ss, Site Class B (0.2 sec) = 1.500g; S1, Site

Class B (1.0 sec) = 0.600g; SMs, Site Class D (0.2 sec) = 1.500g; SM1, Site Class D (1.0 sec) = 0.900g; SDs, Site Class D (0.2 sec) = 1.000g; SD1, Site Class D (1.0 sec) = 0.600g.

Liquefaction

The site is mapped as having a low liquefaction potential in the zone mapped as Terrace Deposits and no liquefaction potential in the zone mapped as Purisima. See Figure 4.

Liquefaction occurs when saturated fine grained sands, silts and sensitive clays are subject to shaking during an earthquake and the water pressure within the pores build up leading to loss of strength. The excess pore water pressures then start to dissipate upwards and sideways. The primary movement is in an upward direction towards the ground surface which often results in ground settlement. Lateral dissipation of pore pressures could result in lateral spreading if soils liquefy near a slope face.

An analysis of the liquefaction potential of the soils underlying the site was conducted using the computer program LiquefyPro (CivilTech 2009). The LiquefyPro liquefaction program analyzes the liquefaction resistance of the sandy layers using the liquefaction resistance proposed by Blake, T.F (1997) and normalized SPT blow count ($N_{1\text{-}60}$) proposed by Liao & Whitman (1986). Fines corrections were performed using methods developed by Stark/Olsen. Settlement analysis methods were developed by Ishihara/Yoshimine.

Percent passing the No. 200 sieve were obtained from laboratory test results. Groundwater depth was based on the depth of groundwater at the time of drilling. Seismic conditions were analyzed using a maximum expected peak ground acceleration of 0.4g. The maximum peak ground acceleration was determined using the seismic coefficient S_{DS} divided by 2.5.

The results of the liquefaction analysis indicate there is a low potential for liquefaction to develop below the homesite. See Figure 5.

Landsliding

The site is very gently sloping with the exception of the slope along the western edge of the site. The top of the slope is steep and some signs of erosion and slumping were observed along the top of the slope. The proposed homesites will be setback at least 60 feet from the top edge of the western slope. There is a low potential for landslides to affect improvements located 60 feet from the top edge of the slope.

DISCUSSIONS AND CONCLUSIONS

Based on the results of our investigation, the new single family residences and road proposed at the site are feasible provided the recommendations presented in this report are incorporated into the design and construction of the project.

Primary geotechnical concerns for the project include setting improvements back from the top edge of the western slope, compacting loose soil below improvements, embedding foundations into firm native soil or engineered fill, controlling site drainage and designing structures to resist strong seismic shaking.

There is 5 to 12 feet of loose to very loose soil along the top of the drainage ravine slope at the western edge of the property. Improvements should be set back from the top of the slope. We understand there are a 50 foot wide riparian setback and a 10 foot wide construction setback from the riparian zone which puts the improvements at least 60 feet from the top edge of the slope. The 60 foot setback provides more than enough setback from the top of the slope from a geotechnical perspective.

Most of the proposed homesites are underlain by 2 to 2.5 feet of loose soil. The depth of loose soil deepens as you move westward towards the drainage ravine. The homesites with accessory dwellings in the back are expected to have 3 or more feet of loose soil below the accessory dwellings. Site grading is expected to include minor cuts and fills to establish building pads and the roadway. The top 3 feet of loose soil should be removed and replaced as compacted engineered fill below the proposed improvements and in areas where fill is planned. The proposed residences may be supported on conventional spread footings embedded into firm, native soil or engineered fill.

Surface runoff should be controlled and collected roof runoff should be discharged away from foundations. Uncontrolled runoff should not be allowed to flow over the top of the ravine slope. There is loose fill at the top of the slope and concentrated runoff could lead to erosion and slumping along the top of the slope. Impervious surfaces should be limited to reduce the amount of concentrated runoff at the site. Concentrated runoff from residences and driveways should be dispersed at least 60 feet from the top of the slope or discharged at the base of the slope into the natural drainage ravine. Concentrated runoff from the roadway should be collected and either percolated back into the ground at least 120 feet from the top of the ravine or discharged at the base of the slope into the natural drainage ravine.

Structures should be designed to resist strong seismic shaking. Structures designed in accordance with current seismic design requirements should react well to seismic shaking.

RECOMMENDATIONS

The following recommendations should be used as guidelines for preparing project plans and specifications:

Site Grading

1. The soil engineer should be notified at least four (4) working days prior to any site clearing or grading to make arrangements for construction observation and testing services. The recommendations of this report are based on the assumption that the soil engineer will perform the required testing and observation during grading and construction. It is the owner's responsibility to make the necessary arrangements for these required services.

2. Areas to be graded should be cleared of obstructions, organics and other unsuitable material. Voids created during site clearing should be backfilled with engineered fill.

3. Where fill is planned to raise grade, any existing loose soil should be removed and the area to receive engineered fill should be scarified 6 inches, moisture conditioned to 2 to 3 percent over optimum moisture content and compacted to 90 percent relative compaction.

4. The top 3 feet of loose soil should be removed from below proposed structures and replaced as compacted engineered fill. The area to receive engineered fill should be scarified 6 inches, moisture conditioned to 2 to 3 percent over optimum moisture content and compacted to 90 percent relative compaction.

5. Where referenced in this report, Percent Relative Compaction and Optimum Moisture Content shall be based on ASTM Test Designation D1557-00.

6. Soils used for engineered fill should be free of organic material, and contain no rocks or clods greater than 6 inches in diameter, with no more than 15 percent larger than 4 inches. Soils with more than 3 percent organic matter by weight should be considered organic and not suitable as engineered fill.

7. We estimate shrinkage factors of about 15 percent for the on-site materials when used in engineered fills.

8. Engineered fill should be placed in thin lifts not exceeding 8 inches in loose thickness; moisture conditioned to 2 to 3 percent over optimum moisture content and compacted to at least 90 percent relative compaction.

9. The upper 6 inches of subgrade below driveway pavements should be moisture conditioned 2 to 3 percent over optimum moisture content and compacted to at least 95 percent relative compaction. The aggregate base below driveways and pavements should also be compacted to 95 percent relative compaction.

10. Engineered fill slopes and permanent cutslopes should be inclined less than 2:1 (horizontal to vertical). Fill slopes should be keyed and benched into firm native soil. Keys should be at least 8 feet wide and embedded at least 18 inches into firm, native soil on the downslope side. Benches should be created in the natural hillside as the fill is placed. Benches should be at least 6 feet wide, remove all loose soil and be sloped into the hillside at least 2 percent.

11. Any keys or benches exposing potential seepage zones should be drained. Drains should consist of a minimum 12 inch wide column of Caltrans Class 1, Type A, permeable material that extends to within 12 inches of the final ground surface. A 4-inch perforated rigid pipe should be placed about 4 inches above the base of the gravel with the holes facing down. The pipe should be sloped at least 2 percent towards the discharge end. A solid collector pipe should be connected to the perforated pipe to carry the collected water to a suitable discharge point. The presence of seepage zones and the location and dimensions of the drains should be determined in the field by a representative from our office at the time of grading.

12. The face of cut and fill slopes should be groomed to remove any loose soil, create a fairly uniform slope surface. Cut and fill slopes should be protected from erosion at all times.

13. Engineered fill should be observed and tested by our firm. For planning purposes, in-place density tests should be performed as follows: one test for every 12 vertical inches of material placed for embankments, in trenches or around structures, one test for every 400 square feet for relatively thin fill sections and one test whenever there is a definite suspicion of a change in the quality of moisture control or effectiveness in compaction. The actual testing schedule should be determined by a representative from our firm at the time of grading.

14. After the earthwork operations have been completed and the soil engineer has finished their observation of the work, no further earthwork operations shall be performed except with the approval of and under the observation of the soil engineer.

Conventional Spread Footing and Concrete Slab-on-Grade Foundations

15. Conventional spread footings or concrete slabs-on-grade with thickened edges may be used to support the proposed residences. Foundations should be embedded into firm, native soil or engineered fill. A minimum of 18 inches of engineered fill should be placed below foundations supported on engineered fill.

16. Footings should be a minimum of 12 inches deep and 12 inches wide for one story structures and 18 inches deep and 15 inches wide for two story structures. The depth of foundations should be measured from the lowest adjacent grade.

17. Footings located adjacent to other footings or utility trenches should have their bearing surfaces founded below an imaginary 1.5:1 plane projected upward from the bottom edge of the adjacent footings or utility trenches.

18. Foundations designed in accordance with the above may be designed using an allowable bearing capacity of 2500 psf for footings embedded into native soil and 4,000 psf for footings embedded into engineered fill. The allowable bearing capacities may be increased by 1/3 for short term seismic and wind loads.

19. Total and differential settlements under the proposed light building loads are anticipated to be less than 1 inch and 1/2 inch respectively.

20. Lateral load resistance for structures supported on footings may be developed in friction between the foundation bottom and the supporting subgrade. A friction coefficient of 0.40 is considered applicable. Where footings are poured neat against firm native soil or engineered fill, a passive lateral earth pressure of 350 pcf may be used. The top 12 inches of soil should be neglected in passive design.

21. Prior to placing concrete, foundation excavations should be cleaned of loose soil and debris and observed by the soils engineer.

Retaining Wall Lateral Pressures

22. Retaining structures should be designed to resist both lateral earth pressures and any additional surcharge loads.

23. Retaining walls may be designed using the following active and passive pressures:

NATIVE SOIL

Slope	Active Pressure	Passive Pressure	Restrained Pressure
Level	40 pcf EFW	350 pcf EFW	60 pcf EFW
3:1 (h:v)	45 pcf EFW	300 pcf EFW	80 pcf EFW
2:1 (h:v)	65 pcf EFW	200 pcf EFW	100 pcf EFW

ENGINEERED FILL

Backslope	Active Pressure	Passive Pressure	Restrained Pressure
Level	35 pcf EFW	350 pcf EFW	55 pcf EFW
3:1 (h:v)	40 pcf EFW	350 pcf EFW	75 pcf EFW
2:1 (h:v)	50 pcf EFW	250 pcf EFW	95 pcf EFW

24. Retaining walls should include an added seismic component of 18 pcf, equivalent fluid weight. Dynamic surcharges should be added to the above active lateral earth pressures. The resultant dynamic pressure should be applied at a point 0.3 H above the base of the wall.

25. The above lateral pressures assume that the walls are fully drained to prevent hydrostatic pressure behind the walls. Drainage materials behind the wall should consist of Class 1, Type A permeable material (Caltrans Specification 68-1.025) or an approved equivalent. The drainage material should be at least 12 inches thick. The drains should extend from the base of the walls to within 12 inches of the top of the backfill. A perforated pipe should be placed (holes down) about 2 inches above the bottom of the wall and be tied to a suitable drain outlet. Wall backdrains should be plugged at the surface with clayey material to prevent infiltration of surface runoff into the backdrains.

26. Retaining wall foundations should be designed in accordance with the foundation recommendations presented in this report.

Concrete Slabs-on-Grade

27. The upper 8 inches of subgrade below concrete slab-on-grade floors, walkways and patios should be compacted to at least 90 percent relative compaction.

28. The upper 8 inches of subgrade below pavements should be moisture conditioned to 2 to 3 percent over optimum moisture content and compacted to 95 percent relative compaction.

29. All slabs-on-grade can be expected to suffer some cracking and movement. However, thickened exterior edges, a well prepared subgrade including pre-moistening prior to pouring concrete, adequately spaced expansion joints and good workmanship should reduce cracking and movement.

30. Dees & Associates, Inc. are not experts in the field of moisture proofing and vapor barriers. In areas where floor wetness would be undesirable, an expert, experienced with moisture transmission and vapor barriers should be consulted. At a minimum, a blanket of 4 inches of free-draining gravel should be placed beneath the floor slab to act as a capillary break. In order to minimize vapor transmission, an impermeable membrane should be placed over the gravel.

Pavements

31. To have the selected pavement sections perform to their greatest efficiency, the grading recommendations provided in this report should be closely followed. Subgrade preparation is very important to the life of pavement.

32. Only quality materials of the type and thickness (minimum) specified should be used. Baserock (R=78 minimum) should meet CALTRANS Standard Specifications for Class 2 Untreated Aggregate Base. Subbase (R=50 minimum) should meet CALTRANS Standard Specifications for Class 2 Untreated Aggregate Subbase.

33. Place the concrete only during periods of fair weather when the free air temperature is within prescribed limits.

34. Develop a maintenance program and perform routine maintenance.

35. Sufficient gradients should be provided for rapid runoff of storm water and to prevent ponding water on or adjacent to the pavement.

Utility Trenches

36. Utility trenches placed parallel to structures should not extend within an imaginary 1.5:1 (horizontal to vertical) plane projected downward from the bottom edge of the adjacent footing.

37. Trenches should be shored in accordance with appropriate safety codes.

38. Trenches may be backfilled with compacted engineered fill placed in accordance with the grading section of this report. The backfill material should not be jetted in place.

39. The portion of utility trenches that extend under slab-on-grade foundations should be sealed with 2-sack sand slurry (or equivalent) to prevent subsurface seepage from flowing under interior floor slabs.

Site Drainage

40. Controlling surface and subsurface runoff is important to the performance of the project.

41. Surface drainage should include provisions for positive gradients so that surface runoff is not permitted to pond adjacent to foundations or other improvements. Where bare soil or pervious surfaces are located next to the foundation, the ground surface within 10 feet of the structure should be sloped at least 5 percent away from the foundation. Where impervious surfaces are used within 10 feet of the foundation, the impervious surface within 10 feet of the structure should be sloped at least 2 percent away from the foundation. Swales should be used to collect and remove surface runoff where the ground cannot be sloped the full 10 foot width away from the structure. Swales should be sloped at least 2 percent towards the discharge point.

42. Full roof gutters should be placed around the eves of the structure. Discharge from the roof gutters should be conveyed away from the downspouts and discharged in a controlled manner.

43. Uncontrolled runoff should not be allowed to flow over the top of the ravine slope. There is loose soil at the top of the slope and concentrated runoff could lead to erosion and slumping along the top of the slope.

44. Impervious surfaces should be limited to reduce the amount of concentrated runoff at the site. Drainage systems should be designed to disperse runoff and allow water to percolate into the ground or runoff should be collected and discharged at the base of the slope into the drainage ravine.

45. Concentrated runoff from residences and driveways may be dispersed at least 60 feet from the top of the slope or discharged at the base of the slope into the natural drainage ravine. Concentrated runoff from the roadway may be collected and either percolated back into the ground at least 120 feet from the top of the ravine or discharged at the base of the slope into the natural drainage ravine.

46. The location of all drainage outlets should be reviewed and approved in the field prior to installation.

Plan Review, Construction Observation, and Testing

47. Dees & Associates, Inc. should be provided the opportunity for a general review of the final project plans prior to construction to evaluate if our geotechnical recommendations have been properly interpreted and implemented. If our firm is not accorded the opportunity of making the recommended review, we can assume no responsibility for misinterpretation of our recommendations. We recommend that our office review the project plans prior to submittal to public agencies, to expedite project review. Dees & Associates, Inc. also requests the opportunity to observe and test grading operations and foundation excavations at the site. Observation of grading and foundation excavations allows anticipated soil conditions to be correlated to those actually encountered in the field during construction.

Dees & Associates, Inc.
Geotechnical Engineers
501 Mission Street, Suite 8A, Santa Cruz, CA 95060
Phone: 831 427-1770
Fax: 831 427-1794

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed in the borings. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that planned at the time, our firm should be notified so that supplemental recommendations can be given.

2. This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information and recommendations contained herein are called to the attention of the Architects and Engineers for the project and incorporated into the plans, and that the necessary steps are taken to ensure that the Contractors and Subcontractors carry out such recommendations in the field. The conclusions and recommendations contained herein are professional opinions derived in accordance with current standards of professional practice. No other warranty expressed or implied is made.

3. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated, wholly or partially, by changes outside our control. Therefore, this report should not be relied upon after a period of three years without being reviewed by a soil engineer.

APPENDIX A

Site Vicinity Map

Boring Site Plan

Geologic Map

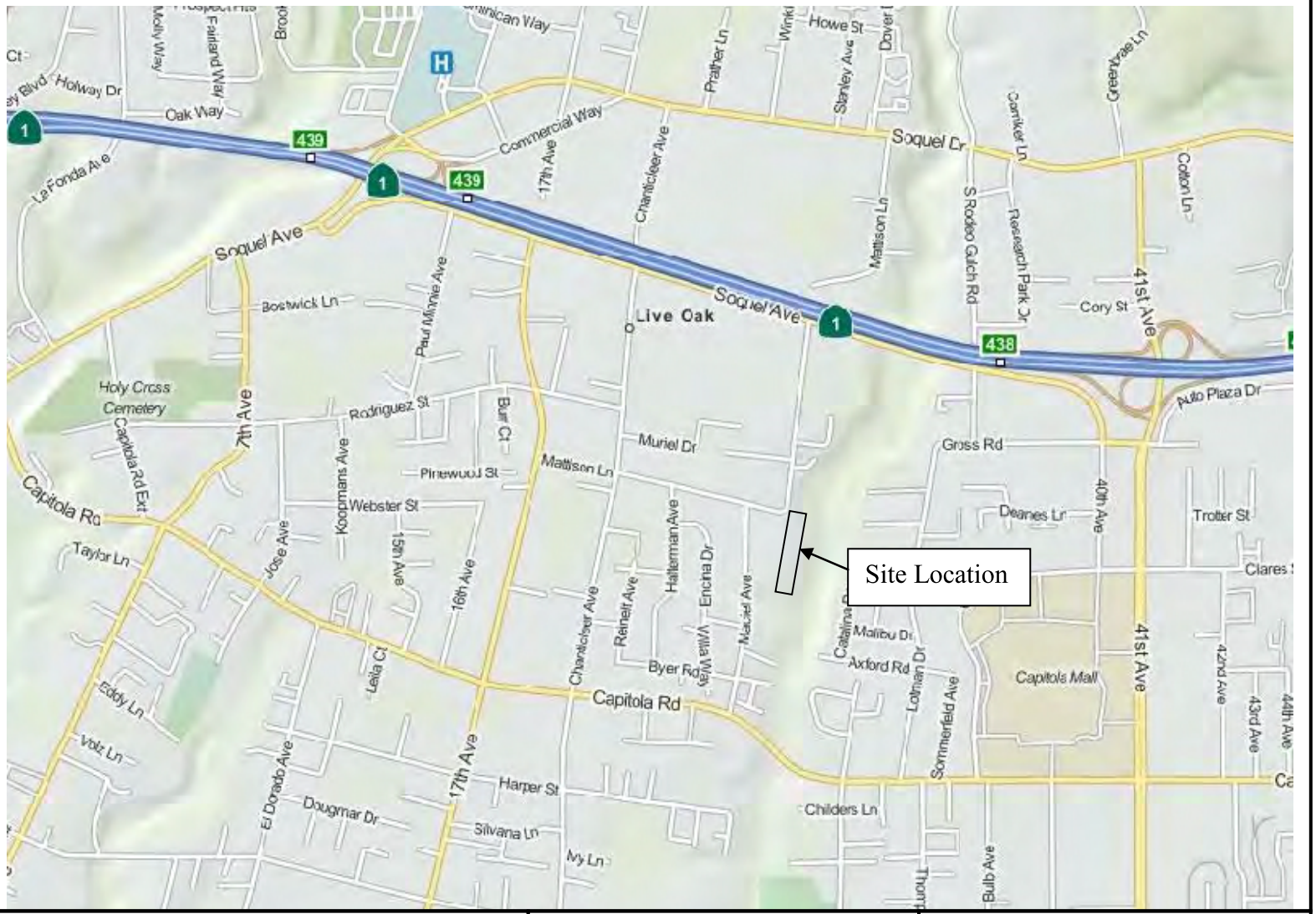
Liquefaction Map

Liquefaction Analysis Results

Unified Soil Classification System

Logs of Test Borings

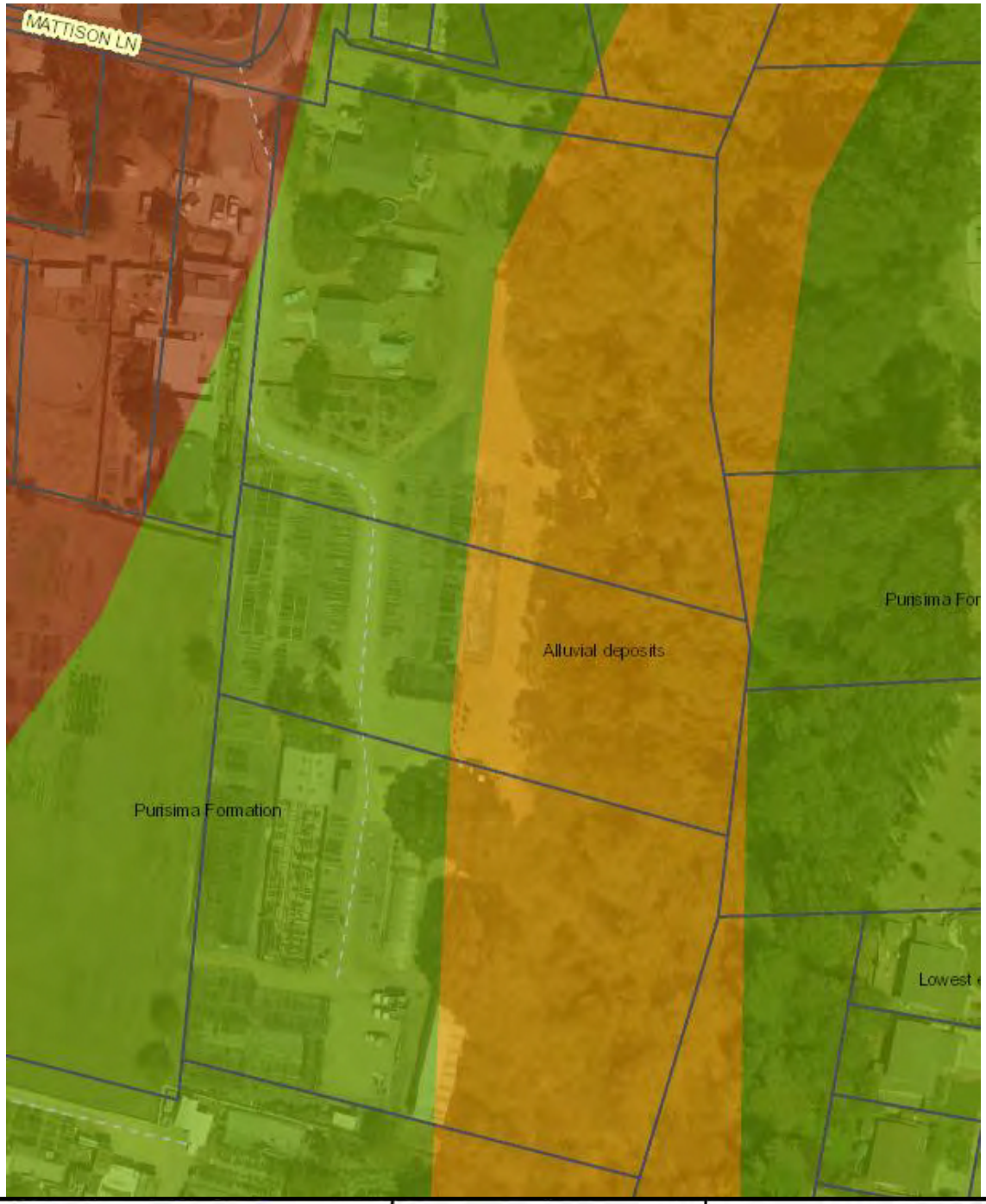
Laboratory Test Results



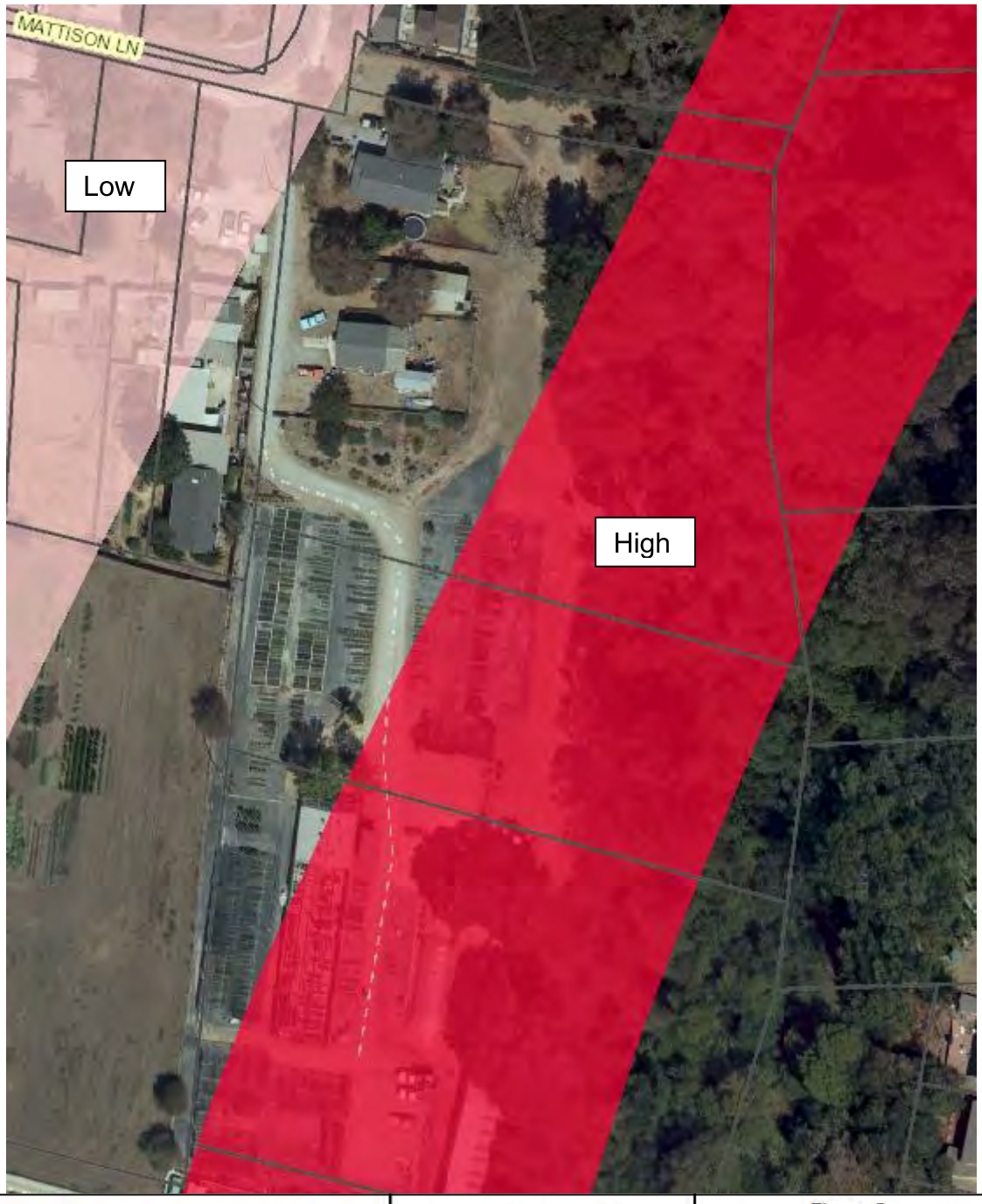
Dees & Associates, Inc. Geotechnical Engineers	**SITE VICINITY MAP**	Figure: 1
		Project Number: SCR-0636
	Mattison Lane Santa Cruz County, California	Scale: N.T.S. / February 2013

Dees &
SCR-0

Dees & Associates, Inc. Geotechnical Engineers	**BORING SITE PLAN**	Figure: 5
		Project Number: SCR-0636
	Mattison Lane Santa Cruz County, California	Scale: N.T.S. / February 2013



Dees & Associates, Inc. Geotechnical Engineers	**GEOLOGIC MAP**	Figure: 3
		Project Number: SCR-0636
	Mattison Lane Santa Cruz County, California	Scale: N.T.S. / February 2013



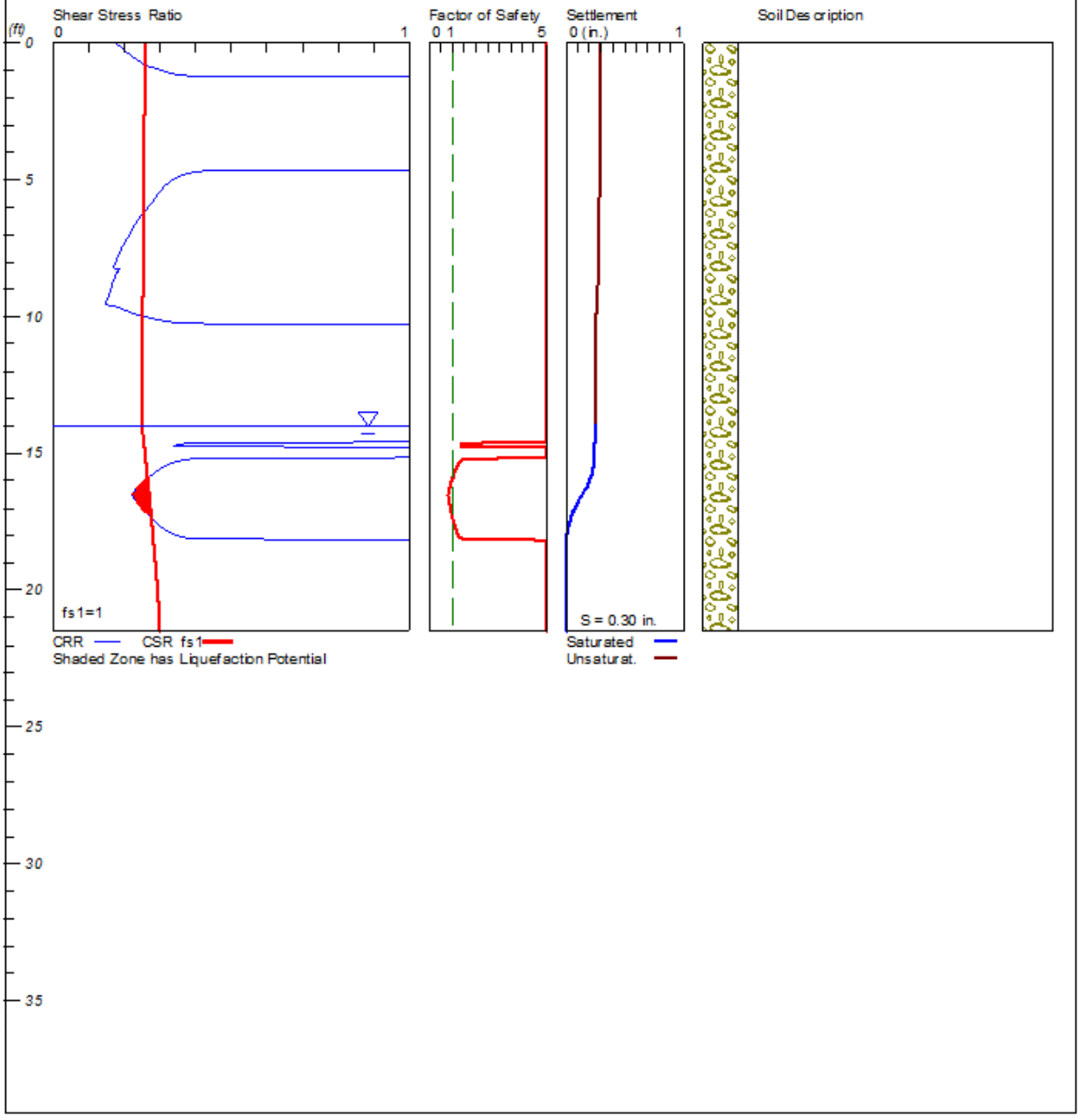
Dees & Associates, Inc. Geotechnical Engineers	**LIQUEFACTION MAP**	Figure: 5
		Project Number: SCR-0636
	Mattison Lane Santa Cruz County, California	Scale: N.T.S. / February 2013

LIQUEFACTION ANALYSIS

Mattison Lane

Hole No.= Water Depth=14 ft

Magnitude=7.9
Acceleration=0.40g



CivilTech Corporation **SCR-0636** **Plate A-1**

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES	CLASSIFICATION CRITERIA	
COARSE-GRAINED SOILS** MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE (THE NO. 200 SIEVE SIZE IS ABOUT THE SMALLEST PARTICLE VISIBLE TO THE NAKED EYE)	**GRAVELS** MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS (< 5% FINES)	**GW**	Well-graded gravels, gravel-sand mixtures, little or no fines	Wide range in grain sizes and substantial amounts of all intermediate particle sizes	
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Predominantly one size or a range of sizes with some intermediate sizes missing Not meeting all gradation requirements for GW	
		GRAVELS WITH FINES (>12% FINES)	**GM**	Silty gravels, gravel-sand-silt mixtures	Non plastic fines or fines with low plasticity Atterberg limits below "A" line or PI < 4	Above "A" line with 4 < PI < 7 are borderline cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures	Plastic fines Atterburg limits above "A" line with PI > 7	
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS (<5% FINES)	**SW**	Well-graded sands, gravelly sands, little or no fines	Wide range in grain sizes and substantial amounts of all intermediate sizes missing	
			SP	Poorly graded sands, gravelly sands, little or no fines	Predominantly one size or a range of sizes with some intermediate sizes missing Not meeting all gradation requirements for SW	
		SANDS WITH FINES (>12% FINES)	**SM**	Silty sands, sand-silt mixtures	Non plastic fines or fines with low plasticity Atterburg limits below "A" line or PI < 4	Limits plotting in hatched zone with 4 < PI < 7 are borderline cases requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures	Plastic fines Atterburg limits above "A" line with PI > 7	
FINE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE (THE NO. 200 SIEVE SIZE IS ABOUT THE SMALLEST PARTICLE VISIBLE TO THE NAKED EYE)	SILTS AND CLAYS (LIQUID LIMIT < 50)		**ML**	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity		
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			OL	Organic silts and organic silty clays of low plasticity		
	SILTS AND CLAYS (LIQUID LIMIT > 50)		**MH**	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			CH	Inorganic clays of medium to high plasticity, organic silts		
			OH	Organic clays of medium to high plasticity, organic silts		

**Gravels and sands with 5% to 12 % fines are borderline cases requiring use of dual symbols.

RELATIVE DENSITY OF SANDS AND GRAVELS

DESCRIPTION	BLOW / FT*
VERY LOOSE	0 – 4
LOOSE	4 – 10
MEDIUM DENSE	10 – 30
DENSE	30 – 50
VERY DENSE	OVER 50

CONSISTENCY OF SILTS AND CLAYS

DESCRIPTION	BLOWS / FT*
VERY SOFT	0 – 2
SOFT	2 – 4
FIRM	4 – 8
STIFF	8 – 16
VERY STIFF	16 – 32
HARD	OVER 32

*Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. 12 vertical inches.

L M T B

SAMPLE TYPES REFERENCED ON BORING LOGS

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 1

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1			2 inches of aggregate base at surface										
2	1-1-1 L		Dark brown fine Silty SAND, moist, loose to medium dense	SM									
3	1-2 T		Orange brown fine Clayey SAND, moist, medium dense (low plasticity)	SC	11 22	104.8	17.3						
4													
5	1-3 T		Orange brown Clayey SAND, moist, loose to medium dense (non-plastic)										
6					8		14.9				31.7		
7													
8													
9													
10	1-4 T		Orange brown Gravelly SAND or Sandy GRAVEL (1/2" to 2" rounded), damp, dense	SW									
11					42								
12			Olive brown fine Silty SAND, very moist, medium dense	SM									
13			Coarse SAND from 12 to 15 feet.										
14			▼ Perched groundwater at 14 feet										
15	1-5 T		Fine Silty SAND, moist below 15 feet, medium dense										
16					18		22.0				19.1		
17			Boring terminated at 16.5 feet. Perched groundwater perched at 14 feet.										
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 2

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1	2-1-1 L		Olive brown and dark brown CLAY, moist, medium stiff	CL									
2					6								
3	2-2 T		Mottled orange brown Clayey SAND with angular gravels, moist, medium dense	SC									
4					17		20.3						
5	2-3 T				22								
6													
7													
8	2-4 T												
9			Mottled orange brown Clayey SAND with angular gravels, moist, medium dense		24		16.9						
10													
11			▼ Perched groundwater										
12	2-5-1 L		Olive brown Sandy SILT grading to										
13			Olive brown with orange mottling Silty SAND, moist, dense	SM	32	78.7	38.0						
14	2-6 T												
15					34								
16			Boring terminated at 15 feet. Groundwater perched at 11 feet.										
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 3

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1			6 inches of Gravel										
	3-1-1 L		Dark brown fine Silty SAND, moist, very loose	SM									
2			Dark brown fine Sandy CLAY, moist, soft	SC	3	104.2	17.5						
3	3-2 T												
4					3		14.9				64.5		
5	3-3-1 L												
6			Brown fine Silty SAND, moist, loose	SM	6	117.5	14.0						
7													
8													
9			Orange brown Silty SAND, moist, medium dense around 8 feet										
10	3-4 T		▼ Groundwater										
11			Orange brown Gravelly SAND, very moist, medium dense	SW	20		17.6						
12													
13													
14			Olive brown fine Silty SAND, wet, medium dense	SM									
15													
16			Boring terminated at 15 feet. Groundwater perched at 10 feet.										
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 4

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1	4-1-1 L		Dark brown fine Silty SAND, moist, very loose	SM									
2			lens of grey sand at 2.5 feet										
3			Dark brown Silty SAND		3								
4				SW									
5	4-2 T		Dark brown Silty SAND and orange brown Gravelly SAND, moist, very loose		5								
6													
7				SW									
8			Orange brown Gravelly SAND, moist, medium dense										
9													
10	4-3-2 L		Orange brown SAND, damp, medium dense	SM	19								
11			Orange brown Gravelly SAND, moist, medium dense	SW									
12													
13													
14			Cobbles from 14 feet to 14.5 feet.	SM									
15	4-4 T		Light grayish brown with orange Silty SAND/SAND with Silt, damp, dense										
16					28								
17													
18													
19													
20	4-5-1 L												
21			Orange brown and grey SAND with Silt, damp, very dense		47								
22			Boring terminated at 21.5 feet. No groundwater encountered.										
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 5

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1	5-1-1		Dark brown Silty SAND, moist, loose	SM									
2	5-2		Brown Silty SAND, moist, loose	SM	8	104.8	20.0						
3					6								
4			Boring terminated at 5 feet. No groundwater encountered.										
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 6

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1	6-1-1 L		Dark brown Silty SAND, moist, loose	SM	8								
2													
3	6-2 T		Orange brown Silty SAND, moist, loose	SM	4		20.8						
4													
5	6-3 T		Approximate contact Grey brown Clayey SAND, moist, loose	SC	5								
6													
7													
8	6-4 T		Orange brown SAND with Silt, damp to moist, medium dense	SM									
9													
10			Orange brown Sandy GRAVEL, damp, dense	SW	27								
11													
12													
13													
14													
15	6-5 T		Grey brown with orange Silty SAND, moist, wet from 15 to 16 feet, medium dense	SM	16								
16													
17			Boring terminated at 16.5 feet. No groundwater encountered.										
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 7

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1	7-1-1 L		Dark brown Silty SAND, moist, loose	SM	7	108.7	18.5						
2													
3	7-2 T		Orange brown Clayey SAND, moist, medium dense	SC	16		21.8					9.6	
4													
5	7-3 T		Orange brown Clayey SAND, moist, medium dense		10								
6													
7													
8													
9													
10			Orange brown Gravelly SAND, moist, medium dense Grades to Sandy GRAVEL with Cobbles at 11.5 feet	SW									
11													
12			Boring terminated at 11.5 feet. No groundwater encountered.										
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 8

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1			Dark brown Silty SAND, moist, loose	SM									
2													
3	8-1-1 L		Orange brown Clayey SAND, moist, medium dense	SC									
4					13	95.3	24.0	27.0	395	30			
5			Boring terminated at 4.5 feet. No groundwater encountered.										
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 9

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1			Dark brown mottled with orange brown Silty Clayey SAND, moist, loose	SC									
5	9-1-1 L		Dark brown mottled orange brown Clayey SAND (chunk of sandstone at tip of sample), moist, loose to medium dense		10								
8			Approximate contact										
10	9-2-1 L		Orange brown mottled brown Sandy SILT with Gravel, moist, medium dense	ML	16								
13			Dark brown Silty SAND, moist, medium dense ▼ Groundwater at 13 feet.	SM									
15	9-3-1 L		Orange brown with grey Silty SAND, damp, very dense	SM	39								
16			Boring terminated at 16.5 feet. Groundwater encountered at 13 feet.										

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

TEST BORING LOGS

LOGGED BY: BD DATE DRILLED: 1-30-2013 BORING TYPE: 6" Solid Stem BORING NO: 10

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX	MISC. LAB RESULTS
1			Dark brown Silty SAND, moist, loose	SM									
2													
3			Orange brown Clayey SAND, moist, medium dense	SC									
4			Boring terminated at 4 feet. No groundwater encountered.										
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
501 MISSION ST., STE. 8A
SANTA CRUZ, CA 95060
Ph: (831) 427-1770 Fax: (831) 427-1794

Project No. SCR-0636

Consolidated – Drained (CD)
Direct Shear Test Results

Project Number: SCR-0636

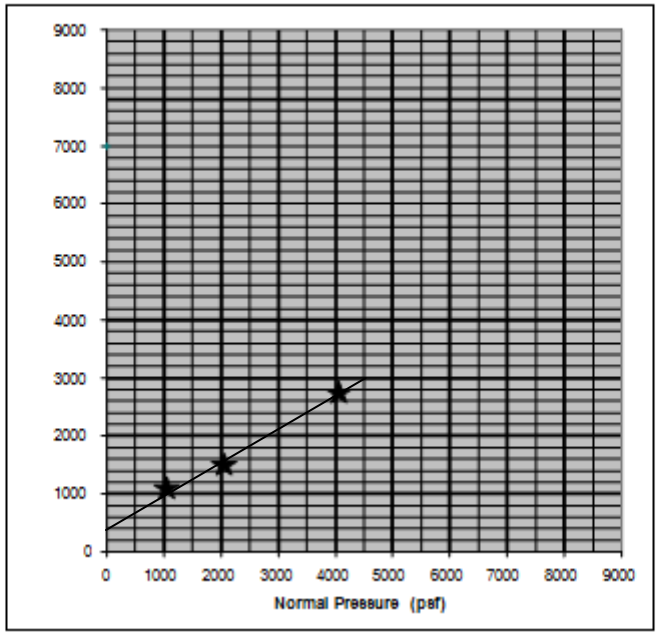
Project Name: Mattison Lane

Date: February 12, 2013

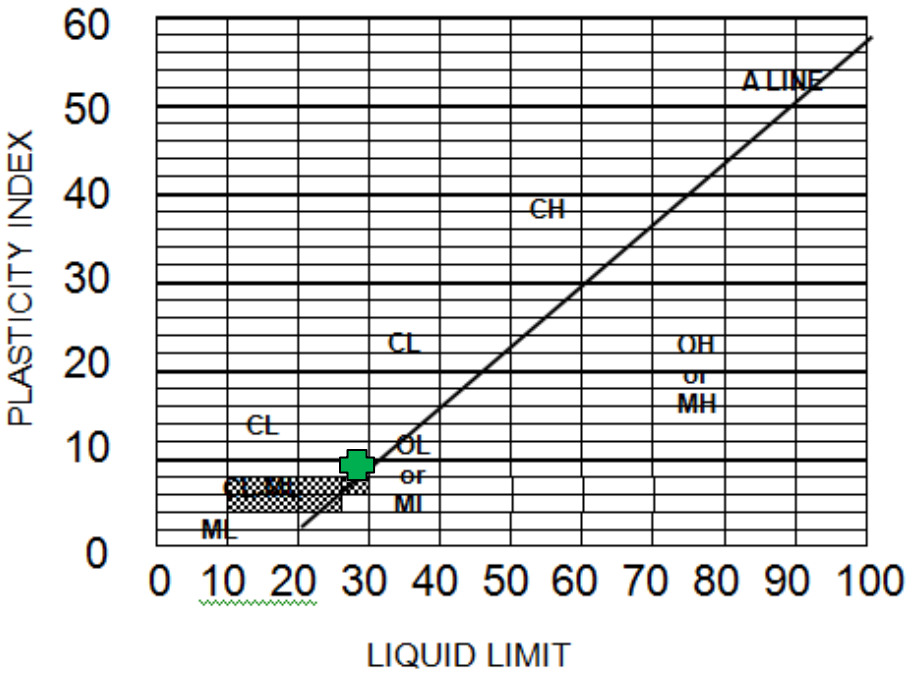
Sample No: 8-1-1

Test Notes: Ring samples were saturated 24 hours prior to shearing.

Ring No.	Normal Pressure (psf)	Shear Strength (psf)	In-Situ Moisture Content (%)	Saturated Moisture Content (%)	In-Situ Dry Density (pcf)
1	1030	1041.1	24.5	26.7	93.3
2	2030	1509.1	24.4	27.5	94.5
3	4030	2766.2	23.9	27.4	95.8
4			23.1	26.2	97.5



Phi = 30˚
C= 395 psf



MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	**ML**	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
CH	Inorganic clays of medium to high plasticity, organic silts, fat clays	**CL**	Inorganic clays of low to medium plasticity, gravelly clay sandy clays, silty clays, lean clays
OH	Organic clays of medium to high plasticity, organic silts	**OL**	Organic silts and organic silty clays of low plasticity
Pt	Peat and other highly organic soils		

PLASTICITY DATA

SYMBOL	SAMPLE NO.	DEPTH (FEET)	IN-SITU MOISTURE CONTENT (%)	LIQUID LIMIT (%	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX (W-PL)/ (LL PL)	UNIFIED SOIL CLASSIFICATION SYMBOL
✚	7-2	3.5	21.8	29.0	19.4	9.6	0.25	CL

APPENDIX E
PERCOLATION RATE STUDY

Dees & Associates, Inc.
Geotechnical Engineers
501 Mission Street, Suite 8A Santa Cruz, CA 95060 Phone (831) 427-1770 www.deesgeo.com

March 2, 2020 Project No. SCR-1420

CLAUDIO LOCATELLI
% Swift Consulting Services
500 Chestnut Street, Suite 100
Santa Cruz, California 95060

Subject: Percolation Test Results

Reference: Proposed Townhouse Development
Mattison Lane, Santa Cruz
APN'S 029-391-01, 02 & 03
Santa Cruz County, California

Dear Mr. Locatelli:

This report presents a summary of our percolation test results for the referenced site. The site is located on Mattison Lane, APN'S 029-391-01, 02 & 03 in Santa Cruz County, California.

Our scope of work included installation of four (4) percolation test borings drilled approximately 5 to 9 feet in depth, percolation testing, engineering analysis and preparation of this report. At some of the test locations, we drilled preliminary borings to determine appropriate depths for the percolation test holes. A total of eight (8) holes were drilled and four of the holes were set up for percolation testing. Figure 1, depicts the approximate locations of our borings. The soils encountered in our test borings are included on the test boring logs, Figures 2 to 9.

Upon removal of the loose soil from the 6-inch diameter borings, a couple inches of pre-washed pea gravel was placed at the bottoms. The test holes were fitted with 3-inch diameter, slotted, PVC pipe and the annuluses were packed with pre-washed pea gravel. The percolation holes were pre-saturated with water twenty-four hours prior to testing.

There was still water in the test holes when we returned the next day to perform the testing so we did not add any more water. We performed the test by measuring the height of the water every 30 minutes for a period of 4 hours.

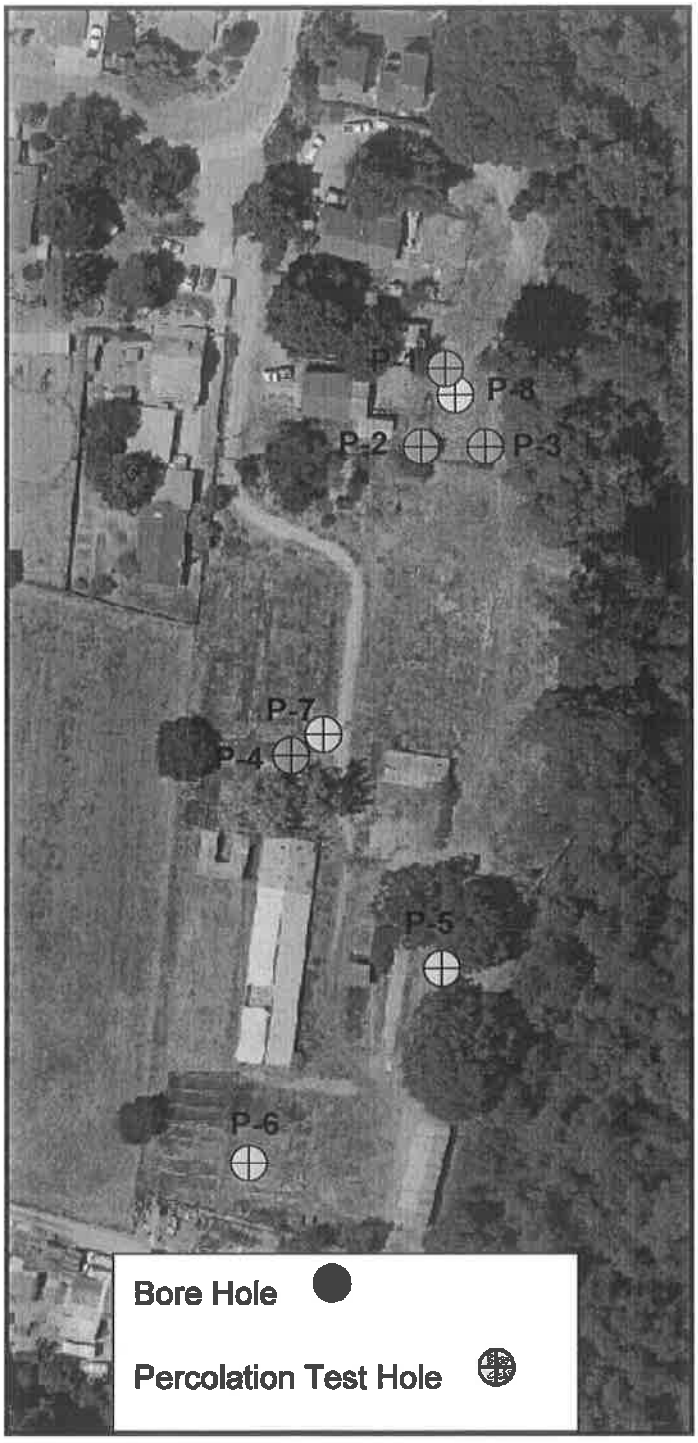
Our test results indicated the percolation rates range from 0.02 to 0.06 inches per hour which indicates the site is not suitable for on-site retention. Our raw field data was adjusted to account for the presence of a gravel and pipe in the hole and the surface area being tested. Our field data and calculations are attached. See Figures 10 to 14.

DEES & ASSOCIATES, INC.

Rebecca L. Dees
Geotechnical Engineer
G.E. 2623

REGISTERED PROFESSIONAL ENGINEER
REBECCA LYNN DEES
GE-2623
EXPIRES: 3/21
GEOTECHNICAL
STATE OF CALIFORNIA

Attachments
Copies: 2 to Addressee
1 to Ifland Engineers



Boring Locations
Figure 1

TEST BORING LOG

SCR-1420
Mattison Lane

LOGGED BY: CL | DATE DRILLED: 12/19/19 | BORING TYPE: 6" SOLID STEM | BORING NO: P-1

DEPTH (feet)	SAMPLE NO.		SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
1	1-1 B		Dark gray silty CLAY, moist, drills firm										
3	1-2 B		Light yellowish-brown Silty CLAY, moist, drills firm										
4			Boring Terminated at 4 Feet No Groundwater Encountered										

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 2

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-1420
Mattison Lane

LOGGED BY: CL | DATE DRILLED: 12/19/19 | BORING TYPE: 6" SOLID STEM | BORING NO: P-2

DEPTH (feet)	SAMPLE NO.	SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
1		Yellowish-brown Silty CLAY, moist										
2												
3												
4												
5												
6		Yellowish-brown fine Sandy SILT, moist										
7												
8		Gravelly										
9		▼ Groundwater Rose to 8.5 feet										
10		Gravelly loose SAND, wet										
11		▼ Groundwater First Encountered at 11 feet										
12												
13		Boring Terminated at 12 Feet										
14		No Groundwater Encountered										
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 3

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-1420
Mattison Lane

LOGGED BY: CL | DATE DRILLED: 12/19/19 | BORING TYPE: 6" SOLID STEM | BORING NO: P-3

DEPTH (feet)	SAMPLE NO.		SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
1			Yellowish-brown Silty CLAY, moist, firm										
2													
3													
4													
5													
6													
7			Yellowish-brown fine Sandy SILT, with Gravel, moist, firm										
8													
9			Boring Terminated at 8 Feet No Groundwater Encountered										
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 4

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-1420
Mattison Lane

LOGGED BY: CL | DATE DRILLED: 12/19/19 | BORING TYPE: 6" SOLID STEM | BORING NO: P-4

DEPTH (feet)	SAMPLE NO.	SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
1	4-1 B	Dark grayish-brown Silty CLAY, moist, firm										
2												
3	4-2 B	Yellowish-brown fine Sandy SILT to CLAY, moist, firm										
4												
5		Boring Terminated at 4 Feet No Groundwater Encountered										
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 5

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-1420
Mattison Lane

LOGGED BY: CL | DATE DRILLED: 12/19/19 | BORING TYPE: 6" SOLID STEM | BORING NO P-5

DEPTH (feet)	SAMPLE NO.	SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
1		Dark grayish-brown Clayey fine SAND, very moist										
2												
3		Yellowish-brown fine Sandy SILT, moist										
4												
5		Boring Terminated at 4 Feet No Groundwater Encountered										
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 6

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-1420
Mattison Lane

LOGGED BY: CL | DATE DRILLED: 12/19/19 | BORING TYPE: 6" SOLID STEM | BORING NO: P-6

DEPTH (feet)	SAMPLE NO.	SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
1	6-1 B	Gray Silty CLAY, moist, firm										
3	6-2 B	Yellowish-brown Silty CLAY, moist										
6	6-3 B	Yellowish-brown fine Sandy SILT with Gravel, moist										
8		Boring Terminated at 8 Feet No Groundwater Encountered										

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 7

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-1420
Mattison Lane

LOGGED BY: CL | DATE DRILLED: 12/19/19 | BORING TYPE: 6" SOLID STEM | BORING NO: P-7

DEPTH (feet)	SAMPLE NO.	SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
1		Dark grayish-brown Silty CLAY										
2												
3		Yellowish-brown fine Sandy CLAY, moist										
4												
5												
6		Yellowish-brown Clayey fine Sandy SILT with Gravel, moist										
7												
8		Boring Terminated at 7 Feet No Groundwater Encountered										
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 9A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 8

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

TEST BORING LOG

SCR-1420
Mattison Lane

LOGGED BY: CL | DATE DRILLED: 12/19/19 | BORING TYPE: 6" SOLID STEM | BORING NO: P-8

DEPTH (feet)	SAMPLE NO.		SOIL DESCRIPTION	USCS SOIL TYPE	FIELD BLOW COUNT	SPT BLOW COUNT*	DRY DENSITY (PCF)	MOISTURE (%) IN-SITU	MOISTURE (%) SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE	PLASTICITY INDEX
1			Dark gray Silty CLAY										
2			Yellow brown Silty CLAY										
3													
4													
5													
6													
7			Yellow brown fine Sandy SILT with Gravel, moist										
8			Boring Terminated at 7 Feet No Groundwater Encountered										
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC.
501 MISSION ST. STE. 8A | SANTA CRUZ, CA 95060
www.deesgeo.com | (831) 427-1770

Figure 9

* Blow count converted:
L = Field Blow Count / 2
M = Field Blow Count / 1.5

PERCOLATION RATE CALCULATIONS

Project No.	SCR-1420	**Percolation Test Method**
Project Name:	Mattison Ln	**Falling Head** ☒
Date:	1/2/20	**Constant Head** ☐
Performed By:	BD	
Test No:	B-5	

Boring Diameter (inches)	6
Diameter of Insert Pipe (inches)	3
Void Ratio of Annulus Fill	0.4

Design Infiltration Rate (Q/A*Δt)
0.024 in/hr

Measured Flow in Field (in/hr)	0.5
Depth of Infiltration Zone (ft)	3.6 (Height of test zone)

Volume of water infiltrated in 1 hour (cf/hr)	0.004
Surface area of infiltration zone (sf)	2.277

Volume of water infiltrated in 1 hour	
Depth of Infiltration Zone	
Height of Water at Start of Test	
Height of Water at End of Test	

Area of boring (sf)	**0.196**
Area of insert pipe (sf)	**0.049**
Area of Annulus (sf)	0.147
Volume of voids (cf)	0.059
Volume per foot (cf)	0.108

Correction factor = volume of voids/volume of boring **0.55**

Figure 10

PERCOLATION RATE CALCULATIONS

Project No.	SCR-1420	**Percolation Test Method**
Project Name:	Mattison Ln	Falling Head ☒
Date:	1/2/20	Constant Head ☐
Performed By:	BD	
Test No:	B-6	

Boring Diameter (inches)	6
Diameter of Insert Pipe (inches)	3
Void Ratio of Annulus Fill	0.4

Design Infiltration Rate (Q/A*Δt)
0.063 in/hr

Measured Flow in Field (in/hr)	1.3
Depth of Infiltration Zone (ft)	3.3 (Height of test zone)

Volume of water infiltrated in 1 hour (cf/hr)	0.012
Surface area of infiltration zone (sf)	2.218

Volume of water infiltrated in 1 hour	
Depth of Infiltration Zone	
Height of Water at Start of Test	
Height of Water at End of Test	

Area of boring (sf)	0.196
Area of insert pipe (sf)	0.049
Area of Annulus (sf)	0.147
Volume of voids (cf)	0.059
Volume per foot (cf)	0.108

Correction factor = volume of voids/volume of boring 0.55

Figure 11

PERCOLATION RATE CALCULATIONS

Project No.	SCR-1420	**Percolation Test Method**
Project Name:	Mattison Ln	Falling Head ☒
Date:	1/1/20	Constant Head ☐
Performed By:	BD	
Test No:	B-7	

Boring Diameter (inches)	6
Diameter of Insert Pipe (inches)	3
Void Ratio of Annulus Fill	0.4

Design Infiltration Rate (Q/A*Δt)
0.048 in/hr

Measured Flow in Field (in/hr)	1.1	
Depth of Infiltration Zone (ft)	4.5	(Height of test zone)

Volume of water infiltrated in 1 hour (cf/hr)	0.010
Surface area of infiltration zone (sf)	2.453

Volume of water infiltrated in 1 hour	
Depth of Infiltration Zone	
Height of Water at Start of Test	
Height of Water at End of Test	

Area of boring (sf)	**0.196**
Area of insert pipe (sf)	**0.049**
Area of Annulus (sf)	**0.147**
Volume of voids (cf)	**0.059**
Volume per foot (cf)	**0.108**

Correction factor = volume of voids/volume of boring **0.55**

Figure 12

PERCOLATION RATE CALCULATIONS

Project No.	SCR-1420	**Percolation Test Method**
Project Name:	Mattison Ln	Falling Head ☒
Date:	1/2/20	Constant Head ☐
Performed By:	BD	
Test No:	B-8	

Boring Diameter (inches)	6
Diameter of Insert Pipe (inches)	3
Void Ratio of Annulus Fill	0.4

Design Infiltration Rate (Q/A*Δt)
0.034 in/hr

Measured Flow in Field (in/hr)	0.8
Depth of Infiltration Zone (ft)	4 (Height of test zone)

Volume of water infiltrated in 1 hour (cf/hr)	0.007
Surface area of infiltration zone (sf)	2.355

Volume of water infiltrated in 1 hour	
Depth of Infiltration Zone	
Height of Water at Start of Test	
Height of Water at End of Test	

Area of boring (sf)	**0.196**
Area of insert pipe (sf)	**0.049**
Area of Annulus (sf)	**0.147**
Volume of voids (cf)	**0.059**
Volume per foot (cf)	**0.108**

Correction factor = volume of voids/volume of boring **0.55**

Figure 13

APPENDIX F
DOWNSTREAM ANALYSIS

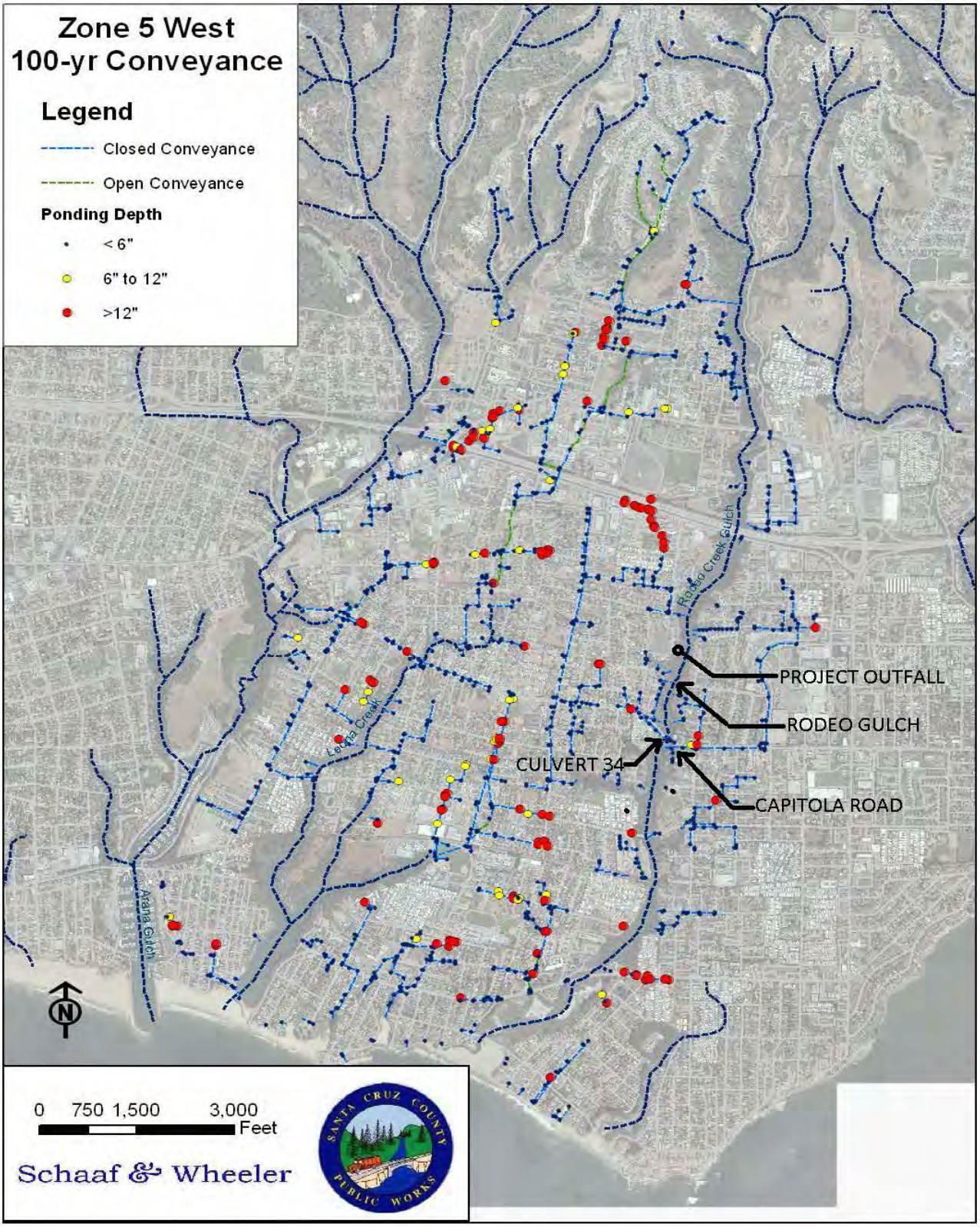
APPENDIX E - DOWNSTREAM ANALYSIS

DOWNSTREAM CONDUIT DATA From SCCO 2013 Stormwater Master Plan

CONDUIT	CAPACITY (cfs)	Q10 (cfs)	Q25 (cfs)	Q50 (cfs)	Q100 (cfs)
RODEO GULCH - OPEN CHANNEL (BETWEEN PROJECT OUTFALL & CULVERT 34)	675	371	574	744	945
CULVERT 34 - (2) 60" Diameter (CAPITOLA ROAD CROSSING)	948	382			970

DOWNSTREAM CONDUIT MAP

County 2013 Zone 5 Master Plan - Drainage Capacity Map



FEMA's National Flood Hazard Layer (NFHL) Map

Analysis:

Per Santa Cruz County Design Criteria: Large Projects shall conduct a downstream impact assessment in accordance with Sections H and I of Design Criteria. The below comment indicate adherence or shortcomings of each sub-section.

Design Criteria - Section H - Hydrology - Minimum Design Requirement Adherence

1. Project outfalls into Rodeo Gulch, a floodway. Gulch 100 year flood elevation (56') does not threaten inundation of structures. Existing Downstream culvert at Capitola Road is undersized for 100 year storm. (culvert capacity is 948cfs, 100 year flow is 970cfs).
2. N/A, calculations not conducted, 2013 County Stormwater Masterplan data used.
3. " "
4. " "
5. " "
6 " "
7 " "

Design Criteria - Section I - Hydraulic Requirement Adherence

1. N/A, calculations not conducted, 2013 County Stormwater Masterplan data used.
2. " "
3. No structures at risk. Near by improvements all built above 100 year flood elevation (56').
4. No roadway overflows proposed or created by this project.
5. No on-site flood overflows. 100 year flood elevation (56') well below all site improvements.
6. N/A, calculations not conducted, 2013 County Stormwater Masterplan data used.
7. " "
8. " "
9. " "
10. No gutter flooding in downstream system. Downstream system is Rodeo Gulch
11. N/A, calculations not conducted, 2013 County Stormwater Masterplan data used.

Downstream Analysis Findings

Downstream system consists of an existing regional 100 year flood way. No reasonable improvements can be made to elevate 100 year flood condition.

SANTA CRUZ COUNTY SANITATION DISTRICT

701 OCEAN STREET, SUITE 410 · SANTA CRUZ, CA · 95060-4073
(831) 454-2160 · FAX (831) 454-2089 · TDD: (831) 454-2123 · WWW.SCCSD.US
MATT MACHADO, DISTRICT ENGINEER

August 15, 2024

SEAN SWIFT
500 CHESTNUT ST., STE 100
SANTA CRUZ, CA 95060

SUBJECT:	SEWER AVAILABILITY AND DISTRICT'S CONDITIONS OF SERVICE FOR THE FOLLOWING PROPOSED DEVELOPMENT
APN:	(029-061-19), (029-391-01), (029-391-02), (029-391-03)
APPLICATION NO.:	N/A
PARCEL ADDRESS:	2450 MATTISON LN, SANTA CRUZ, CA 95062
PROJECT DESCRIPTION:	DEMOLISH EXISTING STRUCTURES AND DEVELOP 16 RESIDENTIAL DWELLING UNITS ON FOUR EXISTING PARCELS

Dear Mr. Swift:

The District has received your inquiry regarding sewer service availability for the subject parcel(s). Sewer service is conditionally available for the proposed development. These parcels are located within the Rodeo Basin Sewer moratorium area. As such, a maximum of four residential sanitary sewer connections shall be allowed per existing parcel. The proposed development of four existing parcels shall be allowed to connect not more than sixteen residential dwelling units total.

The Sanitation District is actively pursuing projects to improve the public sewer infrastructure within the Rodeo Basin moratorium area. Once construction contracts are awarded for the necessary sewer infrastructure upgrades, the applicant may re-apply for a revised availability letter. Capacity for any additional connections shall be re-assessed at that time.

This notice is valid for one year from the date of this letter. If, after this time frame, this project has not yet received approval from the Planning Department, then this determination of availability will be considered to have expired. If that occurs or is likely to occur prior to an upcoming submittal or public hearing, please call us ahead of time for a new letter. At that time, we can evaluate the then proposed use, improvements, and downstream capacity, and provide a new letter.

For your reference, we have attached a list of common items required during the review of sanitation projects.

Thank you for your inquiry. If you have any questions, please call Bryan Wardlow at (831) 454-2160.

Yours truly,

MATT MACHADO
District Engineer

By: DocuSigned by:
528D647137C44D4...
Ashleigh Trujillo
Sanitation Engineer

BW/arg:24-103.docx

Common Items Required During the Review of Sanitation Projects

What to show on the drawings: When you begin the design process, please show:

On the plot/site/utility plan:

1. Location of any **existing** on-site sewer lateral(s), clean-out(s), and connection(s) to existing public sewer on the site (plot) plan.

2. Location of any **proposed** on-site sewer lateral(s), clean-out(s), and connection(s) to existing public sewer on the site (plot) plan.

   Place a note, *"Existing" or "(E)"*,on each existing item that is to be removed.
   Place a note, *"To be removed"*, on each existing item that is to be removed.
   Place a note, *"New" or "(N)"*, on each item that is to be new.

On a floor plan:

1. All plumbing fixtures both existing and new (label *"(E)"* or "*(N)*") on a floor plan of the entire building. Completely describe all plumbing fixtures according to table T-702.1 of the California Plumbing Code. (Sanitation District Code sections 7.04.040 and 7.04.430)

Design and Construction Standards

The project sewer design and connection of the project to the Santa Cruz County Sanitation District system will be required to conform to the County of Santa Cruz Design Criteria (CDC) Part 4, Sanitary Sewer Design, February 2017 edition. Reference for County Design Criteria: http://www.dpw.co.santa-cruz.ca.us/Portals/19/pdfs/Design%20Crit/DESIGNCRITERIA.pdf

Demolition and sewer abandonment

If the proposed plans will involve some demolition, the existing sewer lateral(s) must be properly abandoned (including inspection by District) prior to issuance of demolition permit or relocation or disconnection of structure. An abandonment permit (either temporary or permanent) for disconnection work must be obtained from the District. This process is often overlooked until the last minute and can result in unnecessary delays, and you are encouraged to plan for the relatively short time and small expense to fulfill this requirement. There is no charge for either permit or inspection. (Sanitation District Code section 7.04.410)

New Connection

If the proposed plans will involve one or more new sewer connections, we must issue a new sewer connection permit for each new connection. The final connection charges can be determined only after the District and, as needed, other Department of Public Works divisions have reviewed and approved the final engineered sewer improvement plans. (Sanitation District Code section 7.04.410)

Multi-unit development with a private collector line

If the development will require a private collector line serving several separate units or parcels, which will be individually and separately owned, prior to any land split or building permit, the applicant must form a homeowners' association with ownership and maintenance responsibilities for all on-site sewers for this project. Please reference this homeowner's association directly on the *tentative map* and *final map,* as well as in the Association's recorded CC&R's. Please record those

CC&Rs, and provide a copy of the recorded documents, with proof of recordation, to the District prior to the filing of the final map.

Increase in the number of plumbing fixtures

If the proposed plans will involve an increase in the fixture unit count for the existing sewer connection, additional fixture unit fees may be due. The exact amount will be calculated at the time a Sewer Connection Permit is issued. (Sanitation District Code section 7.04.040)

Tentative, parcel, or final map required

When any new *tentative, parcel,* or *final* map is required, please show the following on the improvement plans (The plans must conform to the County's "Design Criteria"):

1. All adjacent or impacted roads and easements,
2. All on- and off-site sewer improvements needed to provide service to each lot or unit proposed.

If a tentative, parcel, or final map is NOT required, please provide to the District written proof of recordation (in the form of copies of the recorded documents) of any and all existing or proposed easement(s).

Inspection of existing lateral for new or remodel construction

If the development will involve the reuse of an existing sewer lateral for a new or remodeled structure, then, before the approval of the building permit, the applicant shall have the sanitary sewer system inspected and certified by a licensed plumber to be in good working order and free of obstructions and breaks. Repairs shall be made to any damaged or deteriorated pipe, misalignment of pipe segments, leaking pipes, root intrusion, open joints, cracks or breaks, sags, damaged or defective cleanout, inflow and infiltration of extraneous water, older pipe materials that are known to be inadequate, inadequate lift or pump stations, inadequate alarm systems for overflows, and inadequate maintenance of lift stations. You must obtain a sewer repair permit (no charge) from the District and shall have repairs inspected by the District inspector (no charge) prior to backfilling of pipe or structure. (Sanitation District Code section 7.04.375.A.3 Private Sanitary Sewer System Repair)

Public sewer (existing) on the property

If a public sewer main is located on the property, any improvements in the easement will need to be removed if the District needs to replace the sewer main. It will be a condition of any development permit that the existing sewer system line and easement shall be surveyed and plotted on the site plan for the development or building permit application. No permanent improvements may be constructed within the easement boundaries. (Sanitation District Code section 7.04.430)

Backflow prevention device

A backflow preventive device may be required. While this determination is often made "in the field" at the time of installation, if you are engaging a surveyor, civil engineer, or knowledgeable contractor, there is nothing to prevent you from making that determination while in the design process. (Sanitation District Code section 7.04.100 and 7.04.375.A.4)