Alameda CTC – RSEP

San Leandro-Hayward IS/MND

HYDROLOGY AND WATER QUALITY TECHNICAL REPORT

MAY 14, 2021 | DRAFT

Prepared By:

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EXECUTIVE SUMMARY

This drainage report has been prepared to analyze the drainage conditions for each crossing with respect to water quality requirements and peak runoff impacts. Based upon the location of the projects, the disturbed area for construction, and the governing agency requirements we have determined the following:

- The project does not violate water quality standards or waste discharge requirements
- The project does not substantially degrade surface or groundwater quality
- The project does not interfere or impede groundwater recharge or management
- The project does not alter the existing drainage pattern; with the exception of Location 33 & 34
- The project does not result in substantial erosion or siltation
- The project does not substantially increase the rate or amount of surface runoff
- The project does not 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; with the exception of Location 33 & 34
- The project does not impede or redirect flood flows
- The project is not located within a flood hazard, tsunami, or seiche zone
- The project does not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan

Each crossing project is subject to the following requirements and recommendations:

A. Conformance with Alameda County Stormwater Quality Best Managements Practices (BMPs) for site design requirements for Small Projects
B. Existing and Proposed Drainage inlets to be marked “No Dumping – Drains to Bay” within project limits
C. Stormwater quality treatment measures are not required based upon the proposed construction
D. No improvements to the drainage conveyance system (inlets and underground pipe) are required based upon the proposed construction

1.0 PROJECT DESCRIPTION

The project site consists of three existing at-grade rail crossings in the City of San Leandro, one in unincorporated Alameda County, and four in the City of Hayward, in California. The crossings are relatively spread out, extending from the central to southern portion of San Leandro to the southern portion of Hayward. Alameda County Transportation Commission (Alameda CTC) is the lead agency under the California Environmental Quality Act (CEQA). The crossings are along Union Pacific Railroad (UPRR) tracks where UPRR tracks intersect with local streets. Each of the crossings is listed in **Table 1** below, noting the jurisdiction and local street intersections. The Map ID number corresponds to crossing locations shown on **Figure 1**. Detailed drawings of each crossing are attached.

Table 1. Location Data

Jurisdiction	Intersection	Map ID
San Leandro	Washington Avenue	24
San Leandro	Hesperian Boulevard	26
San Leandro	Marina Boulevard (Coast)	28
Unincorporated Alameda County	Lewelling Boulevard	29
Unincorporated Alameda County	Paseo Grande – Trespass Area	31
Hayward	Tennyson High School Pedestrian Crossing (near Schafer Road)	33
Hayward	Leidig Court – Trespass Area	34
Hayward	Tennyson Road	35
Hayward	Industrial Parkway	36

2.0 DRAINAGE METHODOLOGY

This report was prepared following the calculation procedures of the Alameda County Flood Control & Water Conservation District (District) Hydrology & Hydraulics Manual 2018. The selection of calculation methodology is dependent upon the size of the study area. For these rail crossing projects the hydrology analysis is conducted by use of the Rational Method equation, which is suitable for analysis up to 320 acres. The Rational Method analysis is dependent upon three key factors; a runoff coefficient based upon ground cover, the rainfall intensity based upon mapped rainfall data, and the drainage area.

Equation 1: Rational Method

$$Q = C'iA$$

where:

Q = Peak Flow Rate (cfs)
C' = District's Runoff Coefficient
i = Rainfall Intensity (in/hour)
A = Watershed Area (Acres)

The Rational Method analysis is computed by the District provided spreadsheet which computes the peak flow based upon inputs of project area, Initial Tc, and mapped Mean Annual Precipitation (MAP).

3.0 EXISTING CONDITIONS

Table 2. Existing Conditions

Intersection	Description	Map ID
Washington Avenue	Washington Avenue extends north-south through this crossing with two lanes of travel in either direction separated by a mix of concrete median and plastic pylons. The area between Washington Avenue and Chapman Road to the west is unpaved and contains several mature trees. Continuous sidewalks run along each side of Washington Avenue. The UPRR corridor contains a single rail line in this location.	24
Hesperian Boulevard	Hesperian Boulevard extends in a north-south direction through this crossing with three lanes of travel in either direction separated by a concrete median. Sidewalks extend along each side of Hesperian, allowing pedestrians to cross the tracks at-grade. Vegetation is limited to small-scale landscaping associated with adjacent businesses and homes. The UPRR corridor contains a single rail line in this location.	26
Marina Boulevard (Coast)	Marina Boulevard extends northeast-southwest through this crossing with one lane of travel in either direction separated by striping. A continuous sidewalk is present along the north and south side of Marina Boulevard. Vegetation is limited to landscaping associated with an adjacent business and a residential home on the north side of Marina Boulevard. A gravel road is adjacent to the UPRR line on the north western side and there is driveway access on the north side of Marina Boulevard. A paved road (Menlo Street) is adjacent to the UPRR line on the south western side that ends with a crosswalk that connects the rail crossing to the southwestern sidewalk along Marina Boulevard. The UPRR corridor contains two parallel rail lines in this location.	28
Lewelling Boulevard	Lewelling Boulevard extends east-west through this crossing with two lanes of travel in each direction separated by a landscaped median. San Lorenzo High School is located immediately to the north and a residential neighborhood abuts the crossing to the south. Continuous sidewalks extend along Lewelling Boulevard on each side. The UPRR corridor contains a single rail line in this location.	29
Paseo Grande Trespass Area	The Trespass Area is located between Lewelling Blvd and Paseo Grande. There are no existing pedestrian facilities that run parallel to the single rail line UPRR corridor. The UPRR line crosses the San Lorenzo Creek via a bridge.	31

Tennyson High School Pedestrian Crossing (near Schafer Road)	The existing pedestrian crossing at Tennyson High School extends from the sidewalk northeast of Huntwood Avenue near Schafer Road, northeast across the UPRR tracks to the high school. Huntwood Avenue runs parallel to the UPRR tracks and contains one lane of travel in either direction with Class II bicycle lanes striped on both sides. The pedestrian crossing contains stairs and an ADA-accessible ramp along with signage and lighting to warn of trains crossing. Given that no automobile traffic crosses the UPRR tracks in this location, no vehicular gate or arm is present. Many mature trees associated with the high school are present on the northeast side of the UPRR tracks.	33
Leidig Ct – Tresspass Area	The trespass area is located at the intersection of Leidig Court, Huntwood Avenue, and Harris road. Leidig Court runs parallel to the UPRR tracks and contains one lane of travel in either direction. Leidig Court changes to Harris Road at the intersection. Huntwood Avenue runs parallel to the UPRR tracks and contains one lane of travel in either direction with Class II bicycle lanes striped on both sides. Between the intersection and the UPRR tracks is an open landscaped area that contains multiple trees. There is an existing utility pole within the landscaped area.	34
Tennyson Road	Tennyson Road extends in a northeast-southwest direction through this crossing with two lanes of travel in each direction separated by a vegetated median. Class II bicycle lanes are striped in both directions along Tennyson Road and sidewalk facilities allow pedestrians to cross the UPRR tracks at grade. Cesar Chavez Middle School is located immediately to the north of this intersection and a residential neighborhood is located immediately to the east behind a wall. The UPRR corridor contains a single rail line in this location.	35
Industrial Parkway	Industrial Parkway extends in a northeast-southwest direction through this crossing with three lanes of travel in either direction separated by a vegetated median. A drainage ditch runs parallel to Industrial Parkway along the southeastern side. A single-family residential neighborhood abuts the crossing to the west behind a wall. Sidewalks are present north and south of the UPRR tracks along the northwestern side of Industrial Parkway, but no pedestrian facilities extend across the tracks. The UPRR corridor contains a single rail line in this location.	36

3.1 EXISTING DRAINAGE SYSTEM

Table 3. Existing Drainage System

Intersection	Description
24 Washington Avenue	The existing drainage system consists of gutter conveyance on both sides of Washington Ave to inlets on Washington Ave north of the site. There is an existing swale to the south west of the site that runs parallel to the UPRR tracks.
26 Hesperian Boulevard	The existing drainage system consists of gutter conveyance on both sides of Hesperian Blvd to inlets south of the site.
28 Marina Boulevard (Coast)	The existing drainage system consists of gutter conveyance on both sides of Marina Blvd to inlets east of the UPRR tracks.

29 Lewelling Boulevard	The existing drainage system consists of gutter conveyance on both sides of Lewelling Blvd to catch basins on Lewelling Blvd to the east and west of the site.
31 Paseo Grande Trespass Area	The existing drainage system consists of swales that convey water to the San Lorenzo Creek.
33 Hayward -Ped Crossing	The existing drainage system consists of gutter conveyance on both sides of Huntwood Ave that lead to inlets south of the site on Huntwood Ave. There is an existing swale on the eastern side of the UPRR tracks.
34 Leidig Ct. Trespass	The existing drainage system consists of gutter conveyance on both sides of Huntwood Ave. There are existing inlets on Huntwood Ave on both the north and south sides along the length of the proposed work. There are existing inlets at the northern stop sign on both sides of Huntwood Ave.
35 Tennyson Road	The existing drainage system consists of gutter conveyance on both sides of Tennyson Road. There are existing catch basins to the northeast of the site on both sides of Tennyson Road. There is an existing catch basin on Leidig Ct, just north of the intersection of Leidig Ct and Tennyson Rd, that takes surface flow from Tennyson Rd and from the landscaped area west of the UPRR tracks.
36 Industrial Parkway	The existing drainage system consists of gutter conveyance on both sides of Industrial Parkway. Gutter conveyance on the northwestern side of Industrial Pkwy flows to an inlet on Pacific Street. Gutter conveyance on the northeastern side of Industrial Pkwy that flows to an inlet north of the site on Industrial Pkwy. Gutter conveyance on southwestern side of Industrial Pkwy that flows to an inlet on Industrial Pkwy at the intersection of Industrial Pkwy and Taylor Ave. Gutter conveyance on the southeastern side of Industrial Pkwy that flows to an inlet south of the site on Industrial Pkwy at the intersection of Industrial Pkwy and Taylor Ave.

3.2 SOIL AND GROUNDWATER

Existing soil data was obtained from the National Resource Conservation Service (NRCS) Web Soil Survey. Groundwater depth data was obtained from EnviroStor, the Department of Toxic Substances Control's (DTSC) online data management system, and GeoTracker, the California State Water Resources Control Board's data management system. Soil maps for each project location are included in Appendix C.

Table 4. Summary of Soil Data

Intersection	NRCS Soil Classification	Groundwater Depth
24 Washington Avenue	Type A 107 – Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14 111 – Danville silty clay loam, 0 to 2 percent slopes	15-ft bgs
26 Hesperian Boulevard	Type A 106 – Botella loam, 0 to 2 percent slopes, MLRA 14 111 – Danville silty clay loam, 0 to 2 percent slopes	10-ft bgs

28 Marina Boulevard (Coast)	Type C 111 – Danville silty clay loam, 0 to 2 percent slopes	15-ft bgs
29 Lewelling Boulevard	Type B 161 – Yolo silt loam, 0 to 3 percent slopes, dry, MLRA 14	10-ft gbs
31 Paseo Grande Trespass Area	Type B 161 – Yolo silt loam, 0 to 3 percent slopes, dry, MLRA 14	10-ft gbs
33 Hayward -Ped Crossing	Type A 107 – Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14	10-ft bgs
34 Leidig Ct. Trespass	Type A 107 – Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14	10-ft bgs
35 Tennyson Road	Type A 107 – Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14	5-ft bgs
36 Industrial Parkway	Type A 140 – Rincon clay loam, 0 to 2 percent slopes, MLRA 107 – Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14	5-ft bgs

4.0 PROPOSED CONDITIONS

4.1 GROUND COVER COMPARISON

The volume and rate of stormwater runoff is directly related to groundcover. By directly comparing the change in impervious ground cover the potential hydrologic impact can be assessed. For each project location the increase in impervious area poses no impact as an increase in up to 1,500sf equates to a 0.1cfs increase for a ten-year storm event. A comparison of pre-project to post-project conditions is summarized in Table 5 below.

Table 5. Summary of Ground Cover

Location	Project Area (sf)	Existing Condition		Proposed Condition		Impervious Area Increase (sf)
		Impervious Area (sf)	Impervious (%)	Impervious Area (sf)	Impervious (%)	
24 Washington Ave	4,724	3,894	82%	4,429	94%	535

26 Hesperian Blvd	7,142	2,510	35%	5,572	78%	3,062
28 Marina Blvd (Coast)	5,470	3,035	55%	4,772	87%	1,737
29 Lewelling Blvd	0	0	0	0	0	0
31 Paseo Grande Trespass Area	15,077	620	4%	14,022	93%	13,402
33 Hayward -Ped Crossing	4,014	971	24%	2,464	61%	1,493
34 Leidig Ct. Trespass	28,614	414	1%	18,140	63%	17,726
35 Tennyson Rd	3,112	1,227	39%	2,338	75%	1,110
36 Industrial Pkwy	3,214	414	13%	1,955	61%	1,540

4.2 POLLUTANTS OF CONCERN

Stormwater run-off naturally contains various constituents, however development and operational activities within developed areas typically increase contaminant concentrations to levels that impact water quality. In addition, development can increase run-off generation from a site by increasing the amount of impervious surfaces. The additional run-off can have detrimental effects on streams and rivers in the form of erosion and sedimentation which can harm water quality and wildlife habitat. Table 6 lists typical pollutants of concern from developed sites.

Table 6. Potential Pollutants of Concern

Pollutant	Impacts on Water Quality
Sediment	Sediment is a common component of stormwater, and can be a pollutant. Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS), a common water quality analytical parameter.
Nutrients	Nutrients including nitrogen and phosphorous are the major plant nutrients used for fertilizing landscapes, and are often found in stormwater. These nutrients can result in excessive or accelerated growth of vegetation, such as algae, resulting in impaired use of water in lakes and other sources of water supply. For example, nutrients have led to a loss of water clarity in Lake Tahoe. In addition, un-ionized ammonia (one of the nitrogen forms) can be toxic to fish.
Bacteria and Viruses	Bacteria and viruses are common contaminants of stormwater. For separate storm drain systems, sources of these contaminants include animal excrement and sanitary sewer overflow. High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming.
Oil and Grease	Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to

	aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking and breaks in hydraulic systems, restaurants, and waste oil disposal.
Metals	Metals including lead, zinc, cadmium, copper, chromium, and nickel are commonly found in stormwater. Many of the artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Over half the trace metal load carried in stormwater is associated with sediments. Metals are of concern because they are toxic to aquatic organisms, can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish), and have the potential to contaminate drinking water supplies.
Organics	Organics may be found in stormwater in low concentrations. Often synthetic organic compounds (adhesives, cleaners, sealants, solvents, etc.) are widely applied and may be improperly stored and disposed. In addition, deliberate dumping of these chemicals into storm drains and inlets causes environmental harm to waterways.
Pesticides	Pesticides (including herbicides, fungicides, rodenticides, and insecticides) have been repeatedly detected in stormwater at toxic levels, even when pesticides have been applied in accordance with label instructions. As pesticide use has increased, so too have concerns about adverse effects of pesticides on the environment and human health. Accumulation of these compounds in simple aquatic organisms, such as plankton, provides an avenue for biomagnification through the food web, potentially resulting in elevated levels of toxins in organisms that feed on them, such as fish and birds.
Gross Pollutants	Gross Pollutants (trash, debris, and floatables) may include heavy metals, pesticides, and bacteria in stormwater. Typically resulting from an urban environment, industrial sites and construction sites, trash and floatables may create an aesthetic “eye sore” in waterways. Gross pollutants also include plant debris (such as leaves and lawn-clippings from landscape maintenance), animal excrement, street litter, and other organic matter. Such substances may harbor bacteria, viruses, vectors, and depress the dissolved oxygen levels in streams, lakes, and estuaries sometimes causing fish kills.
Vector Production	Vector production (e.g., mosquitoes, flies, and rodents) is frequently associated with sheltered habitats and standing water. Unless designed and maintained properly, standing water may occur in treatment control BMPs for 72 hours or more, thus providing a source for vector habitat and reproduction.

Source: CASQA BMP Handbook, 2003

Table 7. Receiving Water Body Pollutant Impacts

Intersection	Receiving Water Body	Pollutant Impacts
24 Washington Avenue	Sausal Creek-Frontal San Francisco Bay Estuaries	Chlordane, DDT, Dieldrin, Dioxin Compounds, Exotic Species, Furan Compounds, Mercury, Mercury (sediment), PCBs, PCBs (dioxin-like), Selenium, Lead (sediment), PAHs (sediment), Pesticides (sediment), Zinc (sediment)
26 Hesperian Boulevard	Sausal Creek-Frontal San Francisco Bay Estuaries	Chlordane, DDT, Dieldrin, Dioxin Compounds, Exotic Species, Furan Compounds, Mercury, Mercury (sediment), PCBs, PCBs (dioxin-like), Selenium, Lead (sediment), PAHs (sediment), Pesticides (sediment), Zinc (sediment)
28 Marina Boulevard (Coast)	Sausal Creek-Frontal San Francisco Bay Estuaries	Chlordane, DDT, Dieldrin, Dioxin Compounds, Exotic Species, Furan Compounds, Mercury, Mercury (sediment), PCBs, PCBs (dioxin-like), Selenium, Lead (sediment), PAHs (sediment), Pesticides (sediment), Zinc (sediment)
29 Lewelling Boulevard	San Lorenzo Creek	None
31 Paseo Grande Trespass Area	San Lorenzo Creek	None
33 Hayward - Ped Crossing	San Lorenzo Creek	None
34 Leidig Ct. Trespass	Ward Creek-Frontal San Francisco Bay Estuaries	Chlordane, DDT, Dieldrin, Dioxin Compounds, Exotic Species, Furan Compounds, Mercury, Mercury (sediment), PCBs, PCBs (dioxin-like), Selenium, Lead (sediment), PAHs (sediment), Pesticides (sediment), Zinc (sediment)
35 Tennyson Road	Ward Creek-Frontal San Francisco Bay Estuaries	Chlordane, DDT, Dieldrin, Dioxin Compounds, Exotic Species, Furan Compounds, Mercury, Mercury (sediment), PCBs, PCBs (dioxin-like), Selenium, Lead (sediment), PAHs (sediment), Pesticides (sediment), Zinc (sediment)
36 Industrial Parkway	Ward Creek-Frontal San Francisco Bay Estuaries	Chlordane, DDT, Dieldrin, Dioxin Compounds, Exotic Species, Furan Compounds, Mercury, Mercury (sediment), PCBs, PCBs (dioxin-like), Selenium, Lead (sediment), PAHs (sediment), Pesticides (sediment), Zinc (sediment)

4.3 WATER QUALITY MANAGEMENT

The post-construction water quality is governed by the Alameda County Stormwater Control guidelines, established by Regional Water Quality Board Provision C3.i. These guidelines define small projects as those which create or replace at least 2,500sf but less than 10,000sf of impervious surface. For project

overs 10,000sf post-construction stormwater treatment is required. Relevant to this project there are exemptions for new sidewalk constructed along existing roads, therefore the Leidig Court location will not be required to implement post-construction treatment. The proposed rail crossings that fall into the classification of a small site are required to implement one of the following Best Management Practices (BMPs):

1. Direct runoff from sidewalks and walkways onto vegetated areas
2. Direct runoff from driveways onto vegetated areas
3. Construct sidewalks and walkways with permeable surfaces.
4. Construct bike lanes and driveways with permeable surfaces

Table 8. Summary of Post Construction Stormwater Quality Requirements

Intersection	Disturbed Area (sf)	Proposed Impervious Surface (sq-ft)	Post-Construction Stormwater Quality Requirements
24 Washington Avenue	4,724	4,429	Implement one of the small site design measures
26 Hesperian Boulevard	7,142	5,572	Implement one of the small site design measures
28 Marina Boulevard (Coast)	5,470	4,772	Implement one of the small site design measures
29 Lewelling Boulevard	0	0	Not Required
31 Paseo Grande Trespass Area	15,077	14,022	Implement one of the small site design measures.
33 Hayward -Ped Crossing	4,014	2,464	Not required
34 Leidig Ct. Trespass	28,614	18,140	Implement one of the small site design measures.
35 Tennyson Road	3,112	2,338	Not required
36 Industrial Parkway	3,214	1,955	Not required

4.4 DRAINAGE IMPACTS

The hydrologic calculations are limited to those sites which have potential impacts to the downstream conveyance system. The results shown in Table 10 represent the change to the drainage system based upon the proposed project area only for the 10-year peak storm event.

Table 9. Hydrology Summary

Location	DMA	Project Area (AC)	Pre-Project Conditions		Post-Project Conditions	
			Runoff Coefficient (C)	Peak Runoff (cfs)	Runoff Coefficient (C)	Peak Runoff (cfs)
31 Paseo Grande Trespass	C	0.34	0.15	0.14	0.84	0.82
33 Hayward -Ped Crossing	EX	0.20	0.25	0.28	0.20	0.28
	A	0.03	0.79	0.36	0.84	0.44
	B	0.06	0.47	0.04	0.58	0.37
34 Leidig Ct. Trespass	C	0.66	0.26	0.32	0.66	0.97

The existing trackside ditch is represented by DMA “EX” which conveys runoff from the adjacent undeveloped area. The proposed pedestrian crossing will include a sidewalk culvert to maintain the existing conveyance. Per the conceptual calculations a 6-inch diameter pipe is sufficient. The final design will be required to analyze the discharge velocity from the culvert and include energy dissipation at the outlet to prevent erosion.

4.5 HYDROMODIFICATION MANAGEMENT

Hydromodification is the change in the timing, peak discharge, and volume of run-off from a site due to land development. When a site is developed, the impervious surfaces no longer allow rainwater to infiltrate into the native soils, which then becomes run-off. The additional run-off can add to the erosive level of flows in creeks and rivers.

These sites are each disturbing less than an acre of land. Therefore, no additional hydromodification management is necessary.

4.6 SOURCE CONTROLS

In addition to the small site BMPs, the site will employ stormwater source controls to reduce the likelihood of contamination during the operation of the site. The source controls that are anticipated for this site are included in Table 10 below.

Table 10. Stormwater Source Controls

Potential Source of Pollutants	Structural Source Controls	Operational Source Control
Litter, pesticides, fertilizers, petroleum drippings from automobiles	All drainage will drain to bio-retention prior to discharge to the storm drain system. Storm drain inlets will be clearly marked "No Dumping, Drains to Bay."	On-site storm drains will be cleaned annually, prior to the rainy season. Landscaping will be designed to minimize the need for irrigation, pesticide, and fertilizer use.

4.7 APPLICABLE BMP'S

Design Engineer should consider implementing the following BMP's during construction:

- EC-1 Scheduling
- NS-3 Paving and Grinding Operations
- NS-4 Temporary Stream Crossing
- NS-8 Vehicle and Equipment Cleaning
- NS-9 Vehicle and Equipment Fueling
- NS-10 Vehicle and Equipment Maintenance
- NS-12 Concrete Curing
- NS-13 Concrete Finishing
- NS-14 Material Over Water
- NS-15 Demolition Adjacent to Water
- SE-1 Silt Fence
- SE-5 Fiber Rolls
- SE-7 Street Sweeping and Vacuuming
- SE-8 Sandbag Barrier
- SE-10 Storm Drain Inlet Protection
- WE-1 Wind Erosion Control
- WM-1 Material Delivery and Storage
- WM-2 Material Use
- WM-3 Stockpile Management
- WM-4 Spill Prevention and Control
- WM-5 Solid Waste Management
- WM-8 Concrete Waste Management

5.0 PROPOSED DESIGN ALTERNATIVES

Stormwater mitigation measures are applicable to those projects with existing drainage deficiencies, a significant increase to proposed condition runoff, and/or require post-construction treatment.

Three alternate design solutions are presented for each crossing. Final design decisions are dependent upon a detailed analysis for the downstream system hydraulics, the Engineer's Opinion of Probable Construction Cost, and life cycle cost for Operations & Maintenance.

Alternative 1 – Resize inlet

The hydraulic capacity of the curb opening, or grate inlets is directly related to surface ponding and horizontal spread into the roadway. For sites with existing drainage deficiency a replacement of the existing impact is anticipated to reduce the surface ponding and minimize impact into the roadway. Further analysis is required to determine if the downstream storm drain system contains adequate capacity to convey the runoff, or if the Hydraulic Grade Line (HGL) is also contributing to surface ponding issues.

Alternative 2 – Install new inlet and lateral

In addition to alternative 1 the hydraulic analysis for the 10-year storm event is required to determine the capacity of the storm drain lateral. In the event the lateral is surcharged the pipe may need to replaced with a larger diameter to maintain the HGL below a 1-foot freeboard elevation at the inlet.

Alternative 3 – Install LID Measures

As an alternative to structural upgrades the proposed projects can implement a variety of Low Impact Design (LID) strategies. By routing the impervious runoff into pervious areas the design will promote infiltration and help slow the time of concentration thereby reducing the peak flow runoff generated.

6.0 REFERENCES

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GeoTracker (2021). California State Water Resources Control Board. Available at: https://geotracker.waterboards.ca.gov/

APPENDIX

Attachment A – Drainage Exhibits

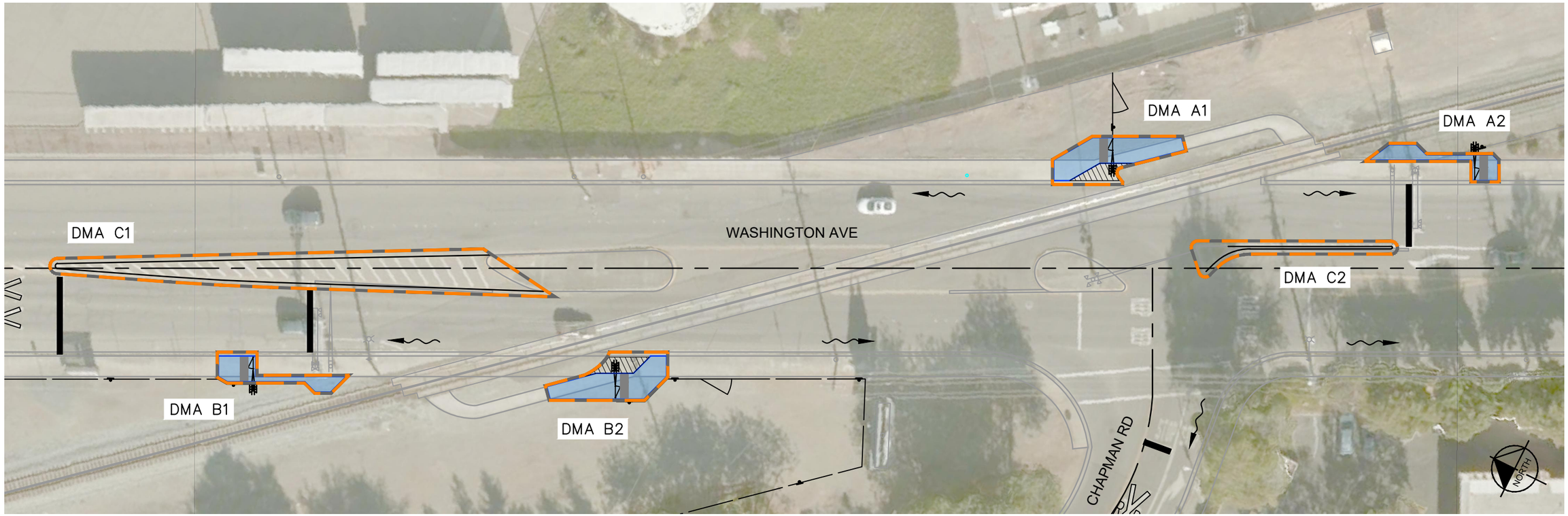
Attachment B – Wetland and Habitat Mapper

Attachment C – FEMA Firmette Maps

Attachment D – Web Soil Survey Maps

Attachment E – Groundwater Data

ATTACHMENT A – DRAINAGE EXHIBITS



		EXISTING CONDITIONS			PROPOSED CONDITIONS		
DRAINAGE MGMT AREA ID	DISTURBED AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)
A1	648	246	403	22%	116	532	82%
A2	297	183	114	38%	28	270	91%
B1	326	161	165	51%	28	298	92%
B2	625	240	385	62%	124	501	80%
C1	2,342	0	2,342	100%	0	2,342	100%
C2	485	0	485	100%	0	485	100%
TOTAL	4,724	830	3,894	82%	295	4,429	94%

LEGEND

- PROJECT LIMITS
- DRAINAGE MANAGEMENT AREA
- PROPOSED TRACK PANELS
- PROPOSED SIDEWALK
- PROPOSED PERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REMOVED (PERVIOUS IN THE PROPOSED CONDITION)
- FLOW DIRECTION

GRAPHIC SCALE IN FEET
0 20 40 80

DRAINAGE EXHIBIT: LOCATION 24 - SAN LEANDRO - WASHINGTON

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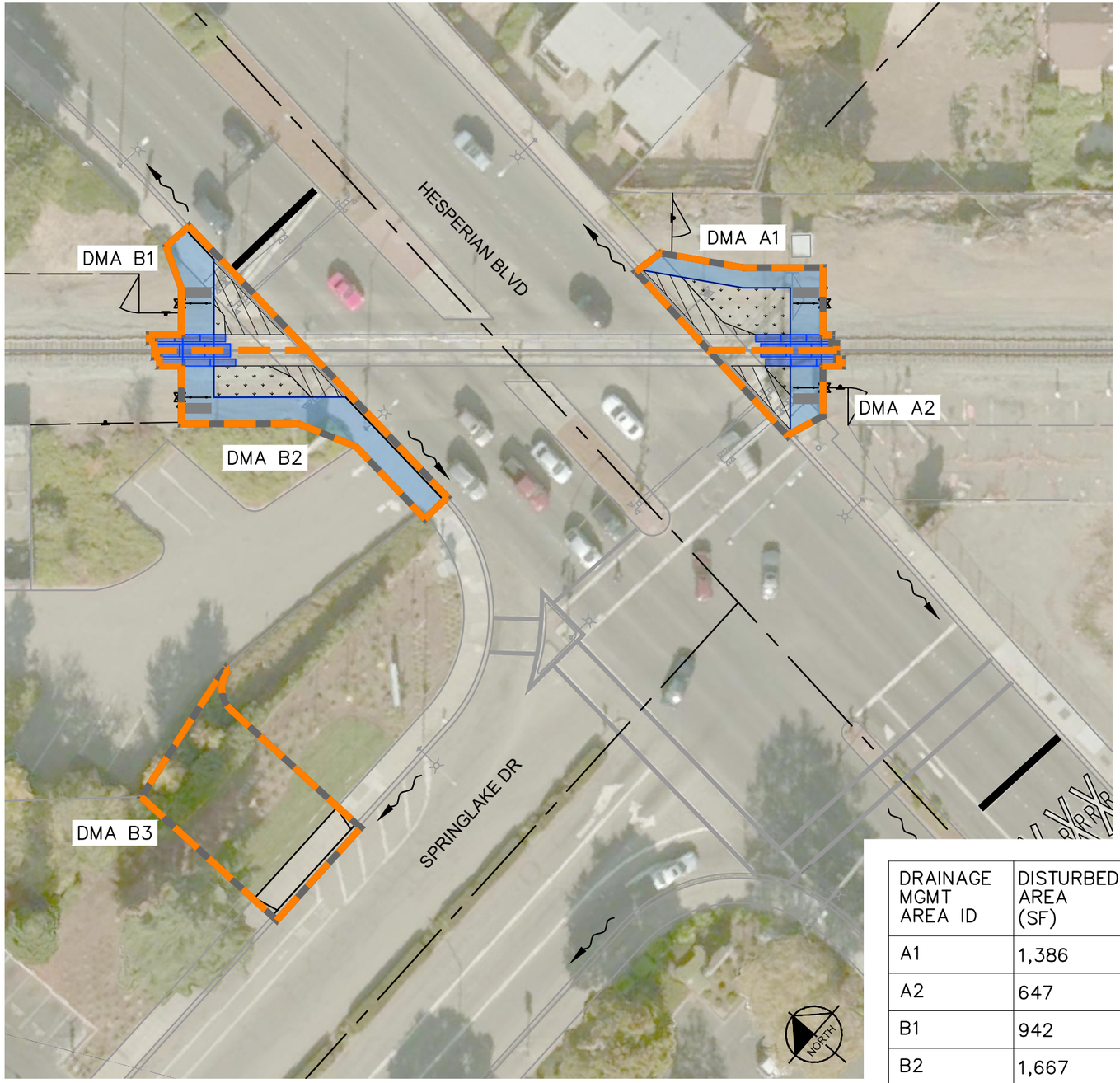


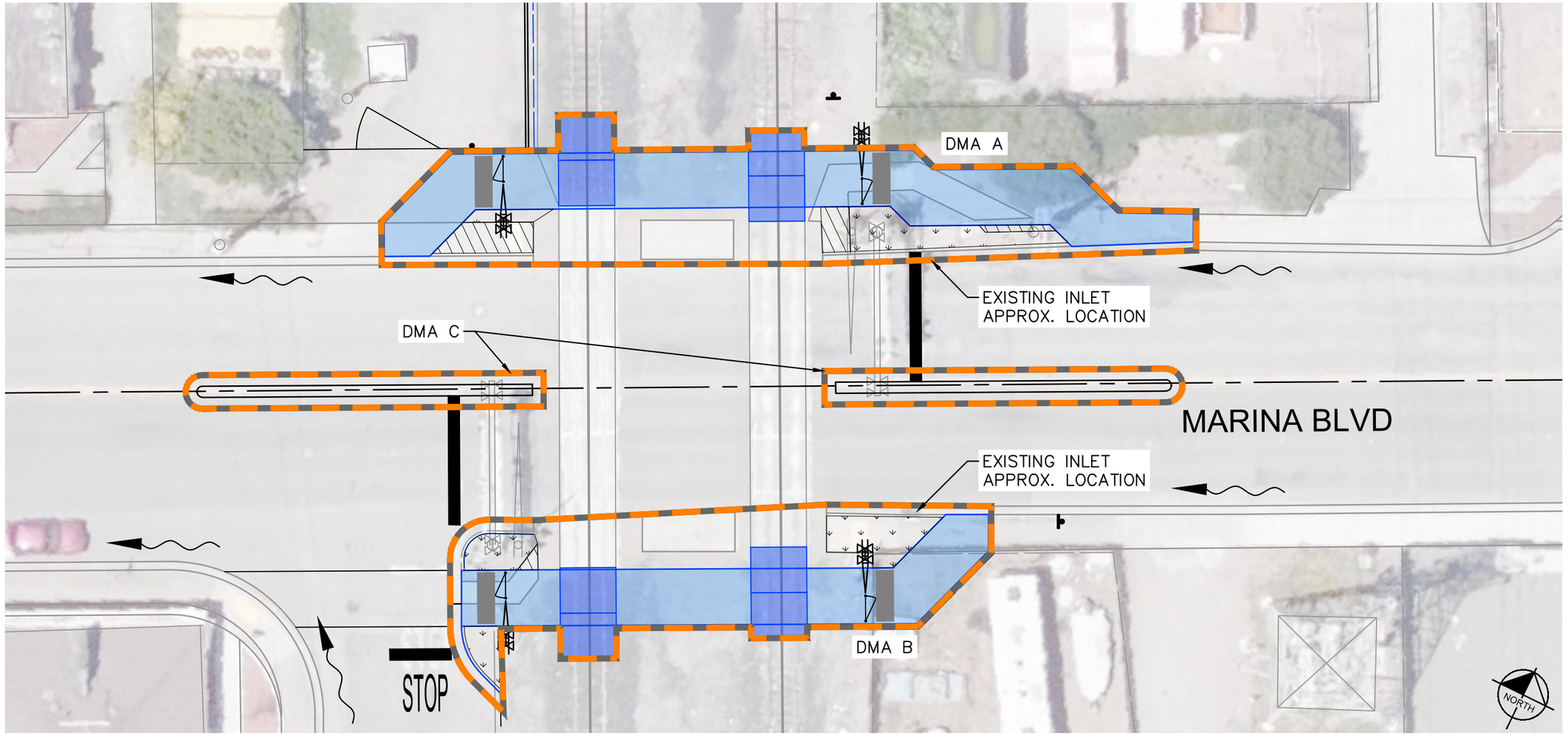
LEGEND

- PROJECT LIMITS
- DRAINAGE MANAGEMENT AREA
- PROPOSED TRACK PANELS
- PROPOSED SIDEWALK
- PROPOSED PERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REMOVED (PERVIOUS IN THE PROPOSED CONDITION)
- FLOW DIRECTION

GRAPHIC SCALE IN FEET
0 20 40 80

DRAINAGE MGMT AREA ID	DISTURBED AREA (SF)	EXISTING CONDITIONS			PROPOSED CONDITIONS		
		PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)
A1	1,386	983	403	29%	636	750	54%
A2	647	287	360	56%	200	447	69%
B1	942	347	596	63%	275	667	71%
B2	1,667	916	751	45%	404	1,263	76%
B3	2,500	2,100	400	16%	55	2,446	98%
TOTAL	7,142	4,632	2,510	35%	1,570	5,572	78%

DRAINAGE EXHIBIT: LOCATION 26 - SAN LEANDRO - HESPERIAN



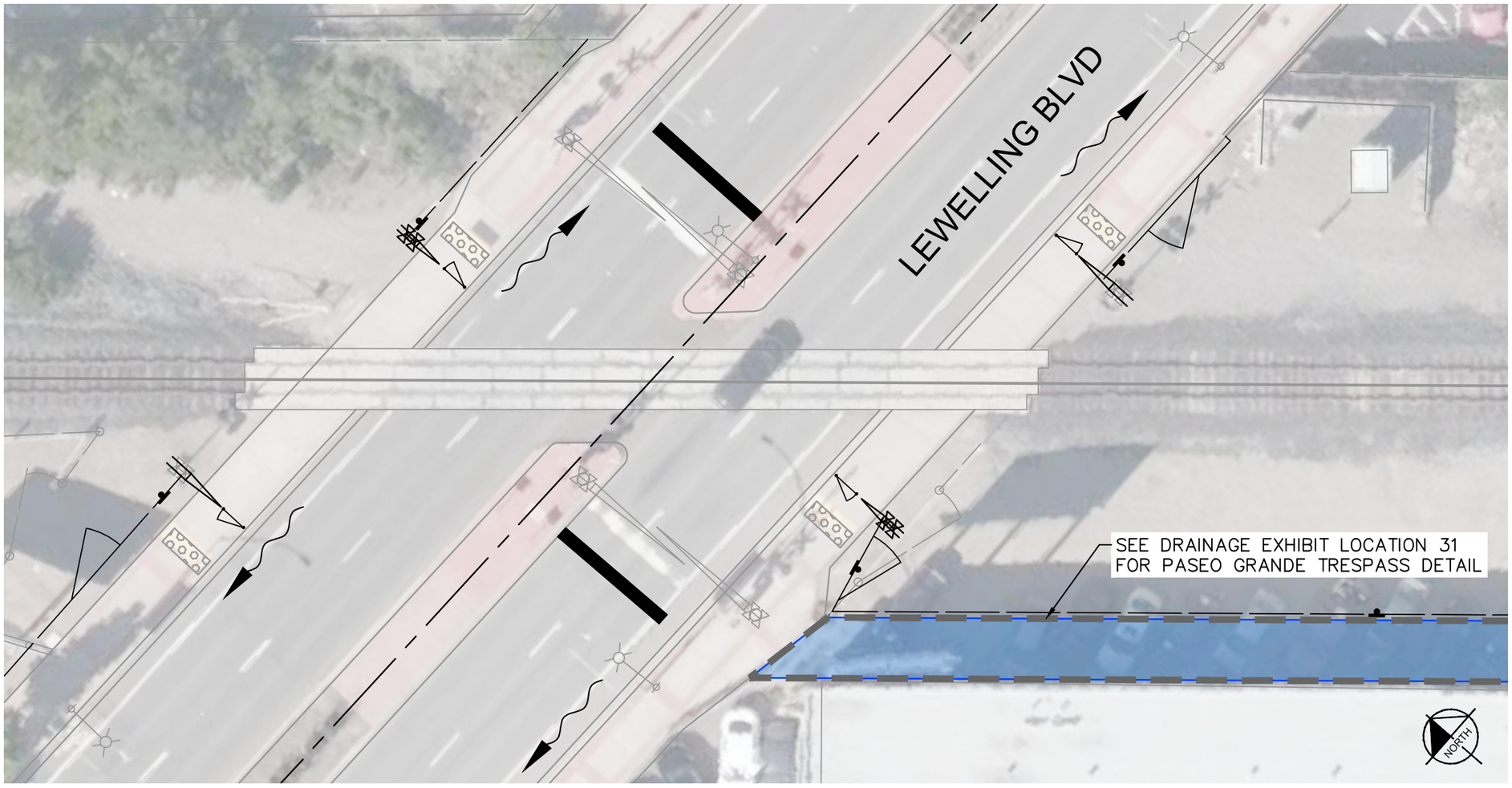
		EXISTING CONDITIONS			PROPOSED CONDITIONS		
DRAINAGE MGMT AREA ID	DISTURBED AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)
A	2,635	1,466	1,169	44%	401	2,234	85%
B	2,075	969	1,106	53%	298	1,777	86%
C	760	0	760	100%	0	760	100%
TOTAL	5,470	2,435	3,035	55%	698	4,772	87%

LEGEND

- PROJECT LIMITS
- DRAINAGE MANAGEMENT AREA
- PROPOSED TRACK PANELS
- PROPOSED SIDEWALK
- PROPOSED PERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REMOVED (PERVIOUS IN THE PROPOSED CONDITION)
- FLOW DIRECTION

GRAPHIC SCALE IN FEET
0 10 20 40

DRAINAGE EXHIBIT: LOCATION 28 - SAN LEANDRO - MARINA (COAST)

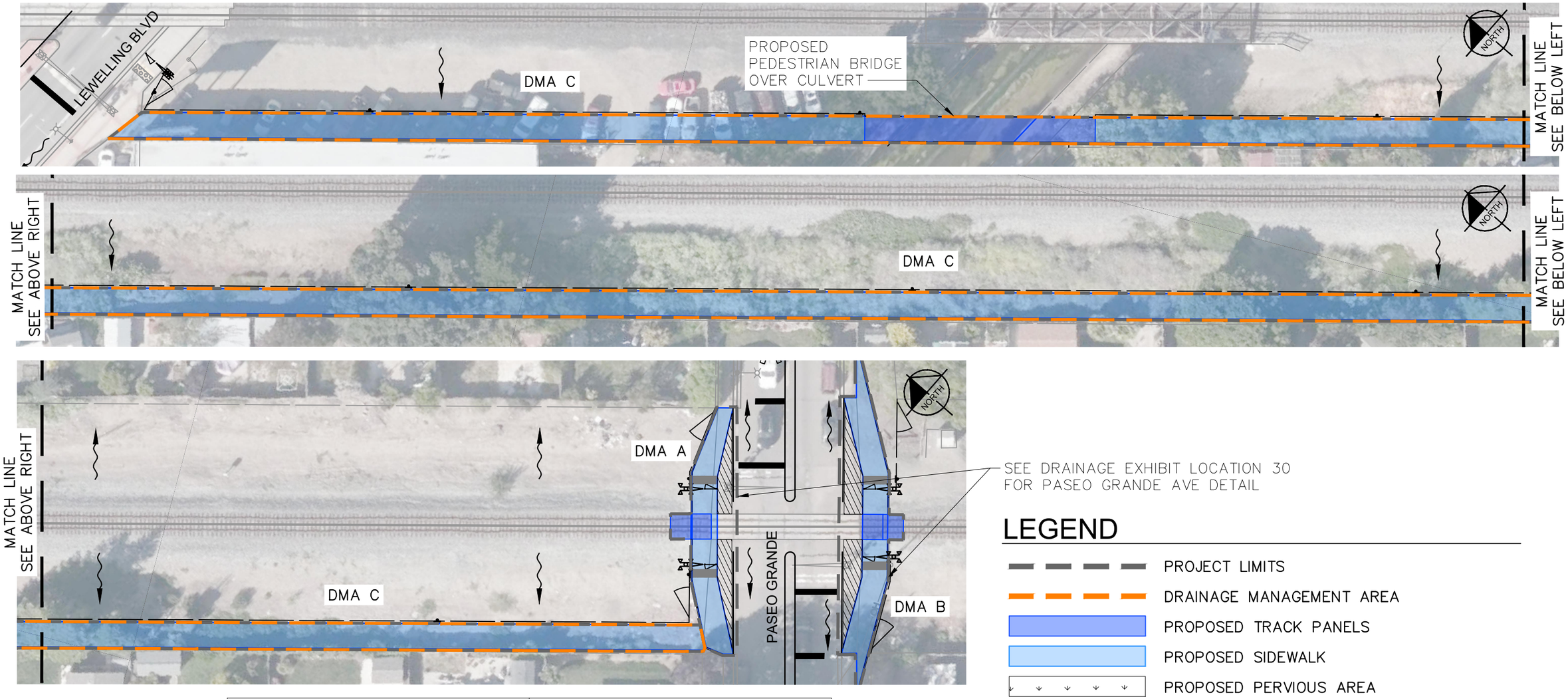


LEGEND

- PROJECT LIMITS
- DRAINAGE MANAGEMENT AREA
- PROPOSED TRACK PANELS
- PROPOSED SIDEWALK
- PROPOSED PERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REMOVED (PERVIOUS IN THE PROPOSED CONDITION)
- FLOW DIRECTION

GRAPHIC SCALE IN FEET
0 10 20 40

DRAINAGE EXHIBIT: LOCATION 29 - ALAMEDA - LEWELLING



SEE DRAINAGE EXHIBIT LOCATION 30
FOR PASEO GRANDE AVE DETAIL

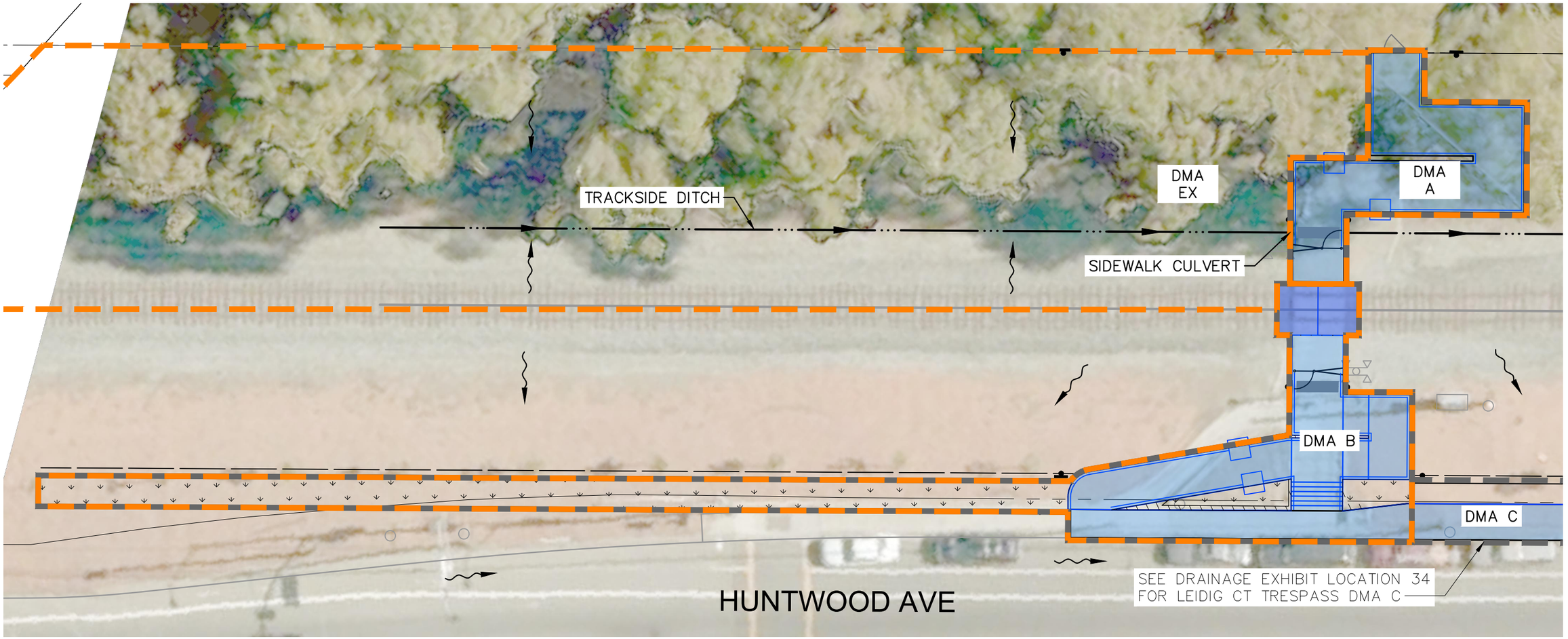
		EXISTING CONDITIONS			PROPOSED CONDITIONS		
DRAINAGE MGMT AREA ID	DISTURBED AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)
C	15,077	14,457	620	4%	1,054	14,022	93%
TOTAL	15,077	14,457	620	4%	1,054	14,022	93%

LEGEND

- PROJECT LIMITS
- DRAINAGE MANAGEMENT AREA
- PROPOSED TRACK PANELS
- PROPOSED SIDEWALK
- PROPOSED PERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REMOVED (PERVIOUS IN THE PROPOSED CONDITION)
- FLOW DIRECTION

GRAPHIC SCALE IN FEET
0 20 40 80

DRAINAGE EXHIBIT: LOCATION 31 - ALAMEDA - PASEO GRANDE TRESPASS



DMA	Area (sf)	Existing Condition			Proposed Condition		
		Pervious Area (sf)	Impervious Area (sf)	Pct Impv (%)	Pervious Area (sf)	Impervious Area (sf)	Pct Impv (%)
EX	13,868	13,868	0	0%	13,868	0	0%
A	1,106	196	910	82%	106	1,000	90%
B	2,908	1,937	971	33%	1,444	1,464	50%
Total*	4,014	2,133	1,881	47%	1,550	2,464	61%

*Existing DMA tributary to sidewalk culvert excluded from project limits totals

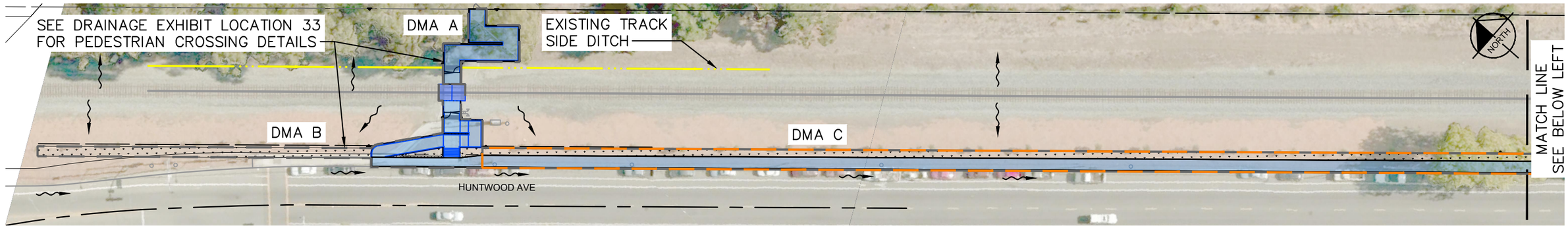
LEGEND

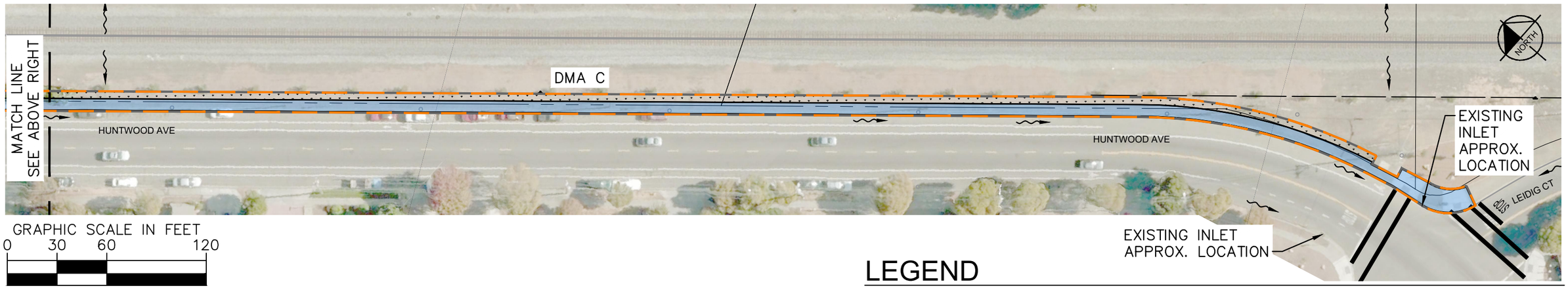
- PROJECT LIMITS
- DRAINAGE MANAGEMENT AREA
- PROPOSED TRACK PANELS
- PROPOSED SIDEWALK
- PROPOSED PERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REMOVED (PERVIOUS IN THE PROPOSED CONDITION)
- FLOW DIRECTION

NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

DRAINAGE EXHIBIT: LOCATION 33 - HAYWARD - PED CROSSING





GRAPHIC SCALE IN FEET
0 30 60 120

		EXISTING CONDITIONS			PROPOSED CONDITIONS		
DRAINAGE MGMT AREA ID	DISTURBED AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)
C	28,614	28,200	414	1%	10,474	18,140	63%
TOTAL	28,614	28,200	414	1%	10,474	18,140	63%

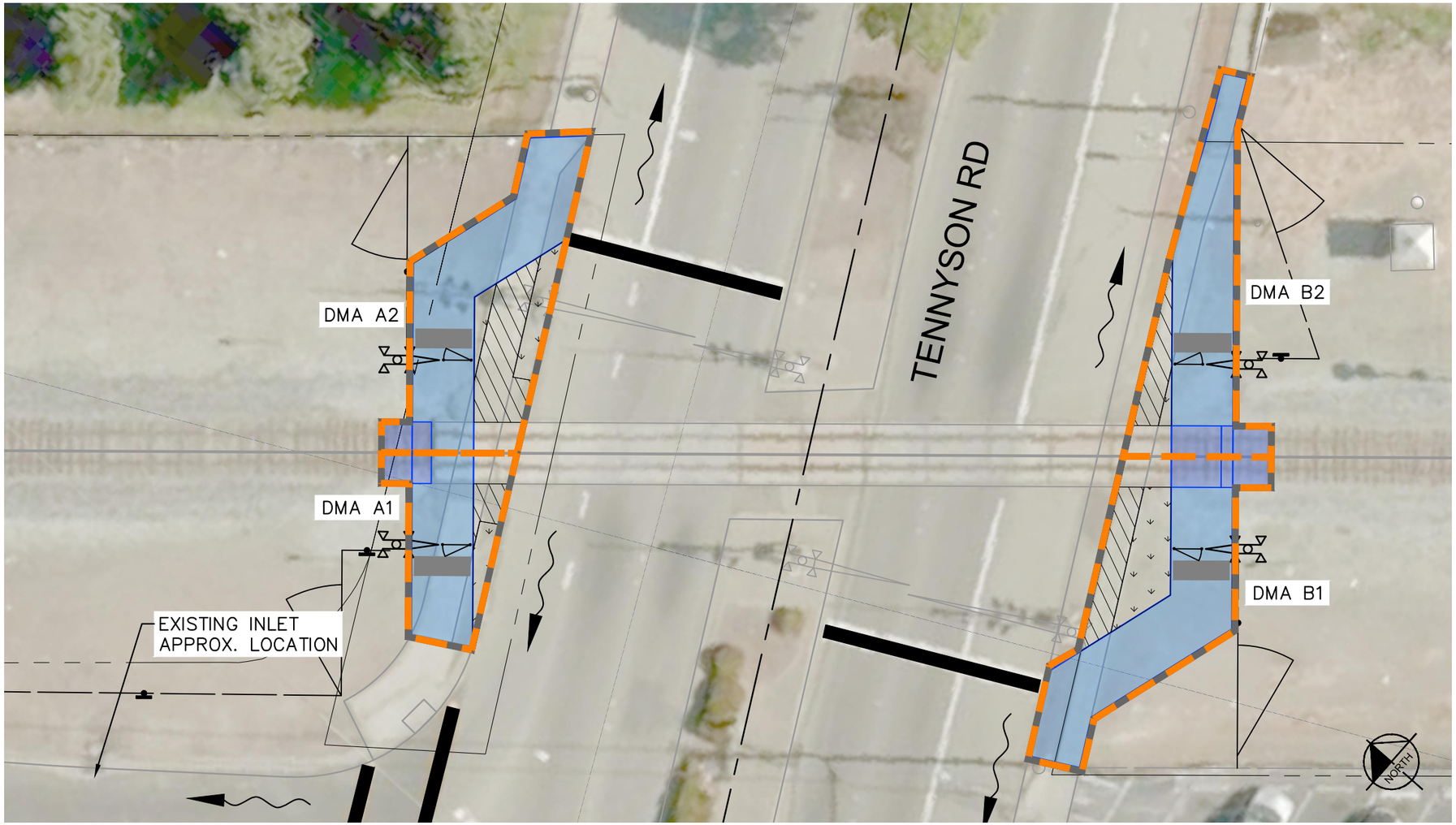
LEGEND

- PROJECT LIMITS
- DRAINAGE MANAGEMENT AREA
- PROPOSED TRACK PANELS
- PROPOSED SIDEWALK
- PROPOSED PERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REMOVED (PERVIOUS IN THE PROPOSED CONDITION)
- FLOW DIRECTION

DRAINAGE EXHIBIT: LOCATION 34 - HAYWARD - LEIDIG CT TRESPASS

Kimley»Horn ©2021

K:\OAK_ITS\097700026 – Alameda CTC RSEP – KGA\Design\CADD\Exhibits\Drainage\34 – Hayward – Liedig – Drainage Exhibit.dwg 34 May 14, 2021



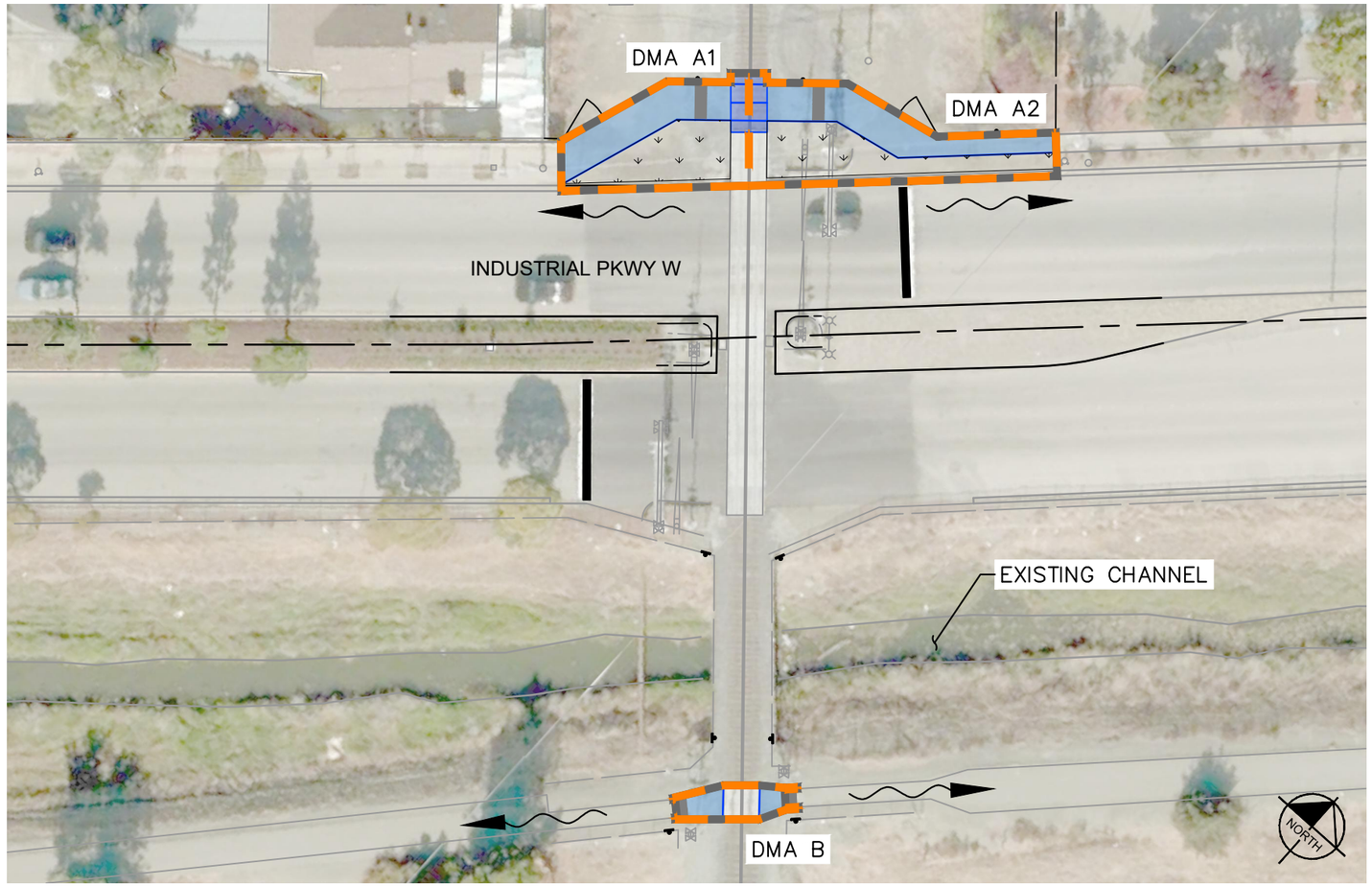
DRAINAGE MGMT AREA ID	DISTURBED AREA (SF)	EXISTING CONDITIONS			PROPOSED CONDITIONS		
		PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)
A1	458	207	251	55%	91	368	80%
A2	969	568	401	41%	300	669	69%
B1	965	659	306	32%	272	693	72%
B2	720	450	270	37%	112	608	84%
TOTAL	3,112	1,885	1,227	39%	775	2,338	75%

LEGEND

- PROJECT LIMITS
- DRAINAGE MANAGEMENT AREA
- PROPOSED TRACK PANELS
- PROPOSED SIDEWALK
- PROPOSED PERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REMOVED (PERVIOUS IN THE PROPOSED CONDITION)
- FLOW DIRECTION

GRAPHIC SCALE IN FEET
0 10 20 40

DRAINAGE EXHIBIT: LOCATION 35 - HAYWARD - TENNYSON



		EXISTING CONDITIONS			PROPOSED CONDITIONS		
DRAINAGE MGMT AREA ID	DISTURBED AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)
A1	1,293	1,171	121	9%	531	761	59%
A2	1,650	1,460	190	12%	693	957	58%
B	271	168	103	38%	35	237	87%
TOTAL	3,214	2,799	414	13%	1,259	1,955	61%

LEGEND

- PROJECT LIMITS
- DRAINAGE MANAGEMENT AREA
- PROPOSED TRACK PANELS
- PROPOSED SIDEWALK
- PROPOSED PERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REMOVED (PERVIOUS IN THE PROPOSED CONDITION)
- FLOW DIRECTION

GRAPHIC SCALE IN FEET
0 20 40 80

DRAINAGE EXHIBIT: LOCATION 36 - HAYWARD - INDUSTRIAL

ATTACHMENT B – WETLAND AND HABITAT MAPPER

U.S. Fish and Wildlife Service

National Wetlands Inventory

SAN LEANDRO - WASHINGTON AVE

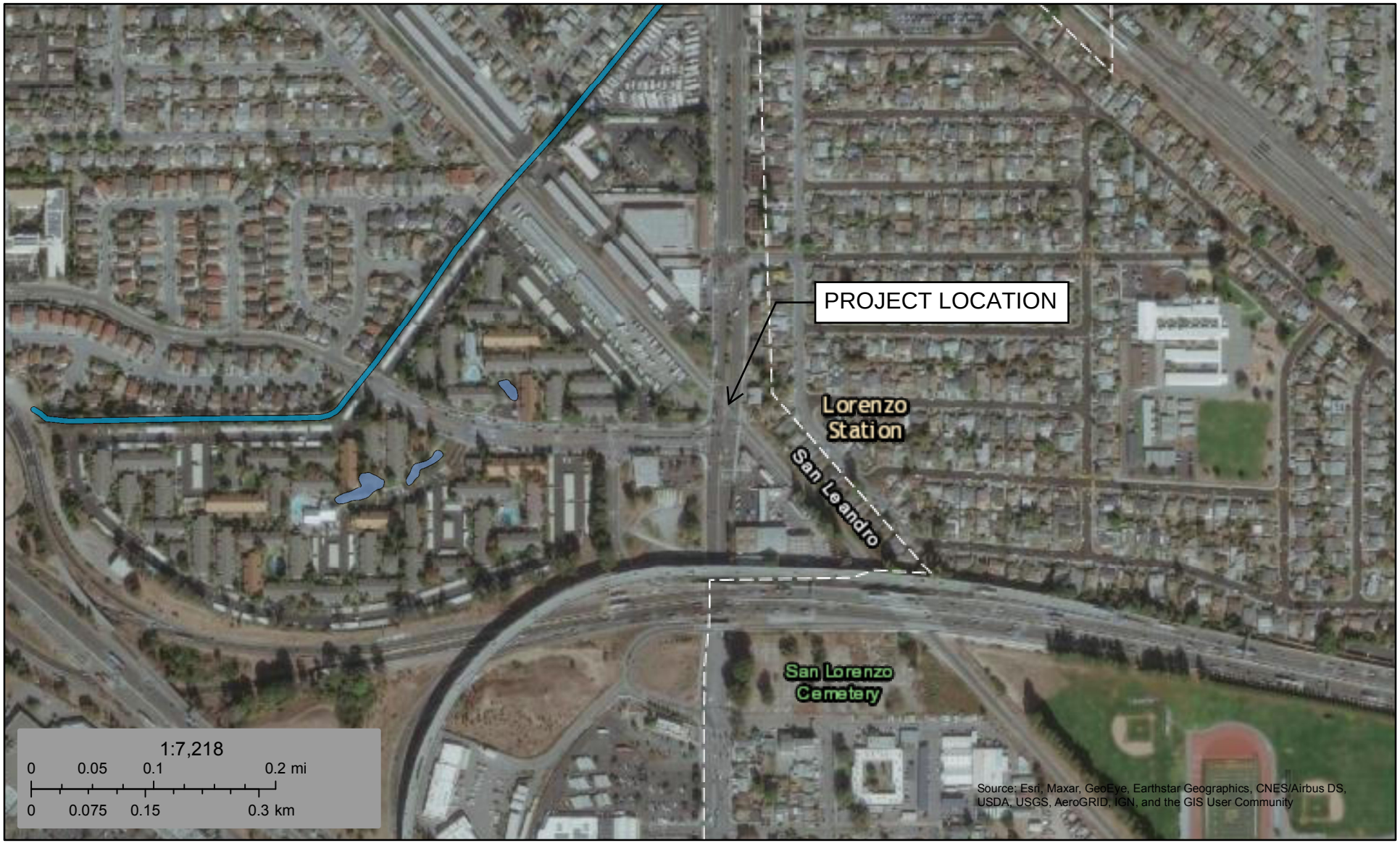
March 3, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

U.S. Fish and Wildlife Service
National Wetlands Inventory

SAN LEANDRO - HESPERIAN BLVD



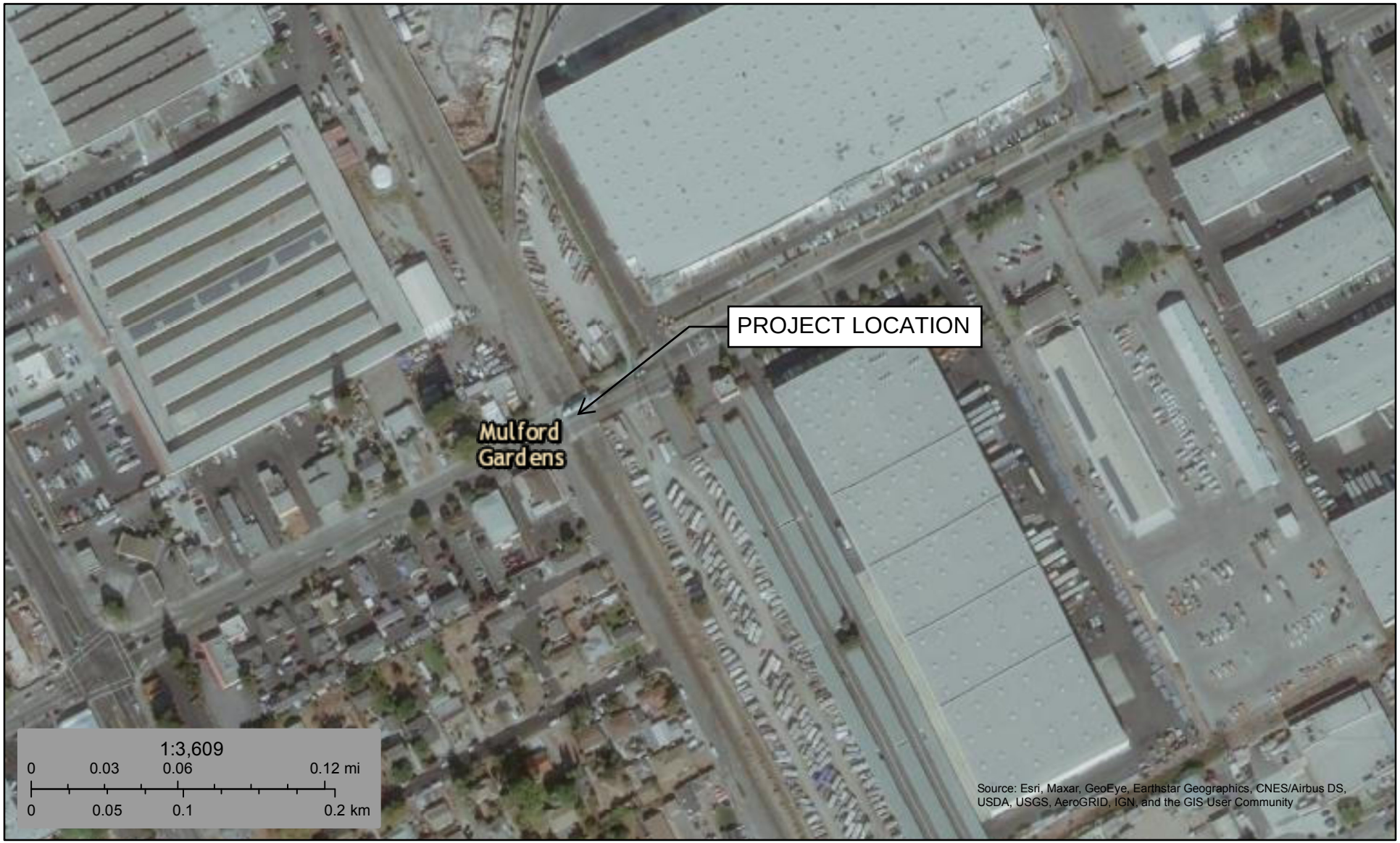
March 3, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

U.S. Fish and Wildlife Service
National Wetlands Inventory

SAN LEANDRO - MARINA BLVD COAST



March 3, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

U.S. Fish and Wildlife Service
National Wetlands Inventory

ALAMEDA COUNTY - LEWELLING BLVD

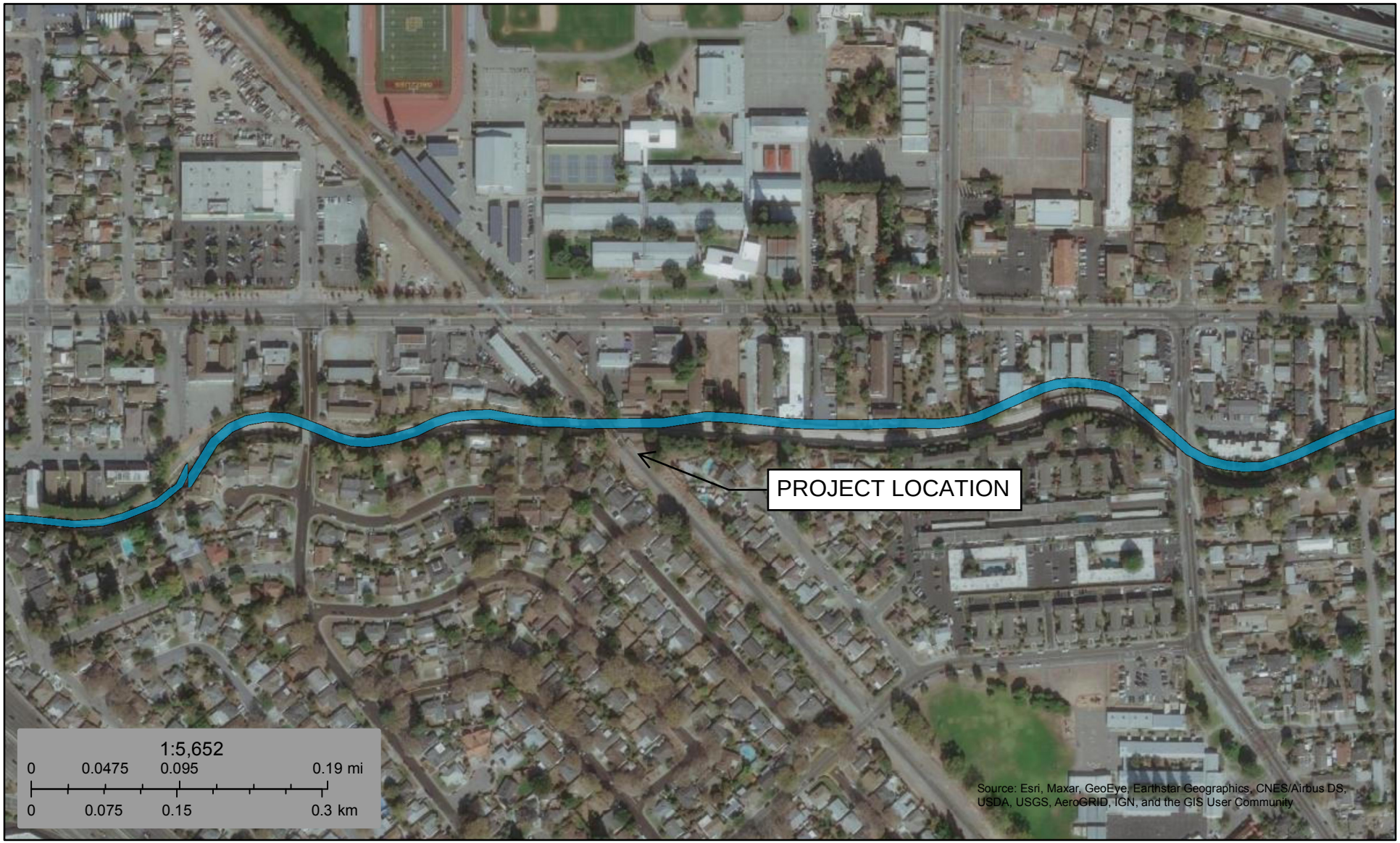
March 3, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

U.S. Fish and Wildlife Service
National Wetlands Inventory

San Lorenzo - Paseo Grande Trespass



May 27, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

U.S. Fish and Wildlife Service
National Wetlands Inventory

HAYWARD - PEDESTRIAN CROSSING

March 3, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

U.S. Fish and Wildlife Service
National Wetlands Inventory

HAYWARD - LEIDIG CT

May 10, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

U.S. Fish and Wildlife Service

National Wetlands Inventory

HAYWARD-TENNYSON RD

March 3, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

U.S. Fish and Wildlife Service
National Wetlands Inventory

HAYWARD-INDUSTRIAL PKWY

March 3, 2021

Wetlands

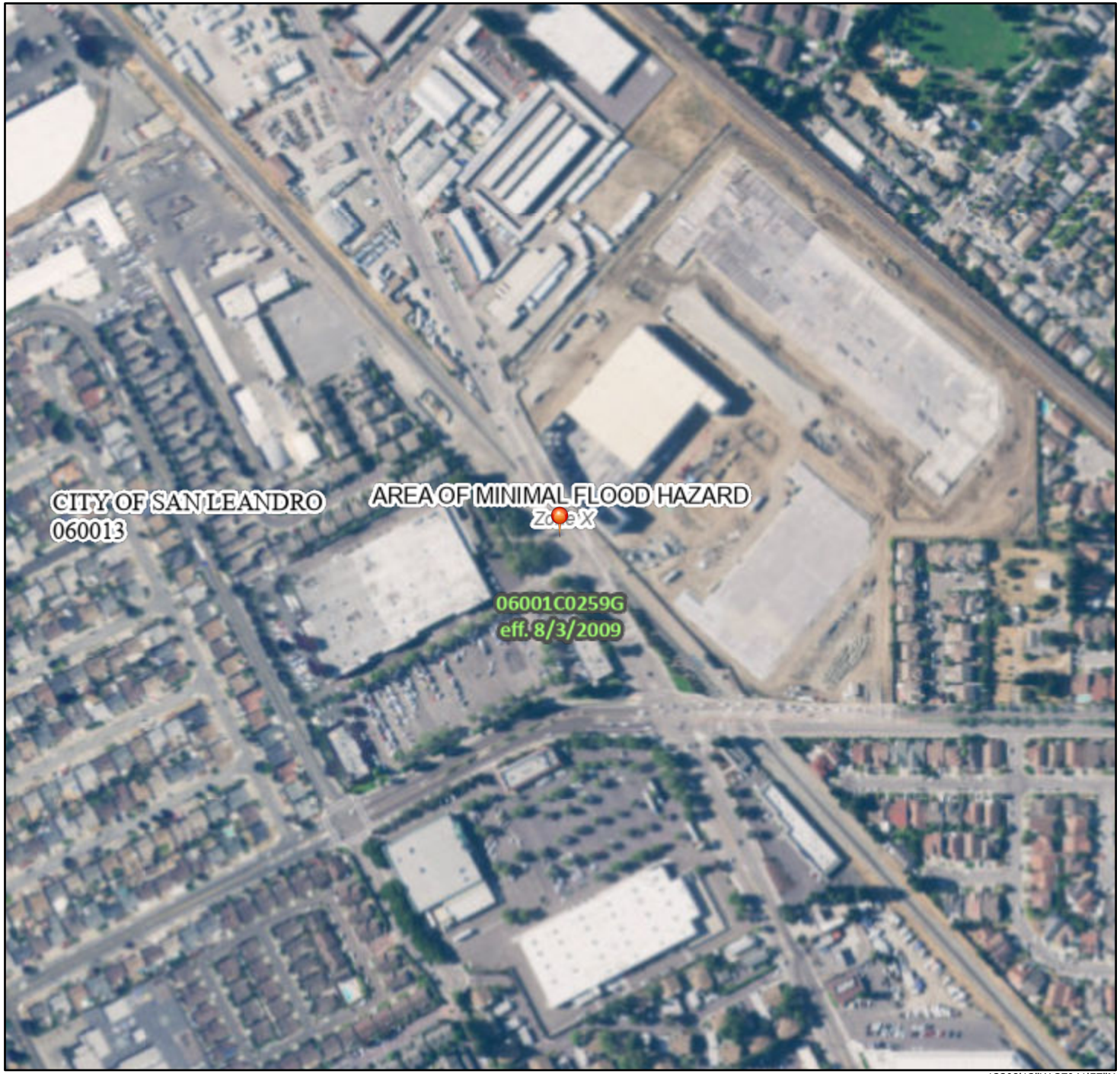
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

ATTACHMENT C – FEMA FIRMETTE MAPS

National Flood Hazard Layer FIRMette

FEMA

122°8'50"W 37°42'26"N



122°8'13"W 37°41'57"N

Feet 1:6,000

0 250 500 1,000 1,500 2,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

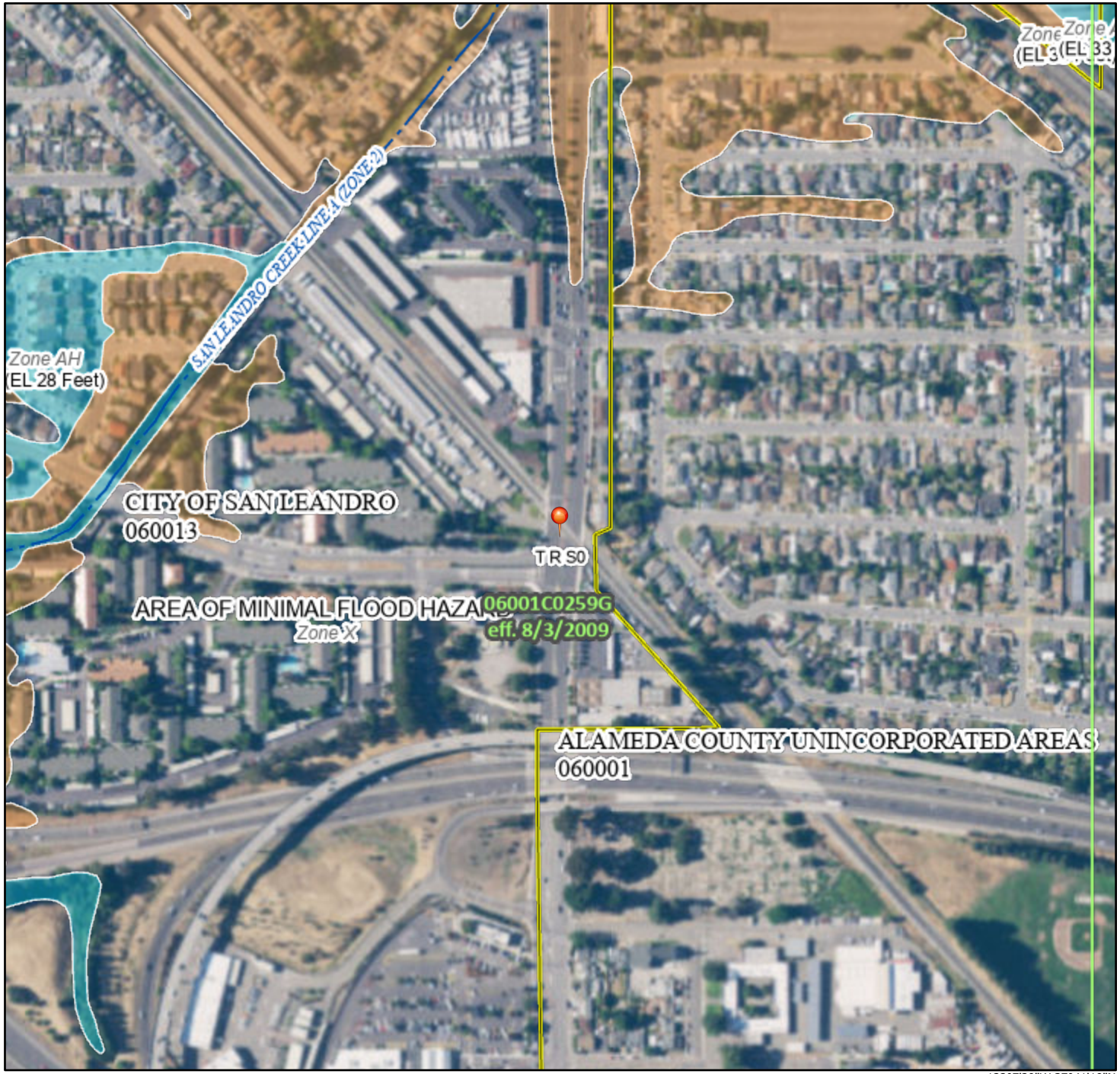
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/2/2021 at 8:33 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

122°8'7"W 37°41'48"N



122°7'29"W 37°41'19"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

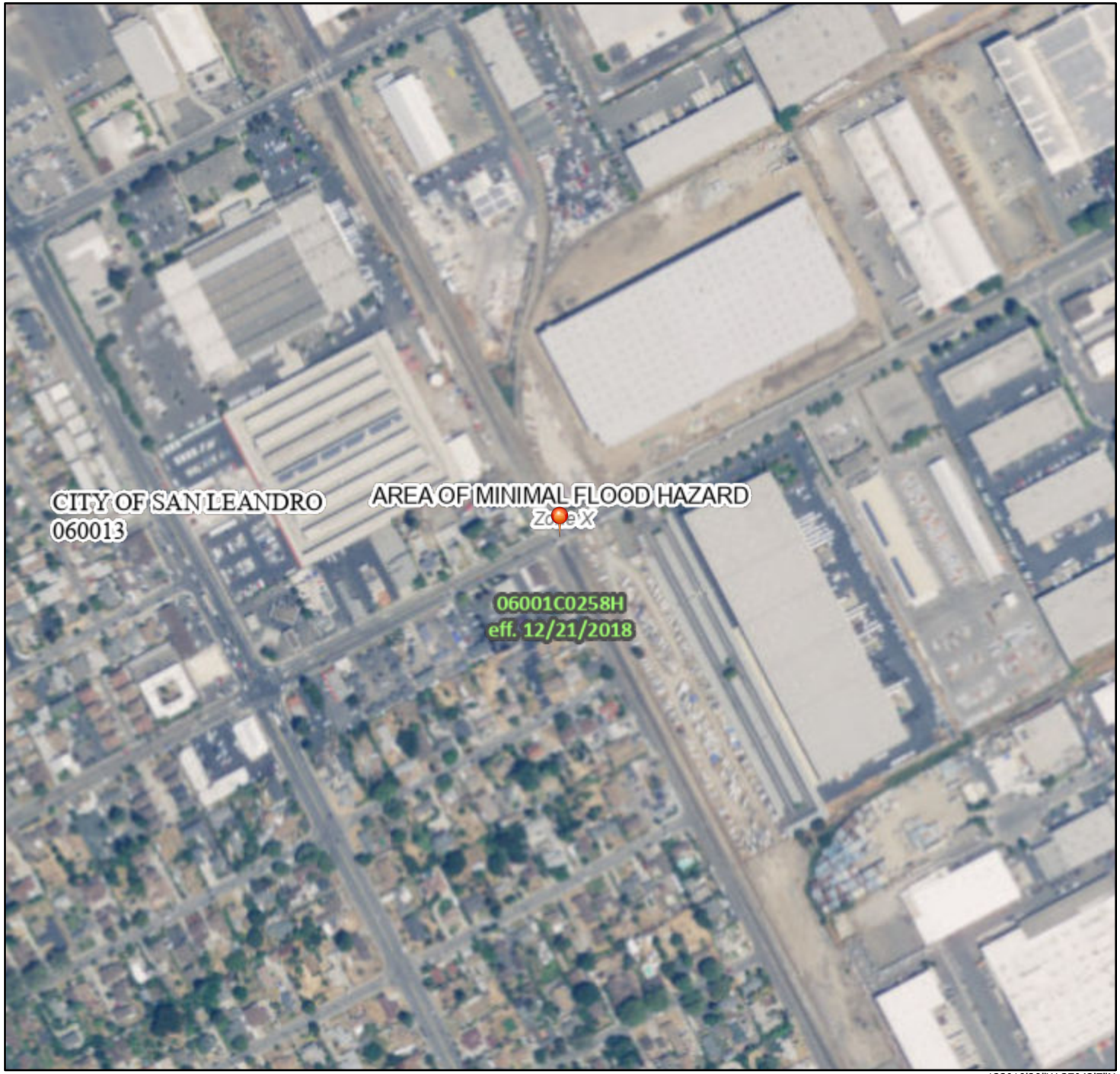
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/3/2021 at 10:42 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

122°10'57"W 37°42'36"N



122°10'20"W 37°42'7"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

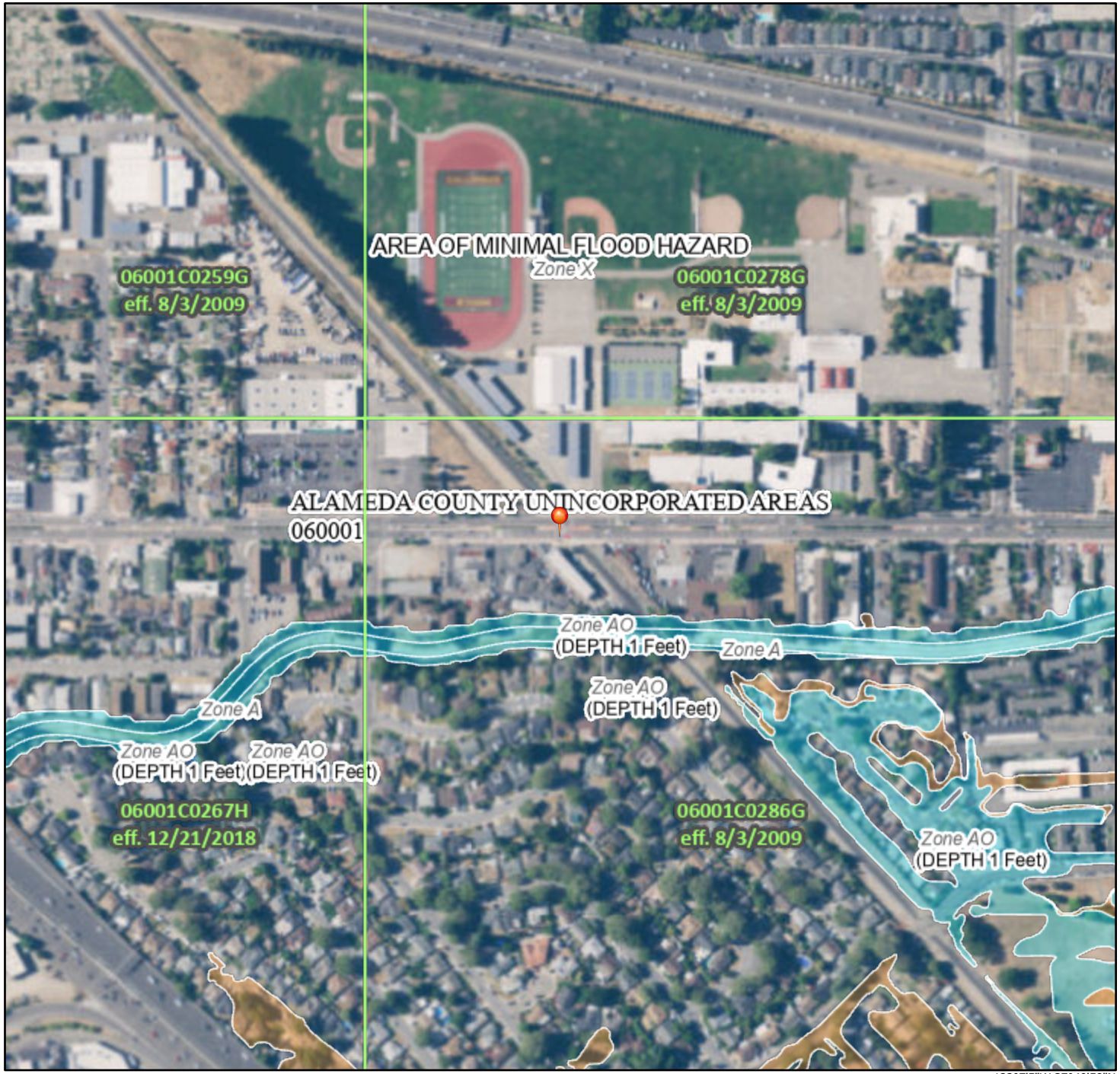
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/2/2021 at 8:24 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

122°7'42"W 37°41'26"N



122°7'5"W 37°40'58"N

Feet 1:6,000

0 250 500 1,000 1,500 2,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

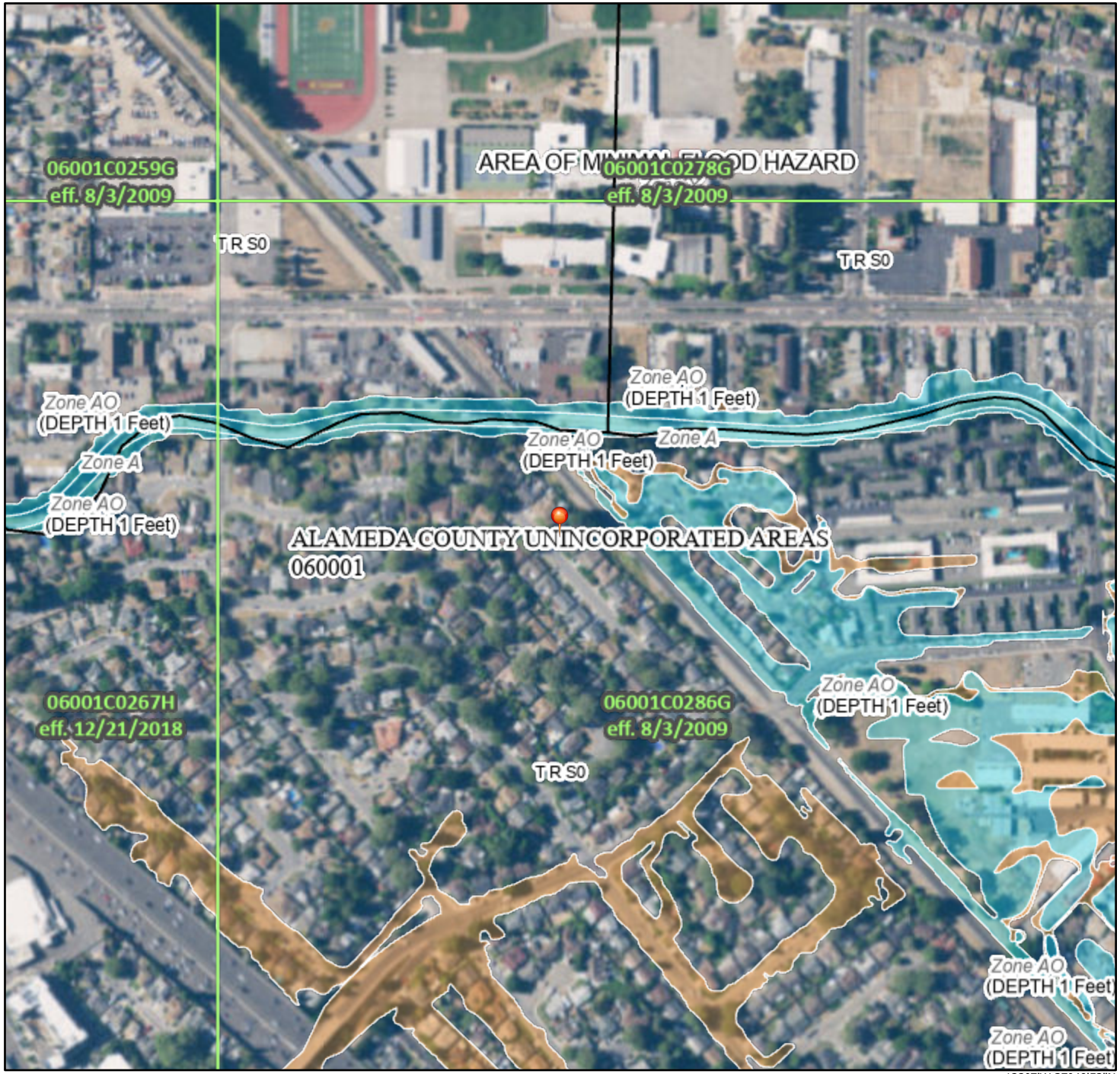
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/3/2021 at 10:46 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

122°7'37"W 37°41'20"N



122°7'W 37°40'52"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/27/2021 at 5:41 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

122°4'38"W 37°38'45"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

122°4'1"W 37°38'16"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

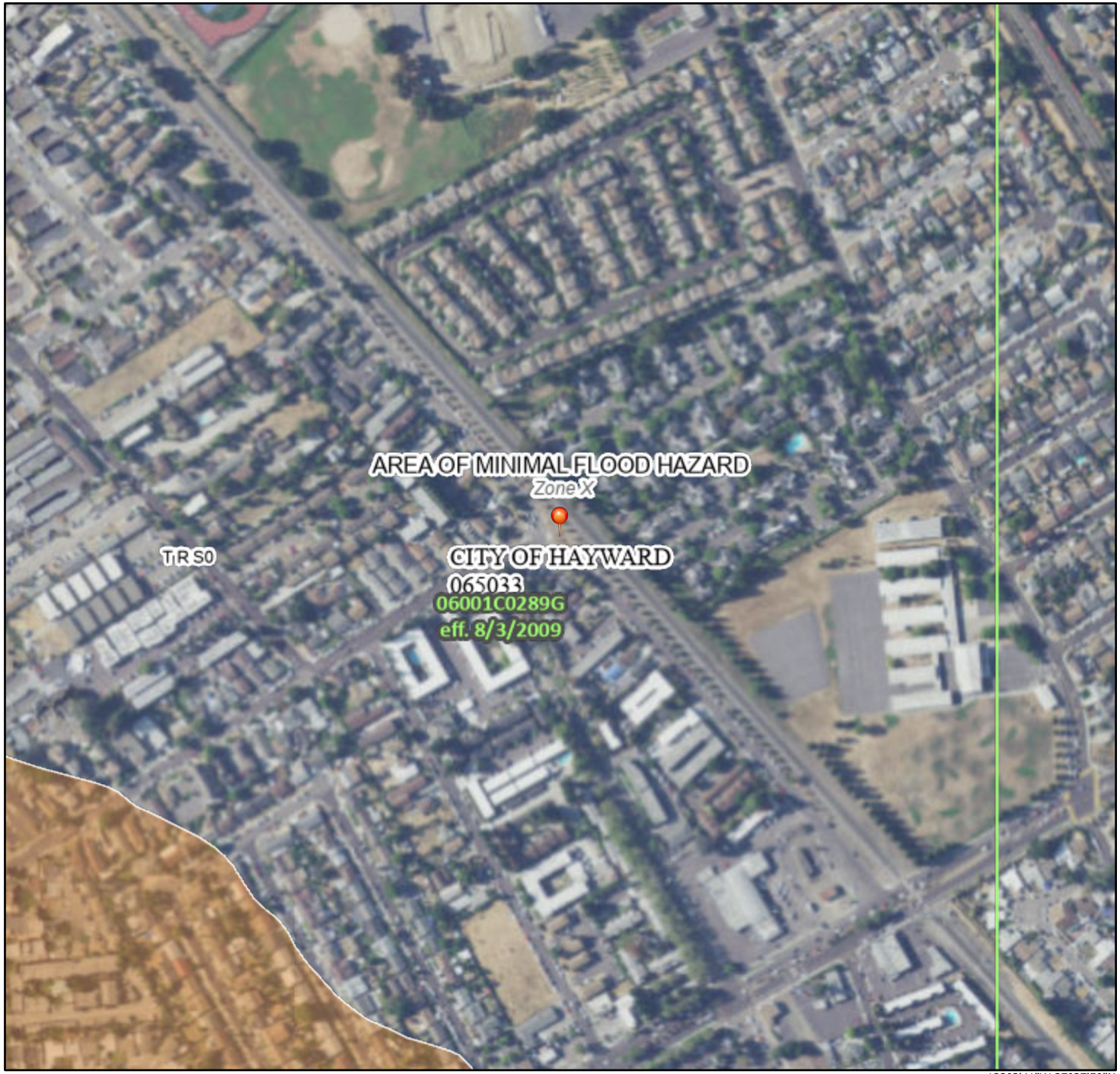
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/3/2021 at 10:59 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

122°4'19"W 37°38'27"N



122°3'41"W 37°37'59"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/10/2021 at 6:17 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

122°4'7"W 37°38'18"N

122°3'29"W 37°37'49"N

Feet 1:6,000

0 250 500 1,000 1,500 2,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

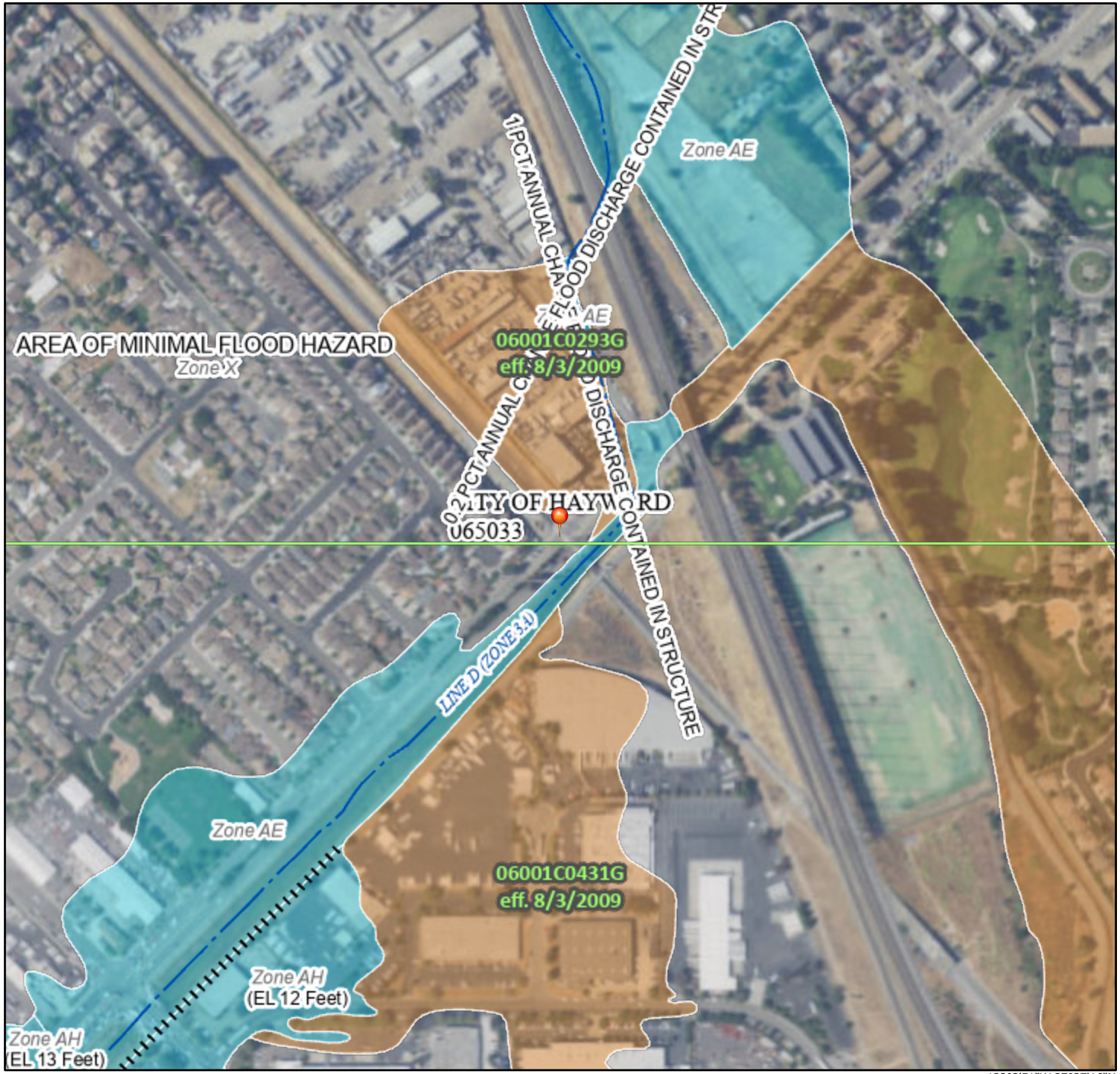
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/3/2021 at 10:53 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

122°3'29"W 37°37'44"N



122°2'51"W 37°37'16"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/3/2021 at 10:50 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

ATTACHMENT D – WEB SOIL SURVEY MAPS

Map Scale: 1:4,570 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Alameda County, California, Western Part
Survey Area Data: Version 17, May 29, 2020

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

Date(s) aerial images were photographed: May 31, 2019—Jun 6, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
106	Botella loam, 0 to 2 percent slopes, MLRA 14	11.9	11.0%
107	Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14	50.7	46.9%
111	Danville silty clay loam, 0 to 2 percent slopes	45.4	42.0%
Totals for Area of Interest		**108.0**	**100.0%**

Map Scale: 1:2,560 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Alameda County, California, Western Part
Survey Area Data: Version 17, May 29, 2020

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

Date(s) aerial images were photographed: May 31, 2019—Jun 6, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
106	Botella loam, 0 to 2 percent slopes, MLRA 14	14.3	43.6%
111	Danville silty clay loam, 0 to 2 percent slopes	18.5	56.4%
Totals for Area of Interest		**32.7**	**100.0%**

Map Scale: 1:2,430 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Alameda County, California, Western Part
Survey Area Data: Version 17, May 29, 2020

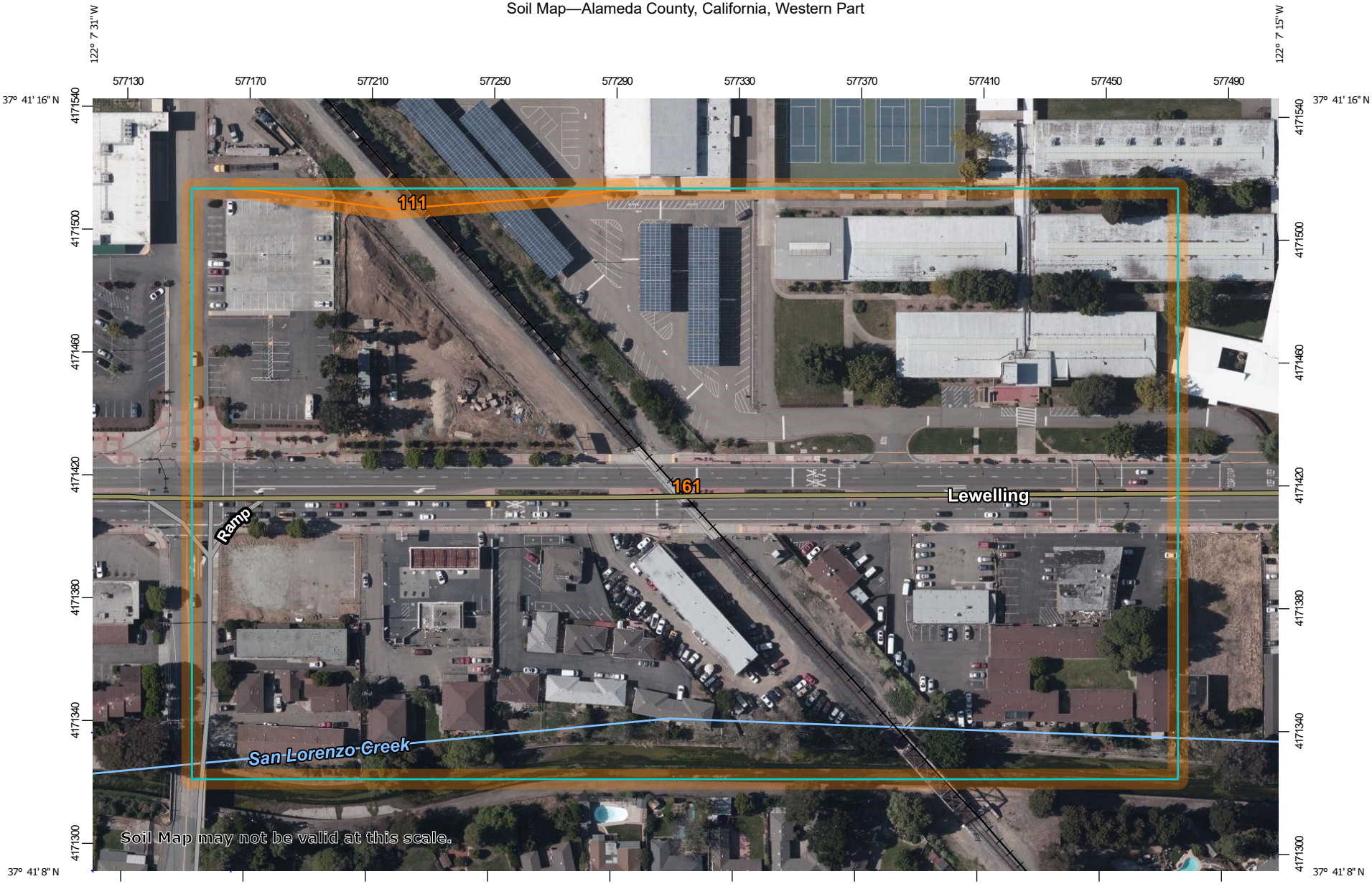
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 1, 2019—May 31, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
107	Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14	2.9	13.7%
111	Danville silty clay loam, 0 to 2 percent slopes	18.6	86.3%
Totals for Area of Interest		**21.5**	**100.0%**



Map Scale: 1:1,770 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Alameda County, California, Western Part
Survey Area Data: Version 17, May 29, 2020

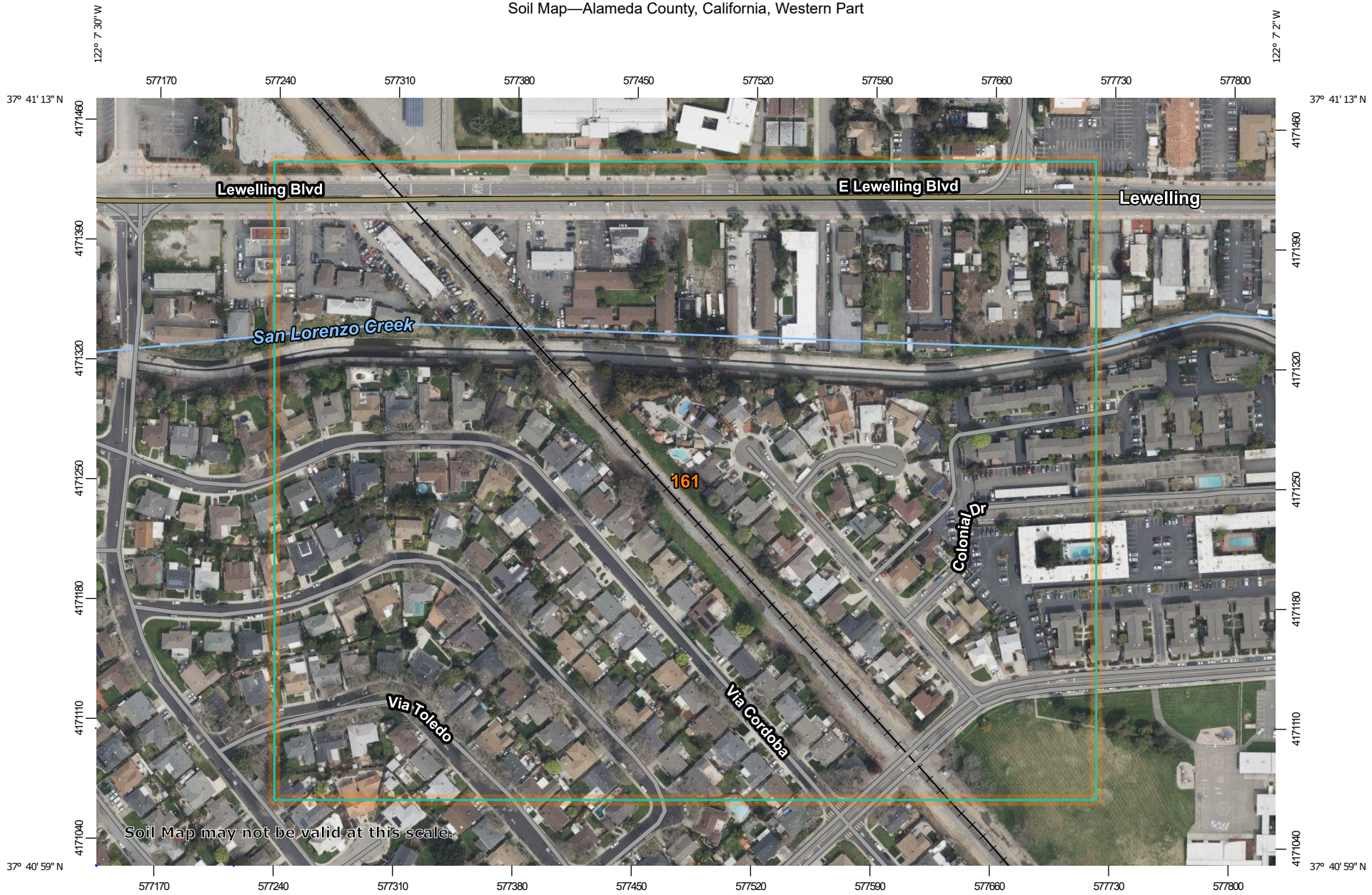
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 31, 2019—Jun 6, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
111	Danville silty clay loam, 0 to 2 percent slopes	0.1	0.7%
161	Yolo silt loam, 0 to 3 percent slopes, dry, MLRA 14	15.3	99.3%
Totals for Area of Interest		**15.4**	**100.0%**



Map Scale: 1:3,160 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Alameda County, California, Western Part
Survey Area Data: Version 17, May 29, 2020

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

Date(s) aerial images were photographed: Mar 7, 2021—Mar 27, 2021

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
161	Yolo silt loam, 0 to 3 percent slopes, dry, MLRA 14	44.6	100.0%
Totals for Area of Interest		**44.6**	**100.0%**

Map Scale: 1:2,880 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Alameda County, California, Western Part
Survey Area Data: Version 17, May 29, 2020

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

Date(s) aerial images were photographed: May 31, 2019—Jun 6, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
107	Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14	38.2	100.0%
Totals for Area of Interest		**38.2**	**100.0%**

Map Scale: 1:2,960 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

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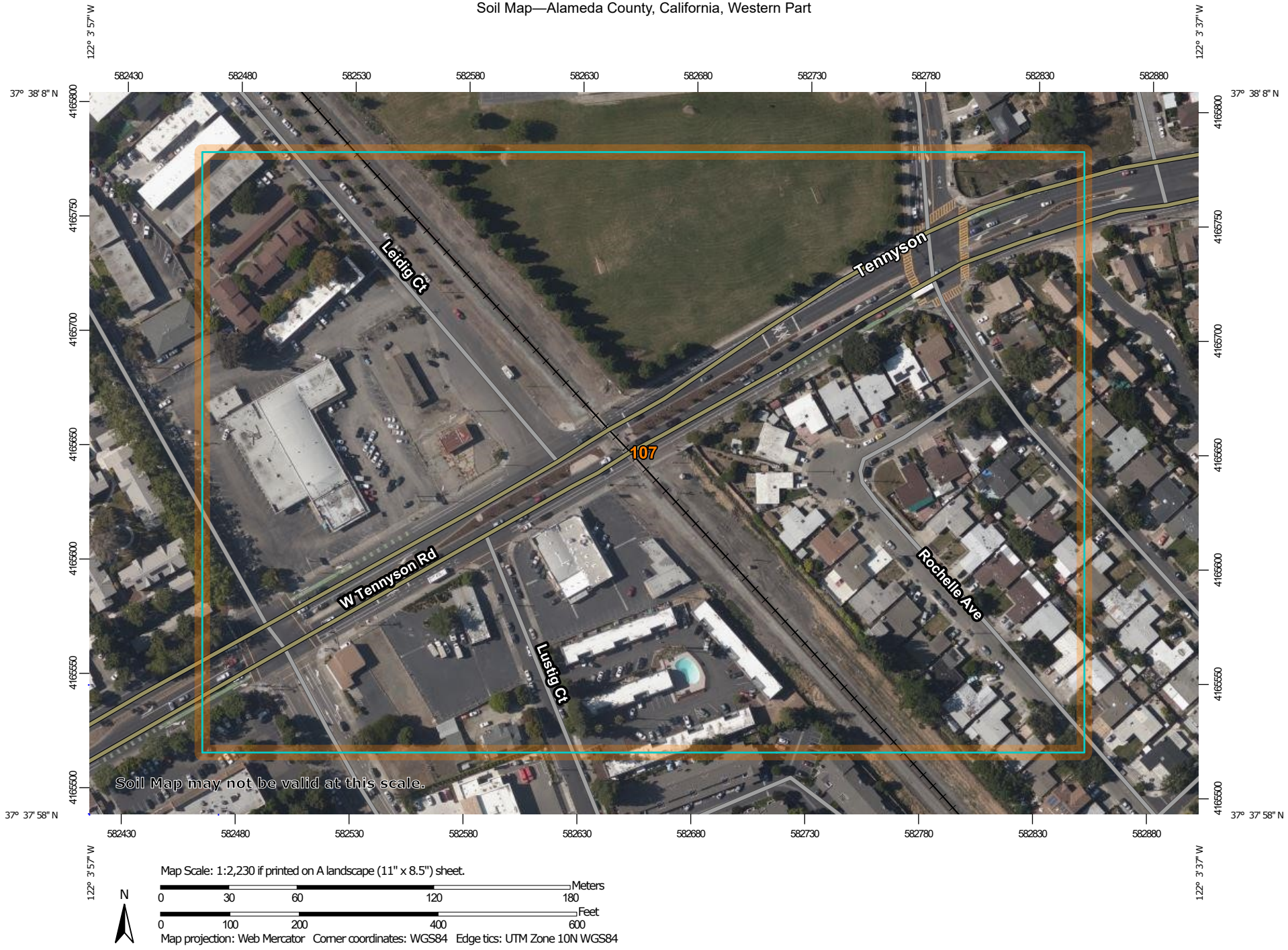
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
107	Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14	43.0	100.0%
Totals for Area of Interest		**43.0**	**100.0%**



Map Scale: 1:2,230 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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- Gravel Pit
- Gravelly Spot
- Landfill
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- Miscellaneous Water
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- Wet Spot
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- Special Line Features

Water Features

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Transportation

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MAP INFORMATION

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Survey Area Data: Version 17, May 29, 2020

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Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
107	Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14	25.2	100.0%
Totals for Area of Interest		**25.2**	**100.0%**

Soil Map—Alameda County, California, Western Part

Map Scale: 1:3,250 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
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Special Point Features

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- Gravel Pit
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Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
107	Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14	29.2	58.0%
140	Rincon clay loam, 0 to 2 percent slopes, MLRA 14	19.5	38.7%
162	Water	1.6	3.3%
Totals for Area of Interest		**50.3**	**100.0%**

ATTACHMENT E – GROUNDWATER DATA

RB&C #01-0328

OK to close

CASE CLOSURE SUMMARY
Leaking Underground Fuel Storage Tank Program

I. AGENCY INFORMATION

Date: August 31, 1998

Agency Name: **Alameda County Haz-Mat** Address: 1131 Harbor Bay Pkwy
City/State/Zip: **Alameda, CA 94502** Phone: **(510) 567-6700**
Responsible Staff Person: **Brian P. Oliva** Title: **Hazardous Materials Specialist**

II. CASE INFORMATION

Site facility name: **Former Chevron Station**
Site facility address: **15526 Hesperian Blvd., San Lorenzo, CA 94580**
RB LUSTIC Case #: **N/A** Local Case #: **1546**
URI Filing Date: **08/12/91**

Responsible Parties:	**Address:**	**Phone Numbers**
Chevron Products Company	PO. Box 5004	
Attn: Tammy Hodge	San Ramon, CA 94583	

Tank No:	**Size in gallons**:	**Contents:**	**Closed in-place or removed**?	**Date:**
1	10,000	gasoline	removed	05/30/91
2	10,000	gasoline	removed	05/30/91
3	6,000	gasoline	removed	05/30/91

III. RELEASE AND SITE CHARACTERIZATION INFORMATION

Cause and type of release: **Product line leak**

Site characterization complete? **Yes** Date approved by oversight agency: 04/28/92

Monitoring wells installed? **Yes** Number: **8**

Properly screened intervals? **Yes**

Highest GW depth? **9.44 feet** Lowest depth: **14.95 feet**

Flow direction: **West/Southwest to West/Northwest**

Most sensitive commercial use: **Commercial**

Are drinking water wells affected? **N/A** Aquifer Name: **N/A**

Off-site beneficial use impacts (address/location) None

Reports on file? Yes, filed with Alameda County, 1131 Harbor Bay, Alameda, CA

agents. Historical operations associated with the paper mill and carton plant included other chemicals such as fuel oils, adhesives, and wax. No uses of chlorinated solvents were identified during review of regulatory agency file information or noted by site personnel during completion of both independent Phase I ESAs.

Groundwater Contaminants

Groundwater has been recorded at depths of approximately 15 feet bgs at properties in the site vicinity and is reported to flow west to southwest towards the San Francisco Bay. Since at least the 1950s, the site vicinity has been used for commercial purposes. A number of properties in the immediate site vicinity have been investigated over the years for releases to groundwater, namely VOCs including PCE and TCE. Ardent reviewed environmental reports on the State Water Resources Control Board (SWRCB) GeoTracker website, and the Alameda County Department of Environmental Health (ACDEH), Local Oversight Program (LOP) website, as well as interviewed case handlers at the SFRWQCB to assess current investigation efforts of the local regulatory agencies.

Off-site facilities with reported VOC impacted groundwater within close proximity to the site included Ingersoll-Rand Company located approximately 340 feet northeast of and upgradient from the site; Place Towing and Recovery (aka Former Crane Valve Company) located immediately north to northwest of and crossgradient from the site; Watkins Terminal/Bluewater, also located north to northwest of and crossgradient from the site; and “1964 Williams Street” located further northwest of and crossgradient from the site.

Due to the large quantities of water involved with the paper manufacturing process, the former occupants maintained four groundwater production wells. Following acquisition of the site, three of the four wells were abandoned in accordance with current regulatory standards. Currently, one groundwater production well is located on-site that is planned to be used as part of the future syrup manufacturing processes.

Due to the number of facilities in the site vicinity reporting VOC-impacted groundwater, representatives of Domtar voluntarily collected three groundwater samples in May 1990 from its on-site production well to assess groundwater concentrations and to determine whether groundwater being pumped for production purposes contained unacceptable concentrations of VOCs.

3 Hayward - Tennyson

SITE CLOSURE SUMMARY

I. AGENCY INFORMATION

Date: November 5, 2008

Agency Name:	**RWQCB – San Francisco Bay Region**	Address:	**1515 Clay Street, Suite 1400**
City/State/Zip:	**Oakland, CA 94612**	Phone:	**(510) 583-4925**
Responsible Staff Person:	**Marcia Y. Liao**	Title:	**Water Resources Control Engineer**

II. SITE INFORMATION

Site Facility Name:	**Chevron Site No. 306464 (Former Unocal Site No. 4070)**				
Site Facility Address:	**71 West Tennyson Road, Hayward, CA**				
RB LUSTIS Case No.	**01-1569**	Local or LOP Case No.: **01-1569**		Priority:	
URF Filing Date:	**9/21/1979**	SWEEPS No.:	**None**		

Responsible Parties (include addresses and phone numbers):

Aaron Costa
Project Manager (Chevron EMC)
Chevron Environmental Management Company
6111 Bollinger Canyon Road, Room 3660
San Ramon, CA 94583
Tel 925 543 2961
Mobile 650 444 4481
acosta@chevron.com

Tank No.	Size in Gallons	Contents	Closed In-Place/Removed?	Date
1	**550**	**Waste Oil**	**Removed**	**09/21/1979**
2	**5,000**	**Gasoline**	**Removed**	**09/21/1979**
3	**7,500**	**Gasoline**	**Removed**	**09/21/1979**

III. RELEASE AND SITE CHARACTERIZATION INFORMATION

Cause and Type of Release:	**Underground Storage Tank Leak, gasoline release.**		
Site characterization complete? **Yes**	Date Approved By Oversight Agency: **06/16/2008**		
Monitoring wells installed? **Yes**	Number: **10**	Proper-screened interval? **Yes**	
Highest GW Depth Below Ground Surface: **6ft.**	Lowest Depth: **8ft.**	Flow Direction: **South**	

Most Sensitive Current Use: **Union Oil Company of California, the current property owner, leases out the site to two commercial small-equipment-repair businesses; there is no known use for groundwater at the current site or in the immediate surrounding facilities.**

Most Sensitive Potential Use and Probability of Use: **None anticipated at this time.**

Are drinking water wells affected? **No**	Aquifer Name:
Is surface water affected? **No**	Nearest/Affected SW Name: **None**

Off-Site Beneficial Use Impacts (Addresses/Locations): **None known**

Report(s) on file? **Yes**	Where is report(s) filed? **City Of Hayward Fire Department**

CASE CLOSURE SUMMARY
Case No. 01-0518

36 Hayward - Industrial

I. AGENCY INFORMATION

Preparation Date: March 30, 2021

Agency Name: San Francisco Bay Regional Water Quality Control Board	**Address:** 1515 Clay Street, Suite 1400
City/State/Zip: Oakland, California 94612	**Phone:** (510) 622-3277
Responsible Staff Person: Kevin D. Brown, CEG	**Title:** Engineering Geologist

II. SOURCE PROPERTY INFORMATION

Source Property Facility Name: Former Duncan and Son Petroleum		**Regional Water Board Case No.:** 01-0518
Source Property Facility Address: 29303 Pacific Street, Hayward, Alameda County, California		
Unauthorized Release Form Filing Date: 5/17/1988		
Global ID No. (GeoTracker): T0600100472		
Underground Storage Tank (UST) Cleanup Fund Expenditure: $1,233,166	**UST Cleanup Fund Claim No.:** 13863	**Number of Years Case Open:** 33 Years

Responsible Party: Ms. Dorothy Duncan
417 Fourth Street
Marysville, CA 95901
Email: McCrory95901@yahoo.com

Tank #	Capacity	Contents	Removed or Active	Date
1	20,000-gallon	Diesel	Removed	1999
2	20,000-gallon	Diesel	Removed	1999
3	20,000-gallon	Diesel	Removed	1999
4	20,000-gallon	Gasoline	Removed	1999
5	20,000-gallon	Gasoline	Removed	1999
6	20,000-gallon	Gasoline	Removed	1999
7	10,000-gallon	Gasoline	Removed	1999
8	5,000-gallon	Gasoline	Removed	1999
9	6,000 gallons	Overspill	Removed	1999

III. RELEASE AND SOURCE PROPERTY CHARACTERIZATION INFORMATION

Cause and Type of Release: Past fuel releases from historic underground storage tanks (USTs) and related components (i.e., product piping and dispensers).		
Source Property Characterization Complete? Yes	**Date Approved by Oversight Agency:** 1-15-2016	
Monitoring Wells Installed? Yes	**Number:** 8	**Proper Screened Intervals?** Yes
Highest Groundwater (GW) Depth (feet below ground surface/fbgs): 3 fbgs	**Lowest GW Depth:** 16.6 fbgs	**GW Flow Direction:** South to Southwest.
Most Sensitive Current GW Use: Potential drinking water. There are no public or private water supply wells within 1,000 feet of the Source Property.		
Most Sensitive Potential GW Use: Drinking water		