APPENDIX C

State Route 37 Corridor Planning and Environmental Linkages Study Existing Conditions Reports

Chapter 1
Introduction

The Existing Conditions Report provide a landscape level overview of resources located within the State Route (SR) 37 Planning and Environmental Linkages (PEL) Study Area. The information provided for each resources category will inform the future environmental review process and build a comprehensive understanding of the resources located along the proposed alignments. As shown in Figure 1-1, the SR 37 PEL Study Area includes land in Marin, Sonoma, Napa, and Solano Counties and is generally bounded by U.S. Highway (US) 101 between Petaluma and Novato to the west, SR 116 and SR 12 to the north, SR 29 between SR 12 and Vallejo to the east, and San Pablo Bay to the south.

1.1 Format of Existing Conditions Reports

Each topical chapter in this Existing Conditions Report includes the following sections:

- **Introduction**. This section provides a brief description of the resources covered in the chapter.
- **Methodology**. This section describes the methodology used to draft the section and compile information for each resource category.
- **Existing Conditions**. This section describes existing conditions for each resource category.
- **Next Steps**. This section describes issues that should be considered when selecting a preferred alignment.
- **References**. This section contains a list of documents and websites referenced, and persons consulted in preparing the Existing Conditions Report.

1.2 Organization of the Existing Conditions Report

The Existing Conditions Report is divided into 22 chapters:

1. **Introduction**. This chapter provides background information, describes the SR 37 PEL Study Area, and overall organization of the Existing Conditions Reports.
2. **Agricultural Lands**. This chapter describes the existing Important Farmland and Grazing Land, land under conservation easement or agricultural preserve protection; and land zoned for agricultural use by local jurisdictions.
3. **Air Quality and Greenhouse Gas Emissions**. This chapter describes the existing conditions for air quality and greenhouse gas emissions.
4. **Community Demographics and Land Use**. This chapter describes community boundaries, demographic characteristics, and existing land uses.
5. **Conversion of Land**. This chapter describes existing land use and zoning along the proposed alignments and the potential for the conversion of land uses.

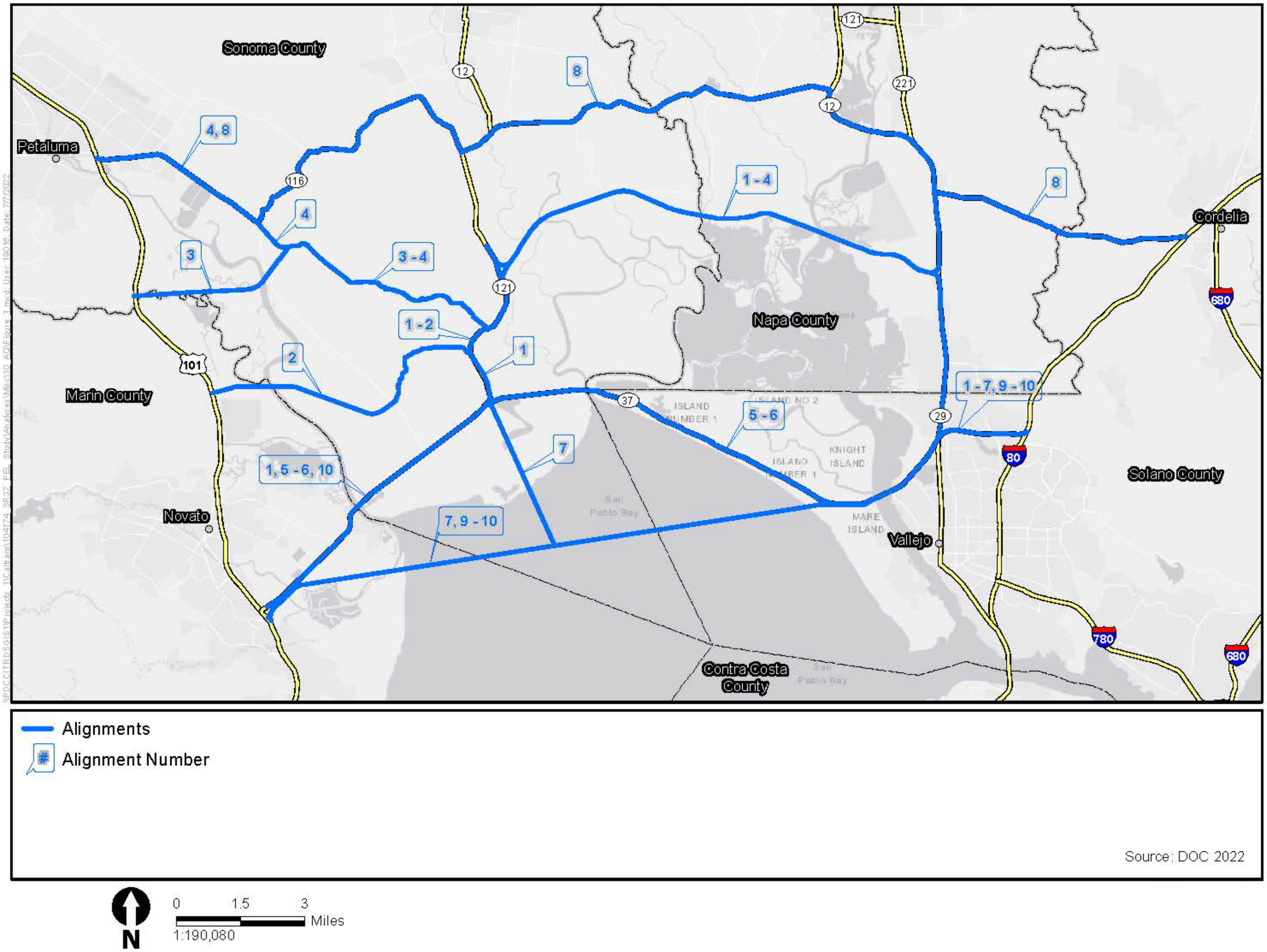

Figure 1-1. State Route 37 Planning Environmental Linkages Study Area

6. **Cultural Resources.** This chapter provides a ranking for each of the proposed alignments based on their potential to effect cultural resources.
7. **Extreme Events.** This chapter describes extreme natural events including such as heat waves, droughts, wildfire, or any other climatic event that may pose a higher risk to the corridor under the changes anticipated from climate change.
8. **Floodplains**. This chapter describes the existing floodplains, areas that experience periodic flooding, watersheds, surface water, and groundwater.
9. **Water Quality**. This chapter describes the existing water quality conditions and impairments.
10. **Geology, Soils, Seismicity, Minerals, and Paleontological Resources**. This chapter describes the existing setting for geology, soils, seismicity, minerals, and paleontological resources.
11. **Hazardous Materials**. This chapter describes and identifies existing known hazardous materials sites.
12. **Threatened and Endangered Species, Special Status Species, and Critical Habitat Assessment**. This chapter describes the distribution and population of special status species and the presence of critical habitat.
13. **Bird Habitat.** This chapter describes existing bird habitat and migratory birds with the potential to occur in the SR 37 PEL Study Area.
14. **Vegetation.** This chapter describes existing vegetation cover.
15. **Wetlands and Waters of the US.** This chapter describes existing wetlands and Waters of the US.
16. **Ecological Resiliency and Connectivity.** This chapter identifies existing ecological systems including rivers and creeks, tidal marsh, tidal bay flats, shallow bay, terrestrial corridors, and critical linkages.
17. **Tidal and Transition Zone Habitat.** This chapter identifies tidal and transition zones including tidal marsh adjacent to uplands, rivers and creeks, tidal marsh adjacent to tidal bay flats, tidal bay flats adjacent to shallow bay, tidal marsh adjacent to agriculture, and tidal marsh adjacent to urban areas.
18. **Noise.** This chapter describes the existing ambient noise conditions.
19. **Recreation, Section 4(f), and Section 6(f).** This chapter describes the existing parks, trails, and recreation facilities.
20. **Transportation.** This chapter describes the existing (2021/22) transportation conditions.
21. **Equity.** This chapter describes equity considerations.
22. **Visual Resources.** This chapter describes existing visual resources including natural landscapes and cultural landscapes.

1.3 Resource Topics Not Discussed Further

As discussed below, coastal zones, coastal areas, and wild and scenic rivers are absent from the SR 37 Study Area. For this reason, these resource topics are not discussed further in the Existing Conditions Report.

1.3.1 Coastal Zones and Coastal Areas

The California Coastal Commission (CCC) administers the federal Coastal Zone Management Act (CZMA) and the California Coastal Act. The CCC regulates the use of land and water within coastal zones in California in collaboration with coastal municipalities and counties pursuant to the CZMA and the California Coastal Act. The coastal zone where the CCC regulates development varies in width from several hundred feet in urbanized areas to up to five miles in rural areas and a three-mile-wide band of ocean in offshore areas.

The SR 37 PEL Study Area does not include any coastal zones that the CCC regulates under the CZMA (CCC 2022). Therefore, no additional consideration of coastal zones is necessary for the PEL Study. However, the presence of any coastal zones should be confirmed for any future projects programmed from the PEL in a NEPA evaluation.

1.3.2 Wild and Scenic Rivers

The National Wild and Scenic Rivers System preserves rivers "with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations" (USFWS 2022a). No designated wild and scenic rivers are present within the SR 37 PEL Study Area (USFWS 2022b). Therefore, no additional consideration of wild and scenic rivers is necessary for the PEL Study. However, the presence of any wild and scenic rivers should be confirmed for any future projects programmed from the PEL in a NEPA evaluation.

1.4 References:

California Coastal Commission (CCC). 2022. Coastal Zone Boundary Maps. Available at: https://www.coastal.ca.gov/maps/czb/. Accessed April 26, 2022.

U.S. Fish and Wildlife Service (USFWS). 2022a. About the WSR Act. Available at: https://www.rivers.gov/wsr-act.php. Accessed April 26, 2022.

U.S. Fish and Wildlife Service (USFWS). 2022b. Map of Wild and Scenic Rivers within California. Available at: https://www.rivers.gov/california.php. Accessed April 26, 2022.

Chapter 2
Agricultural Lands

This chapter describes the existing Important Farmland and Grazing Land as identified by the California of Conservation; Important Farmland and Not Prime Farmland as identified by the Natural Resources Conservation Service (NRCS); land under Williamson Act contract as recorded by the respective counties; land under conservation easement or agricultural preserve protection; and land zoned for agricultural use by local jurisdictions.

2.1 Methodology

The existing conditions sections were prepared based on review of geographic information system (GIS) data representing the project alternatives and agricultural resources. Refer to Chapter 4, *References*, for a complete list of references cited in this section.

2.2 Definitions

2.2.1 California Department of Conservation Important Farmland and Grazing Land

The California Department of Conservation recognizes the following categories of agricultural land: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, and some subcategories of Other Land (including confined animal agriculture and semi-agricultural and rural commercial) (California Department of Conservation 2019a). Of these, Prime Farmland, Farmland of Statewide Importance, and Unique Farmland are considered Important Farmland.[1] The California Department of Conservation assumes that land within a mapped category has been used for crop production at some time during the previous 4 years, so if Important Farmland is fallowed for more than 4 years, it is no longer considered Important Farmland. Important Farmland includes farmland with characteristics appropriate to sustain agricultural production. Prime Farmland has the best combination of physical and chemical features. Farmland of Statewide Importance is similar to Prime Farmland but with minor shortcomings such as steeper slopes or less ability to store moisture. Unique Farmland is farmland of lesser quality soils that is still suitable for crop production.

2.2.2 Natural Resources Conservation Service Important Farmland

NRCS recognizes the following categories of Important Farmland based on soil quality: Prime Farmland, Unique Farmland, and Farmland of Statewide Importance. In addition, NRCS maps soils

[1] California Department of Conservation's categories of Important Farmland are relevant to analysis under the California Environmental Quality Act.

categorized as Not Prime Farmland (NRCS n.d.).[2] Definitions for NRCS Important Farmland are similar to those for the California Department of Conservation's categories of Important Farmland, but there is no requirement for the land having been used for crop production within the previous four years. Instead, the categories are based on soil quality.

2.2.3 Williamson Act Lands

The California Land Conservation Act of 1965, also called the Williamson Act, was established to encourage landowners to keep their land in agricultural or open space use. This act enables local governments to enter contracts with private landowners (California Department of Conservation 2019b). These contracts restrict the parcels named by the contract to agricultural or open space use. In return for the restriction, the local jurisdiction grants property tax assessments that are based on farmland and open space uses rather than full market value and are accordingly lower than they would be without the contract. The law specifies minimum parcel size for Prime Farmland and nonprime farmland and allows the counties that administer the program to set different minimum parcel sizes. Any land that is removed from contract to facilitate public works such as transportation projects must be reported to the California Department of Conservation (California Department of Conservation 2019c, 2022).

2.2.4 Agricultural Conservation Easements and Agricultural Preserves

An agricultural conservation easement is a deed restriction that landowners voluntarily place on their land to protect agricultural resources (American Farmland Trust and Natural Resources Conservation Service 2016). The agricultural conservation easement restricts future uses through a contract between the landowner and a qualified conservation or organization or public agency. In particular, the easement does not transfer ownership of the property. Instead, it provides certain restrictions, obligations, or both to the landowner and certain rights to the granting organization (County of Marin 2019). The landowner receives financial benefit either through sale or donation of the easement to a qualified conservation organization or government body. Granting an agricultural conservation easement allows the landowner to take federal income tax deductions and in many cases state deductions. The Marin Agricultural Land Trust (MALT) in Marin County (County of Marin n.d.(a)) and the Sonoma Land Trust (Sonoma Land Trust 2022) and the Sonoma County Agricultural Preservation and Open Space District (Sonoma County Agricultural Preservation and Open Space District 2022) in Sonoma County offer agricultural conservation easements.

Agricultural preserves are areas that require that all land within the preserve be in agricultural use. The mechanism for creating an agricultural preserve varies by jurisdiction. In the Study Area, MALT has established agricultural preserves through the extensive use of agricultural conservation easements (County of Marin 2019). In Sonoma, Napa, and Solano Counties, agricultural preserves are established in land under Williamson Act contract. In Sonoma County, an agricultural preserve is an area of at least 100 acres designated by the Board of Supervisors established through a Williamson Act contract (County of Sonoma 2022a, 2022b). In Napa County, an agricultural preserve must be zoned Agricultural Preserve or Agricultural Watershed, be at least a minimum size (10 acres for prime agricultural land and 40 acres for nonprime agricultural land) and be in a

[2] Natural Resources Conservation Service categories of farmland are relevant to analysis under the National Environmental Policy Act.

Williamson Act contract (County of Napa n.d.). In Solano County, an agricultural preserve is an area at least 100 acres in size, comprised of adjacent full parcels, in agricultural, recreational, or open space use as defined in Solano County's Uniform Rules and Procedures, and under a Williamson Act contract (County of Solano 2012). Agricultural preserves can be granted to parcels less than 100 acres if authorized by the Board of Supervisors.

2.3 Existing Conditions

Agriculture is a substantial part of the local economy in the Study Area (County of Marin 2020; County of Sonoma 2020; County of Napa 2020, County of Solano 2020). Agricultural products in the Study Area include livestock; livestock products, including milk, cheese, eggs, and wool; field crops, including hay, rye, oat, straw, and pasture; and fruit, vegetable, and nursery crops, including wine grapes and wine, olives, apples, citrus, floral crops, and nuts. In the Study Area in Solano County, agriculture primarily focuses on grazing (Sustainable Solano 2022).

These crops are grown in varying conditions that relate to the quality of the soil, availability of water, and topography (Important Farmland as defined by the California Department of Conservation and NRCS) and financial and legal protections (Williamson Act contract, agricultural conservation easements and agricultural preserves, and local zoning), as described above under *Definitions*. The following subsections discuss these resources in the Study Area.

2.3.1 Farmland

2.3.1.1 California Department of Conservation Important Farmland

Generally, Prime Farmland, Farmland of Statewide Importance, and Unique Farmland as designated by California Department of Conservation are in the northern and northeastern portions of the Study Area in Sonoma and Napa Counties (Figure AG-1). Some Prime Farmland and Unique Farmland are located in the northwestern portion of Solano County in the Study Area. Farmland of Local Importance is concentrated in the southern portion of the Study Area in Marin and Sonoma Counties.

2.3.1.2 Natural Resources Conservation Service Important Farmland

Generally, Prime Farmland and Farmland of Statewide Importance as designated by the Natural Resources Conservation Service are located in the northern extent of the Study Area in Sonoma and Napa Counties, with some located in southern and central Solano County (Figure AG-2).

2.3.1.3 Other Farmland: California Department of Conservation Grazing Land

Generally, Grazing Land occupies the western portion of the Study Area in Marin and Sonoma Counties, with some located in northern Napa County and the eastern portion of the Study Area in Solano County. Urban Land is concentrated on the northwestern, southwestern, northeastern, and southeastern ends of the Study Area in Marin, Sonoma, Napa, and Solano Counties.

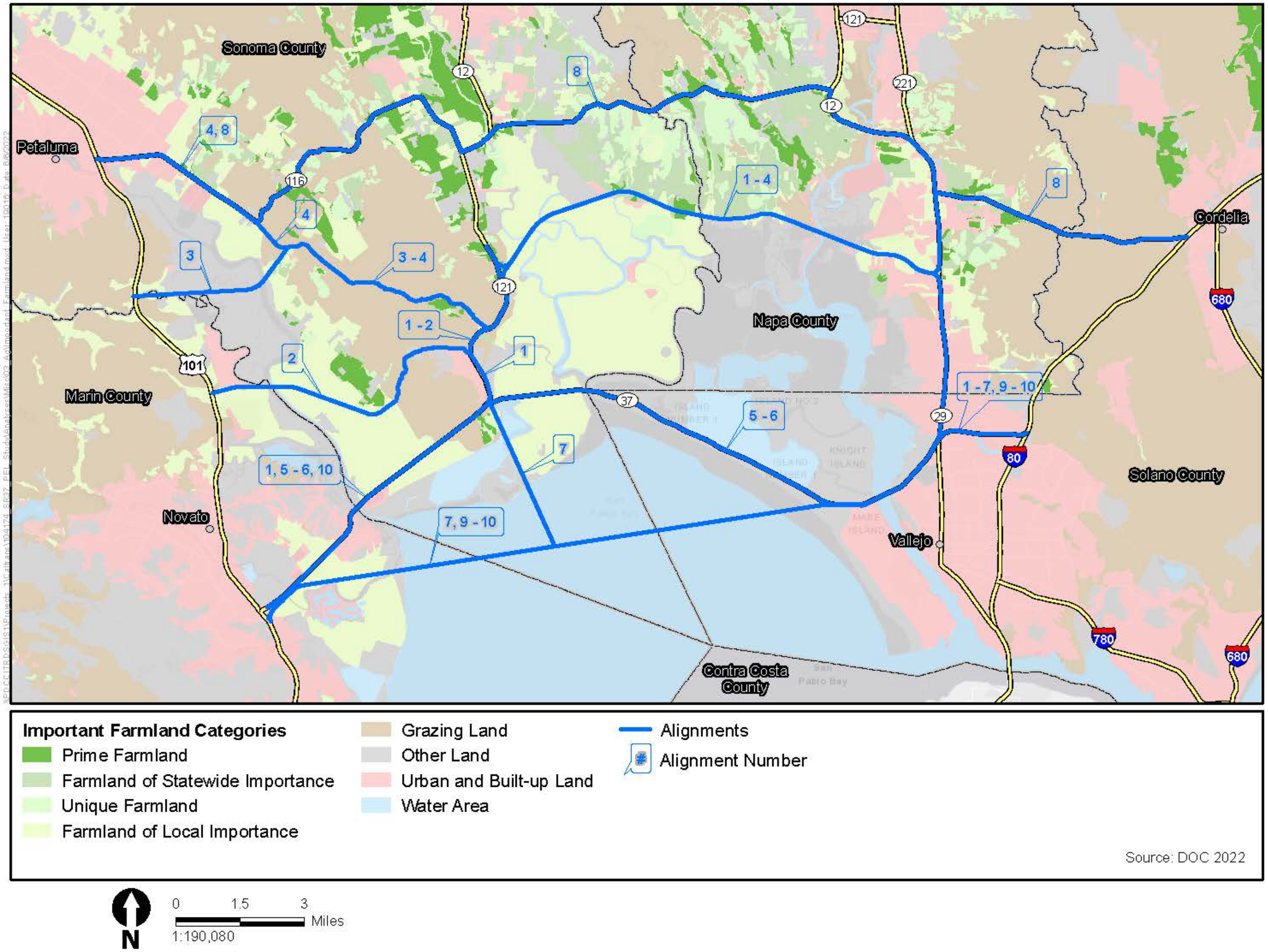

Figure AG-1. California Department of Conservation Important Farmlands

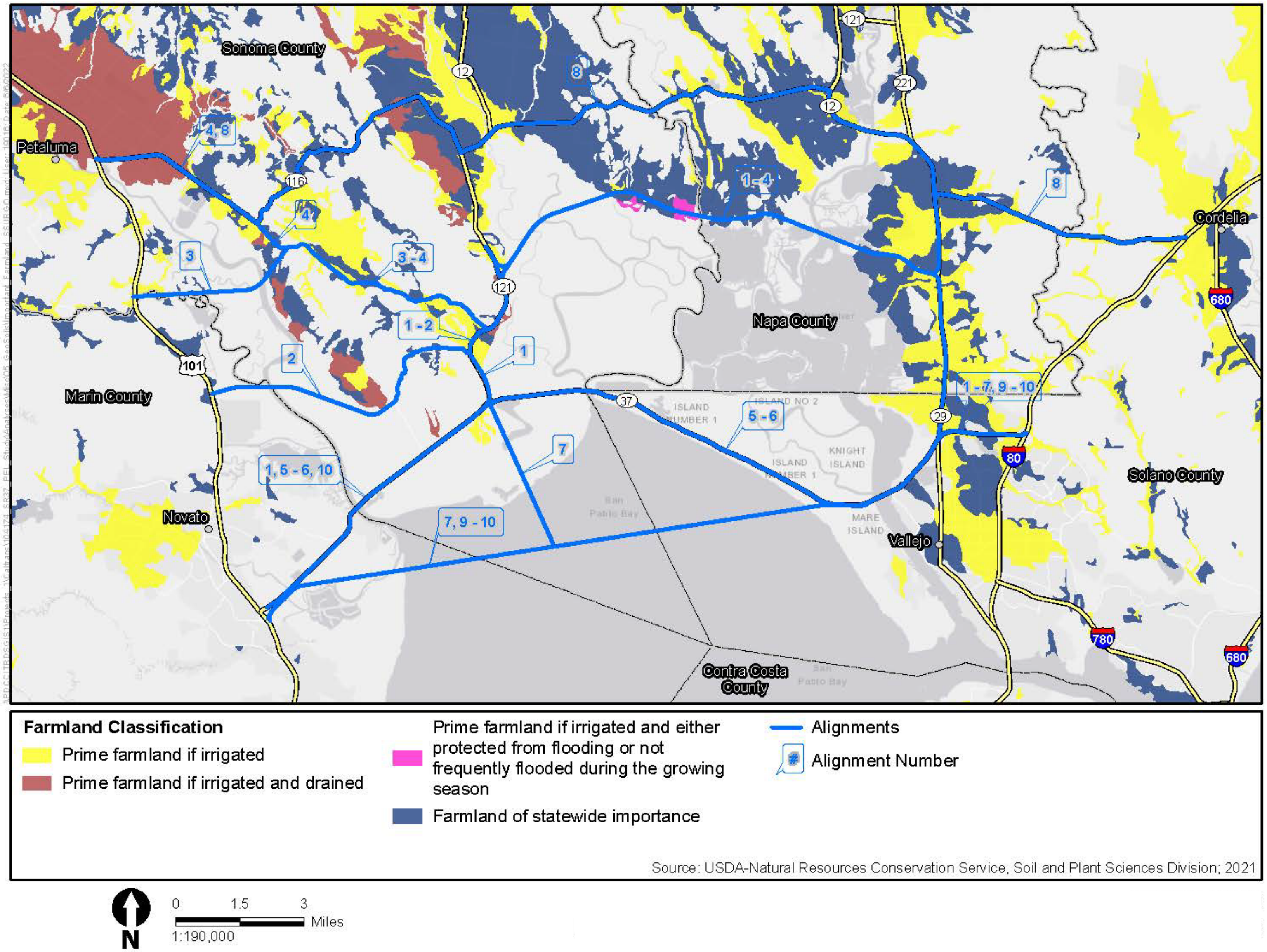

Figure AG-2. Natural Resources Conservation Service Important Farmlands

2.3.2 Land Protected by Williamson Act Contract and Other Agricultural Preserves

Land protected by Williamson Act contract is located throughout the northwestern and north-central portions of the Study Area, with concentrations in the central and northern portions of Sonoma County and western and northern portions of Napa County (Figure AG-3). These Williamson Act contracted lands, depending on size of the parcel and other conditions as described above, are eligible to be designated as agricultural preserves. Any agricultural preserve in Sonoma, Napa, and Solano counties would lie within the areas described for Williamson Act lands. As discussed above, MALT makes use of agricultural conservation easements in Marin County to preserve land in agricultural use for future generations. No MALT agricultural conservation easements are in the Study Area (Figure AG-4) (California Natural Resources Agency 2022; County of Marin n.d.(a)). In addition, lands under agricultural conservation easement managed by the Sonoma Agricultural Preservation and Open Space District lie north of SR 37 between the Petaluma River and Lakeville Highway and on the eastern border with Napa County (California Natural Resources Agency 2022).

2.3.3 Land Zoned for Agricultural Use by Local Jurisdictions

Land zoned for agricultural use exists throughout the Study Area outside of incorporated cities and towns (County of Marin n.d.(b); County of Sonoma n.d.; County of Napa n.d.; County of Solano n.d.).

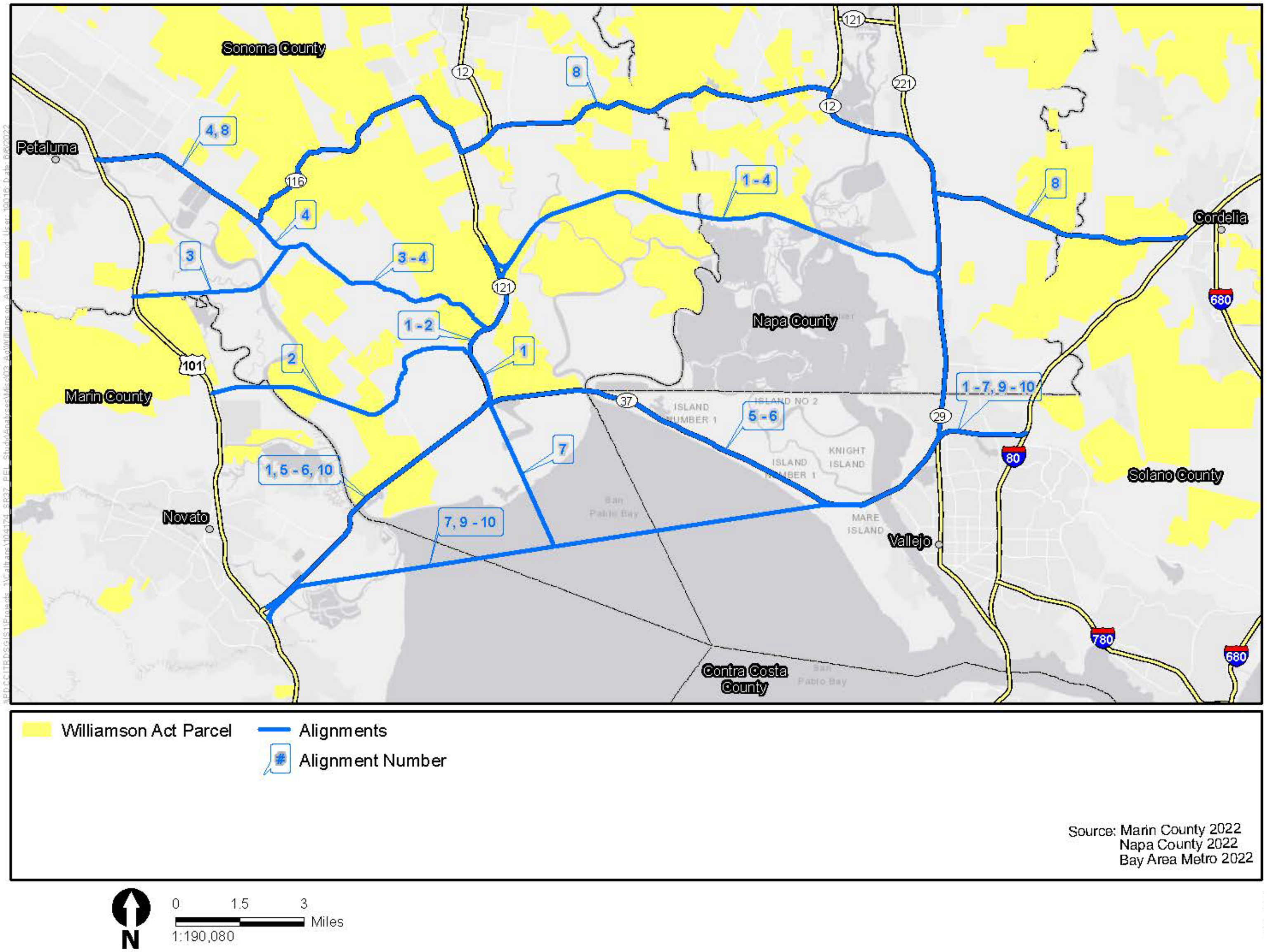

Figure AG-3. Williamson Act Contract Parcels

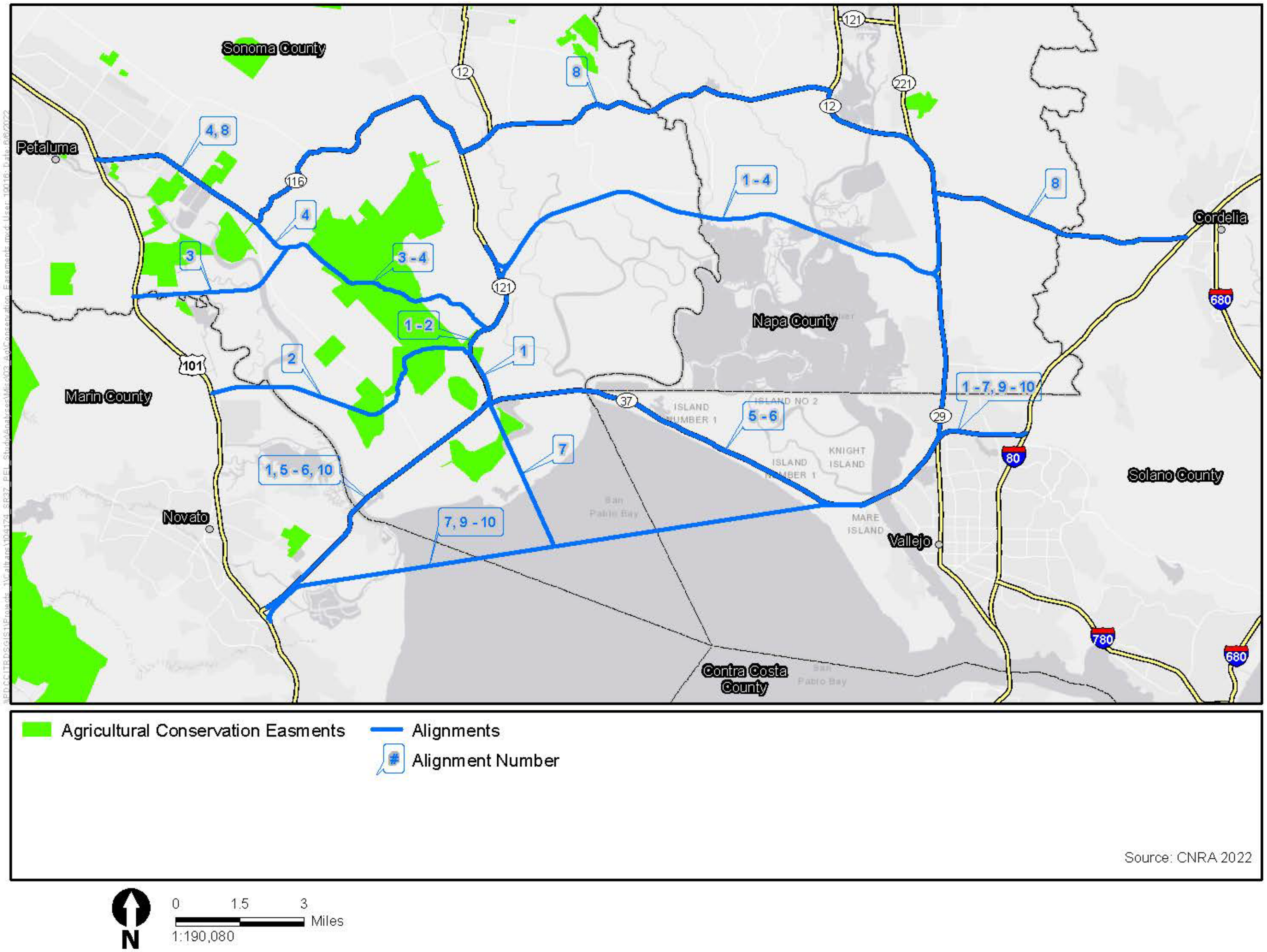

Figure AG-4. Agricultural Conservation Easements

2.4 Next Steps

The SR 37 PEL Study should consider the proximity of agricultural lands along the proposed alignments. Future coordination with governing agencies/bodies may be required.

2.5 References

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County of Marin. n.d.(b). Zoning Map. Available: https://gisopendata.marincounty.org/datasets/MarinCounty::unincorporated-marin-county-zoning-2/explore?location=38.115966%2C-122.574158%2C12.00. Accessed: March 24, 2022.

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County of Napa. n.d. Williamson Act & Agricultural Preserve Contracts. Available: https://www.countyofnapa.org/1893/Williamson-Act-Agricultural-Preserve-Con. Accessed: March 4, 2022.

County of Solano. 2012. Solano County Uniform Rules and Procedures Governing Agricultural Preserves And Land Conservation Contracts. Available: https://www.solanocounty.com/civicax/filebank/blobdload.aspx?blobid=2492#:~:text=Under%20the%20Solano%20County%20Agricultural,defined%20in%20the%20Williamson%20Act. Accessed: March 4, 2022.

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County of Sonoma. 2020. 2020 Sonoma County Crop Report. Available: https://sonomacounty.ca.gov/Agriculture-Weights-and-Measures/Crop-Reports/. Accessed: March 14, 2022.

County of Sonoma. 2022a. Frequently Asked Questions (FAQs) Agricultural Preserves Phase Out of Substandard Parcels. Available: https://sonomacounty.ca.gov/PRMD/Planning/FAQs-Agricultural-Preserves-Phase-Out/#:~:text=An%20Agricultural%20Preserve%20is%20an,agricultural%20or%20open%20space%20use. Accessed: March 4, 2022.

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Chapter 3
Air Quality and Greenhouse Gas Emissions

This chapter describes the existing conditions for air quality and greenhouse gas (GHG) emissions for the SR 37 PEL Study Area. As shown on Figure AQ-1, the regional air quality Study Area includes the San Francisco Bay Area Air Basin (SFBAAB), which covers Alameda, Contra Costa, Marin, Napa, Santa Clara, San Mateo, and San Francisco Counties, and portions of Solano and Sonoma Counties.

GHG emissions, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), once emitted, are circulated into the atmosphere on a global scale, resulting in global climate change impacts. For this reason, the GHG Study Area is comprised of the entire global atmosphere, including the state of California.

3.1 Methodology

Analysts prepared the existing conditions report based on a review of regional air quality planning documents, monitoring data, and attainment status information. Refer to Section 4, *References*, for a complete list of information cited.

3.2 Existing Conditions

3.2.1 Air Quality

3.2.1.1 Climate, Meteorology, and Topography

The SFBAAB includes 11 climatological subregions; of these, SR 37 and the proposed alignments span the following climatological subregions:

- Marin County Basins
- Cotati and Petaluma Valleys
- Sonoma Valley
- Napa Valley
- Carquinez Strait Region

Meteorological conditions, topography, and primary factors contributing to the existing air quality within each climatological subregion is described below.

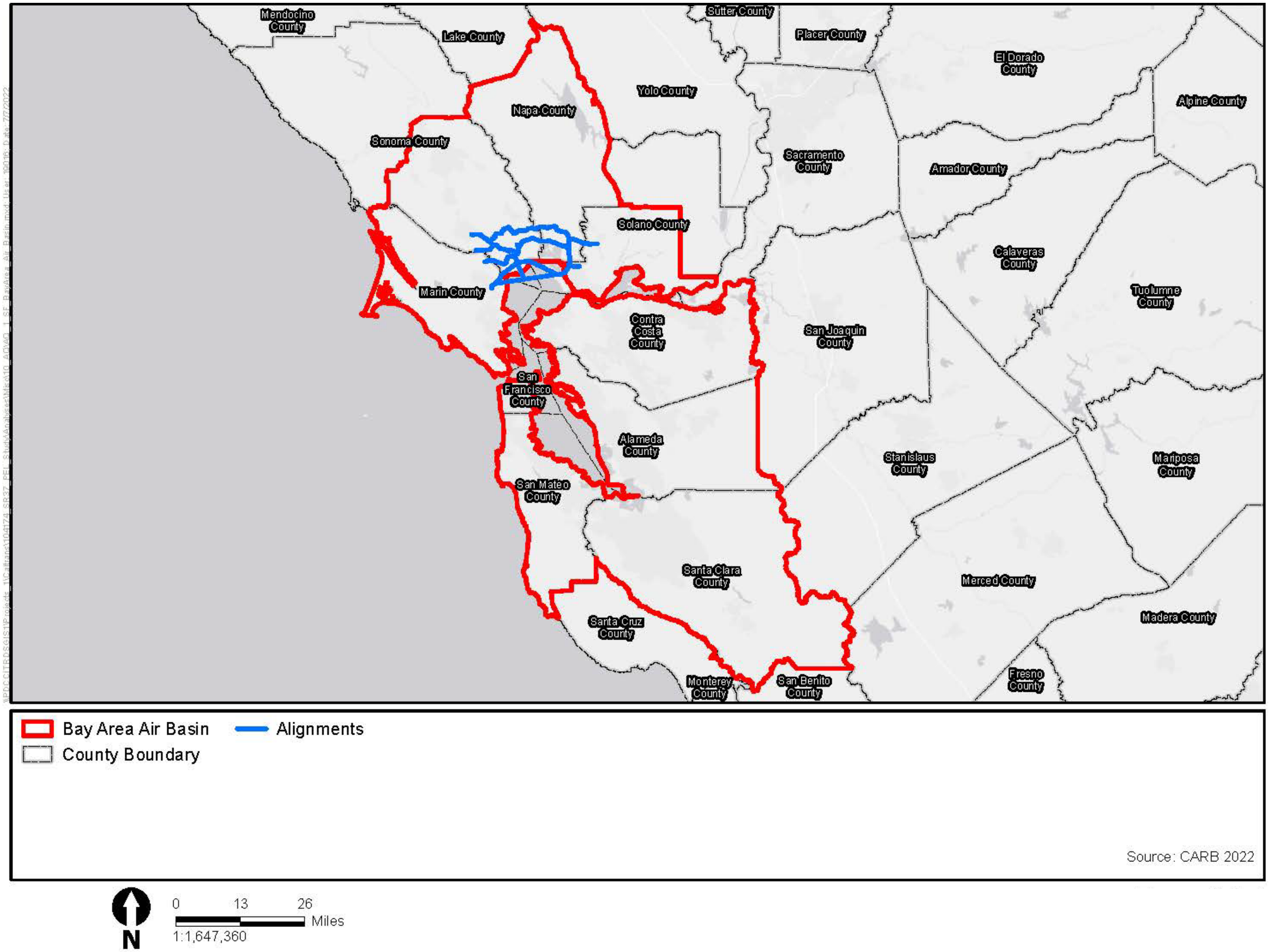

Figure AQ-1. San Francisco Bay Area Air Basin

Marin County Basins

Marin County is bounded by the Petaluma Gap to the north, San Pablo Bay to the east, Golden Gate to the south, and the Pacific Ocean to the west. Most of Marin's population lives in the eastern part of the county, in small, sheltered valleys that act like a series of miniature air basins. The majority of the terrain in the area is 800 to 1,000 feet in elevation, which is not high enough to block the marine layer because of the wedge shape of the county—northeast Marin County is further from the ocean than is the southeastern section. This extra distance from the ocean allows the marine air to be moderated by bayside conditions as it travels to northeastern Marin County. In southern Marin County the distance from the ocean is short and elevations are lower, resulting in higher incidence of maritime air in that area.

Wind speeds are highest along the west coast of Marin County, averaging about eight to 10 miles per hour (mph). The complex terrain in central Marin County creates sufficient friction to slow the air flow. At Hamilton Air Force Base, in Novato, the annual average wind speeds are only five mph. The prevailing wind directions throughout Marin County are generally from the northwest.

In the summer months, areas along the coast are usually subject to onshore movement of cool marine air. In the winter, proximity to the ocean keeps the coastal regions relatively warm, with temperatures varying little throughout the year. Coastal temperatures are usually in the high 50s in the winter and the low 60s in the summer. The warmest months are September and October.

The eastern side of Marin County has warmer weather than the western side due to its distance from the ocean and because the hills that separate eastern Marin from western Marin occasionally block the flow of the marine air. The temperatures of cities along the bay are moderated by the cooling effect of the bay in the summer and the warming effect of the bay in the winter. For example, San Rafael experiences average maximum summer temperatures in the low 80s and average minimum winter temperatures in the low 40s. Inland towns such as Kentfield experience average maximum temperatures that are two degrees Fahrenheit (°F) cooler in the winter and two °F warmer in the summer.

Air pollution potential is highest in eastern Marin County, where most of population is located in semi sheltered valleys. In the southeast, the influence of marine air keeps pollution levels low. As development moves further north, there is greater potential for air pollution to build up because the valleys are more sheltered from the sea breeze. While Marin County does not have many polluting industries, the air quality on its eastern side—especially along the U.S. Highway (US) 101 corridor—may be affected by emissions from motor vehicle use within and through the county.

Cotati and Petaluma Valleys

This subregion stretches from Santa Rosa to the San Pablo Bay and is often considered as two different valleys: the Cotati Valley in the north and the Petaluma Valley in the south. To the east, the valley is bordered by the Sonoma Mountains, and to the west is a series of low hills and the Estero Lowlands, which open to the Pacific Ocean. The region from the Estero Lowlands to the San Pablo Bay is known as the Petaluma Gap. This low-terrain area allows marine air to travel into the SFBAAB.

Wind patterns in the Petaluma and Cotati Valleys are strongly influenced by the Petaluma Gap, with winds flowing predominantly from the west. As marine air travels through the Petaluma Gap, it splits into northward and southward paths moving into the Cotati and Petaluma Valleys. The southward path crosses San Pablo Bay and moves eastward through the Carquinez Strait. The northward path contributes to Santa Rosa's prevailing winds from the south and southeast. Petaluma's prevailing winds are from the northwest.

When the ocean breeze is weak, strong winds from the east can predominate, carrying pollutants from the Central Valley and the Carquinez Strait. During these periods, up valley flows can carry the polluted air as far north as Santa Rosa.

Winds are usually stronger in the Petaluma Valley than the Cotati Valley because the former is directly in line with the Petaluma Gap. Petaluma's climate is similar to areas closer to the coast even though Petaluma is 28 miles from the ocean. Average annual wind speed at the Petaluma Airport is seven mph. The Cotati Valley, being slightly north of the Petaluma Gap, experiences lower wind speeds. The annual average wind speed in Santa Rosa is five mph.

Air temperatures are very similar in the two valleys. Summer maximum temperatures for this subregion are in the low to mid-80s, while winter maximum temperatures are in the high 50s to low 60s. Summer minimum temperatures are around 50°F, and winter minimum temperatures are in the high 30s.

Generally, air pollution potential is low in the Petaluma Valley because of its link to the Petaluma Gap and because of its low population density. There are two scenarios that could produce elevated pollutant levels: (1) stagnant conditions in the morning hours created when a weak ocean breeze meets a weak bay breeze, and (2) an eastern or southeastern wind pattern in the afternoon bringing pollution from the Carquinez Strait region and the Central Valley.

The Cotati Valley has a higher pollution potential than does the Petaluma Valley. The Cotati Valley lacks a gap to the sea, contains a larger population, and has natural barriers at its northern and eastern ends. There are also industrial facilities in and around Santa Rosa. Both valleys of this subregion are also threatened by increased motor vehicle traffic and the associated air contaminants. Population and motor vehicle use are increasing significantly, and housing costs and the suburbanization of employment centers lead to longer commutes, which contribute to air pollution.

Sonoma Valley

The Sonoma Valley is long and narrow, approximately five miles wide at its southern end, and less than a mile wide at the northern end. It is separated from Napa Valley and the Cotati and Petaluma Valleys by mountains.

The climate is similar to that of the Napa Valley, with the same basic wind characteristics. The strongest up valley winds occur in the afternoon during the summer and the strongest down valley winds occur during clear, calm winter nights. Prevailing winds follow the axis of the valley northwest/southeast, while some upslope flow during the day and downslope flow during the night occurs near the base of the mountains. Summer average maximum temperatures are usually in the high 80s, and summer minimums are around 50°F. Winter maximums are in the high 50s to the mid-60s, with minimums ranging from the mid-30s to low 40s.

As in the Napa Valley, the air pollution potential of the Sonoma Valley could be high if there were significant sources of pollution nearby. Prevailing winds can transport locally and nonlocally generated pollutants northward into the narrow valley, which often traps and concentrates the pollutants under stable conditions. The local upslope and downslope flows set up by the surrounding mountains may also recirculate pollutants.

However, local sources of air pollution are minor. With the exception of facilities that process agricultural goods, such as wine and cheese manufacturing, there is little industry in this valley. Increases in motor vehicle emissions and woodsmoke emissions from stoves and fireplaces may increase pollution as the valley grows in population and as a tourist attraction.

Napa Valley

Napa Valley is bordered by relatively high mountains. With an average ridge line height of about 2,000 feet, with some peaks approaching 3,000 to 4,000 feet, these mountains are effective barriers to the prevailing northwesterly winds. The Napa Valley is widest at its southern end and narrows in the north.

During the day, the prevailing winds flow up valley from the south about half of the time. A strong up valley wind frequently develops during warm summer afternoons, drawing air in from the San Pablo Bay. Daytime winds sometimes flow down valley from the north. During the evening, especially in the winter, down valley drainage often occurs. Wind speeds are generally low, with almost 50% of the winds less than four mph. Only five percent of the winds are between 16 and 18 mph, representing strong summertime up valley winds and winter storms.

Summer average maximum temperatures are in the low 80s at the southern end of the valley and in the low 90s at the northern end. Winter average maximum temperatures are in the high 50s and low 60s, and minimum temperatures are in the high to mid-30s, with the slightly cooler temperatures in the northern end.

The air pollution potential in the Napa Valley could be high if there were sufficient sources of air contaminants nearby. Summer and fall prevailing winds can transport ozone precursors northward from the Carquinez Strait region to the Napa Valley, effectively trapping and concentrating the pollutants when stable conditions are present. The local upslope and downslope flows created by the surrounding mountains may also recirculate pollutants already present, contributing to buildup of air pollution. High ozone concentrations are a potential problem for sensitive crops such as wine grapes, as well as for human health. The high frequency of light winds and stable conditions during the late fall and winter contribute to the buildup of particulate matter from motor vehicles, agriculture, and wood burning in fireplaces and stoves.

Carquinez Strait Region

The Carquinez Strait runs from Rodeo to Martinez. It is the only sea-level gap between the bay and the Central Valley. The subregion includes the lowlands bordering the strait to the north and south and includes the area adjoining Suisun Bay and the western part of the Sacramento–San Joaquin Delta as far east as Bethel Island. The subregion extends from Rodeo in the southwest and Vallejo in the northwest to Fairfield in the northeast and Brentwood in the southeast.

Prevailing winds are from the west in the Carquinez Strait. During the summer and fall months, high pressure offshore coupled with low pressure in the Central Valley causes marine air to flow eastward through the Carquinez Strait. The wind is strongest in the afternoon. Afternoon wind speeds of 15 to 20 mph are common throughout the strait region. Annual average wind speeds are eight mph in Martinez, and nine to 10 mph further east. Sometimes atmospheric conditions cause air to flow from the east. East winds usually contain more pollutants than the cleaner marine air from the west. In the summer and fall months, this can cause elevated pollutant levels to move into the central SFBAAB through the strait. These high-pressure periods are usually accompanied by low wind speeds, shallow mixing depths, higher temperatures, and little or no rainfall.

Summer mean maximum temperatures reach about 90°F in the subregion. Mean minimum temperatures in the winter are in the high 30s. Temperature extremes are especially pronounced in sheltered areas further from the moderating effects of the strait itself (e.g., Fairfield).

Many industrial facilities with significant air pollutant emissions (e.g., chemical plants and refineries) are located within the Carquinez Strait region. The pollution potential of this area is often moderated by high wind speeds. However, upsets[1] at industrial facilities can lead to short-term pollution episodes, and emissions of unpleasant odors may occur at any time. Receptors downwind of these facilities could suffer more long-term exposure to air contaminants than individuals elsewhere. It is important that local governments maintain buffer zones around sources of air pollution sufficient to avoid adverse health and nuisance impacts on nearby receptors. Areas of the subregion that are traversed by major roadways (e.g., Interstate 80), may also be subject to higher local concentrations of carbon monoxide (CO) and particulate matter, as well as certain toxic air contaminants (TAC) such as benzene.

3.2.1.2 Air Quality Pollutants of Concern and Attainment Status

Air quality studies generally focus on the five pollutants that are most commonly measured and regulated: CO, ozone, nitrogen dioxide, sulfur dioxide, and suspended particulate matter (i.e., PM10 and PM2.5). Criteria pollutant standards established by the national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS) are summarized in Table AQ-1.

[1] The term upset refers to unpreventable emissions events at industrial facilities that result in pollutant emissions above those allowed by the facilities permit.

Table AQ-1. Current Federal and State Ambient Air Quality Standards

Criteria Pollutant	Average Time	California Standards	National Standards[a] Primary	National Standards[a] Secondary
Ozone	1-hour	0.09 ppm	None[b]	None[b]
	8-hour	0.070 ppm	0.070 ppm	0.070 ppm
Particulate matter (PM10)	24-hour	50 μg/m³	150 μg/m³	150 μg/m³
	Annual mean	20 μg/m³	None	None
Fine particulate matter (PM2.5)	24-hour	None	35 μg/m³	35 μg/m³
	Annual mean	12 μg/m³	12.0 μg/m³	15 μg/m³
Carbon monoxide	8-hour	9.0 ppm	9 ppm	None
	1-hour	20 ppm	35 ppm	None
Nitrogen dioxide	Annual mean	0.030 ppm	0.053 ppm	0.053 ppm
	1-hour	0.18 ppm	0.100 ppm	None
Sulfur dioxide[c]	Annual mean	None	0.030 ppm	None
	24-hour	0.04 ppm	0.014 ppm	None
	3-hour	None	None	0.5 ppm
	1-hour	0.25 ppm	0.075 ppm	None
Lead	30-day Average	1.5 μg/m³	None	None
	Calendar quarter	None	1.5 μg/m³	1.5 μg/m³
	3-month average	None	0.15 μg/m³	0.15 μg/m³
Sulfates	24-hour	25 μg/m³	None	None
Visibility-reducing particles	8-hour	–[d]	None	None
Hydrogen sulfide	1-hour	0.03 ppm	None	None
Vinyl chloride	24-hour	0.01 ppm	None	None

Source: CARB 2016.

[a] NAAQS are divided into primary and secondary standards. Primary standards are intended to protect public health, whereas secondary standards are intended to protect public welfare and the environment.

[b] The federal 1-hour standard of 12 parts per hundred million was in effect from 1979 through June 15, 2005. The revoked standard is referenced because it was employed for a long period and is a benchmark for state implementation plans.

[c] The annual and 24-hour NAAQS for sulfur dioxide only apply for 1 year after designation of the new 1-hour standard to those areas that were previously in nonattainment for 24-hour and annual NAAQS.

[d] CAAQS for visibility-reducing particles is defined by an extinction coefficient of 0.23 per kilometer – visibility of 10 miles or more due to particles when relative humidity is less than 70%.

ppm= parts per million; μg/m³ = micrograms per cubic meter; NAAQS = national ambient air quality standard; CAAQS = California ambient air quality standard

3.2.1.3 Existing Air Quality Conditions

The existing air quality conditions in the Study Area can be characterized by the attainment status of the region and monitoring data collected in the region. The following sections summarize these characteristics.

Regional Attainment Status

Local monitoring data are used to designate areas as nonattainment, maintenance, attainment, or unclassified for CAAQS and NAAQS. These terms are defined as follows:

- **Nonattainment.** Assigned to areas where monitored pollutant concentrations consistently violate the standard in question.
- **Maintenance.** Assigned to areas where monitored pollutant concentrations exceeded the standard in question in the past but are no longer in violation of that standard.
- **Attainment.** Assigned to areas where pollutant concentrations meet the standard in question over a designated period.
- **Unclassified.** Assigned to areas where data are insufficient to determine whether a pollutant is violating the standard in question.

The current attainment status of the air quality Study Area, with respect to CAAQS and NAAQS, is included in Table AQ-2.

Table AQ-2. Federal and State Ambient Air Quality Attainment Status for Project Corridor

Criteria Pollutant	Federal Designation	State Designation
O_3 (8-hour)	Marginal[a] Nonattainment	Nonattainment
CO	Attainment	Attainment
PM10	Attainment	Nonattainment
PM2.5	Moderate Nonattainment	Nonattainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
Lead	Attainment	Attainment
Sulfates	(No Federal Standard)	Attainment
Hydrogen Sulfide	(No Federal Standard)	Unclassified
Visibility	(No Federal Standard)	Unclassified

Sources: CARB 2021a; EPA 2021a.

CO = carbon monoxide; O_3 = ozone; PM10 = particulate matter less than 10 microns in diameter; PM2.5 = particulate matter less than 2.5 microns in diameter; NO_2 = nitrogen dioxide; SO_2 = sulfur dioxide.

[a] Federal designations listed for the 2015 standard/2008 standard.

Ambient air quality refers to the concentration of pollutants in the air. The California Air Resources Board (CARB) collects ambient air quality data through a network of air monitoring stations throughout the state. Table AQ-3 summarizes data for criteria pollutant levels from air quality monitoring stations for the last three years for which complete data was available (2018–2020). Not all pollutants are monitored at every station, and there may be gaps in the data in certain years due to equipment or monitoring issues. In Marin County, the nearest monitoring station is the San Rafael station, which is approximately eight miles south of where SR 37 meets US 101. In Napa County, the nearest monitoring station is the Napa Valley College station, which is approximately 11 miles north of the eastern portion of the existing SR 37 corridor and three miles north of the northernmost alignment option (Alignment 8). In Solano County, the nearest monitoring station is the Vallejo station, which is approximately two miles south of the SR 37 corridor. There are no monitoring stations in Sonoma County near SR 37. Figure AQ-2 shows the locations of the monitoring stations that are nearest to the project corridor.

Table AQ-3. Ambient Air Quality Monitoring Data

	San Rafael			Napa Valley College			Vallejo		
Pollutant Standards	**2018**	**2019**	**2020**	**2018**	**2019**	**2020**	**2018**	**2019**	**2020**
Ozone (O_3)									
Maximum 1-hour concentration (ppm)	0.072	0.096	0.086	0.083	0.095	0.091	0.070	0.092	0.096
Maximum 8-hour concentration (ppm)	0.054	0.081	0.064	0.069	0.077	0.077	0.055	0.076	0.077
Number of days standard exceeded									
CAAQS 1-hour (>0.09 ppm)	0	1	0	0	1	0	0	0	1
CAAQS 8-hour (>0.070 ppm)	0	1	0	0	2	1	0	1	1
NAAQS 8-hour (>0.070 ppm)	0	1	0	0	2	1	0	1	1
Carbon Monoxide (CO)									
Maximum 1-hour concentration	2.0	1.4	2.1	1.4	1.3	4.4	2.8	2.0	2.5
Maximum 8-hour concentration	1.6	0.9	1.6	1.1	1.0	2.7	2.4	1.5	1.7
Days state 1-hour standard exceeded (20 ppm)	–	–	–	–	–	–	–	–	–
Days national 1-hour standard exceeded (35 ppm)	0	0	0	0	0	0	0	0	0
Days state 8-hour standard exceeded (9 ppm)	–	–	–	–	–	–	–	–	–
Days national 8-hour standard exceeded (9 ppm)	0	0	0	0	0	0	0	0	0
Nitrogen Dioxide (NO_2)									
Maximum 1-hour Concentration	55.3	49.9	42.1	43.2	36.6	29.9	57.4	52.5	48.4
Annual Average Concentration	9	8	7	–	4	4	–	7	7
Days state standard exceeded (0.18 ppm)	0	0	0	0	0	0	0	0	0
Days national standard exceeded (0.100 ppm)	0	0	0	0	0	0	0	0	0
Particulate Matter (PM10)									
National maximum 24-hour concentration (μg/m^3)	160.0	31.9	115.7	25.5	37.5	122.9	–	–	–
National second-highest 24-hour concentration (μg/m^3)	95.2	30.7	39.9	23.6	29.3	81.1	–	–	–
State maximum 24-hour concentration (μg/m^3)	166.0	33.0	118.0	26.0	39.0	125.0	–	–	–
State second-highest 24-hour concentration (μg/m^3)	99.0	32.0	42.0	24.0	30.0	82.0	–	–	–
Annual average concentration (μg/m^3)	18.4	13.9	16.2	12.7	13.5	18.6	–	–	–

Pollutant Standards	San Rafael			Napa Valley College			Vallejo		
	2018	2019	2020	2018	2019	2020	2018	2019	2020
Number of days standard exceeded									
NAAQS 24-hour (>150 μg/m³) (estimated)	6.1	0.0	0.0	–	0.0	0.0	–	–	–
CAAQS 24-hour (>50 μg/m³)	12.2	-	6.1	–	–	11.5	–	–	–
CAAQS annual (> 20 μg/m³)	No	No	No	No	No	No	–	–	–
Particulate Matter (PM2.5)									
National maximum 24-hour concentration (μg/m³)	167.6	19.5	155.5	117.9	21.5	148.5	197.2	30.5	152.7
National second-highest 24-hour concentration (μg/m³)	119.9	17.3	94.4	109.1	19.9	112.8	123.8	24.9	104.5
State maximum 24-hour concentration (μg/m³)	167.6	19.5	155.5	117.9	21.5	148.5	197.2	30.6	153.2
State second-highest 24-hour concentration (μg/m³)	119.9	18.3	94.4	109.1	19.9	112.8	123.8	24.9	104.9
Annual average concentration (μg/m³)	11.1	6.4	8.7	–	6.0	10.4	13.3	8.6	12.0
Number of days standard exceeded									
NAAQS 24-hour (>35 μg/m³)	13	0	9	–	0.0	14.7	16.4	0.0	12.0
NAAQS/CAAQS annual (>12 μg/m³)	No	No	No	No	No	No	No	No	Yes

Sources: CARB 2021b; EPA 2021b

μg/m³ = micrograms per cubic meter; -- = no data available; PM10 = particulate matter less than 10 microns in diameter; PM2.5 = particulate matter less than 2.5 microns in diameter; ppm = parts per million

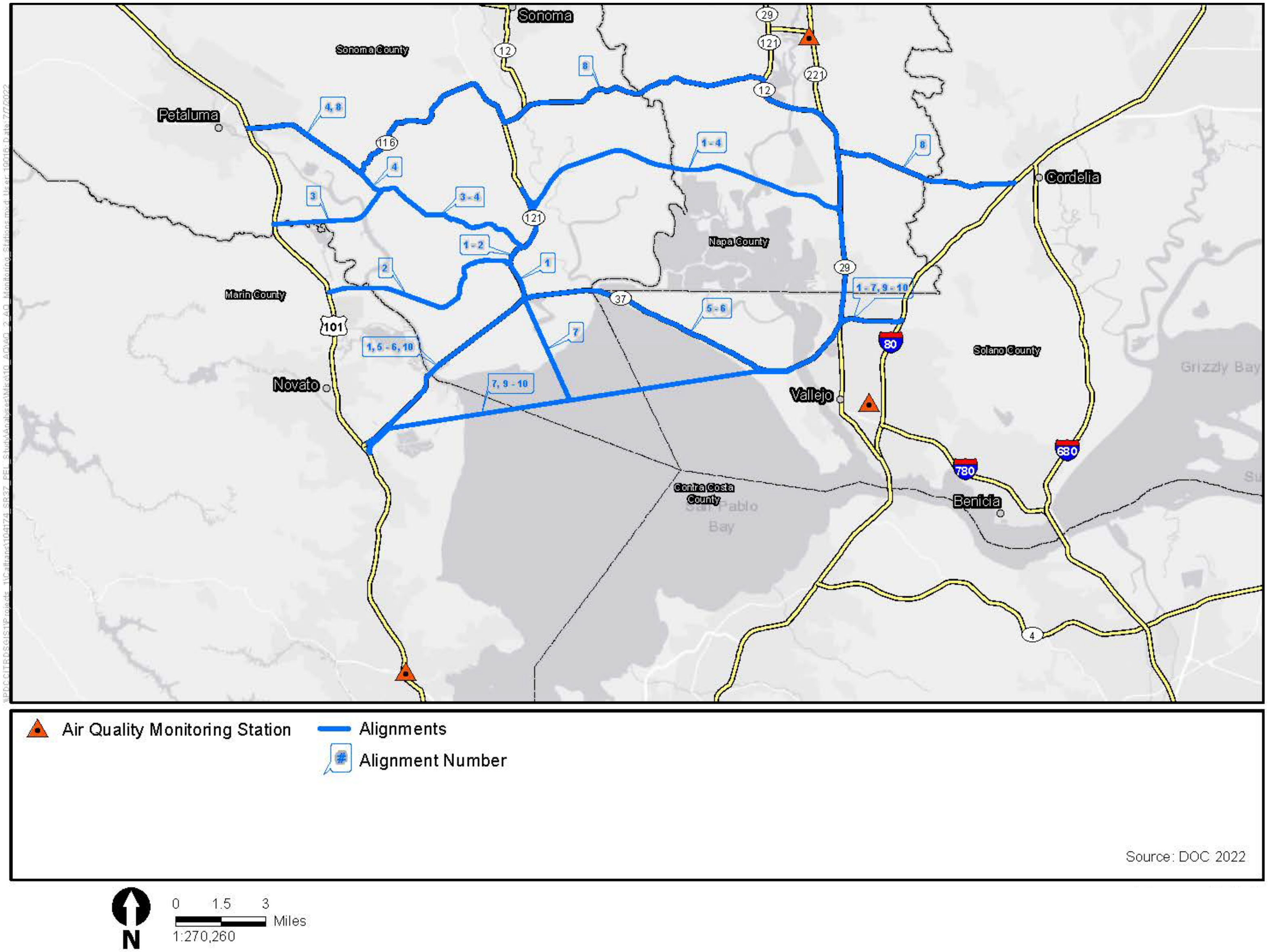

Figure AQ-2. Air Quality Monitoring Stations

3.2.1.4 Sensitive Receptors

Sensitive receptors are typically defined as facilities that attract children, the elderly, people with illnesses, or others sensitive to the effects of air pollution. Examples of sensitive receptors include residences, hospitals, schools, parks, and places of worship.

The project corridor spans a vast area that is comprised of multiple types of land uses. Much of the Study Area is uninhabited land without sensitive receptors, such as wetland, farmland, or grassland. The Study Area also includes urban areas that are inhabited by sensitive receptors, such as residences, hospitals, schools, parks, and places of worship. Sensitive receptors located in urban areas and isolated receptors, such as rurally located residences, may be affected by emissions.

Local air pollutants in the Study Area are emitted primarily by vehicular traffic, including trucks, traveling on roadways, including US 101, SR 37, SR 116, SR 121, and SR 29. Other notable sources in the area include stationary sources at commercial and industrial land uses, such as boilers, generators, gas stations, and dry-cleaning facilities.

3.2.2 Existing Greenhouse Gases Conditions

The process known as the greenhouse effect keeps the atmosphere near Earth's surface warm enough for the successful habitation of humans and other life forms. The greenhouse effect is created by sunlight that passes through the atmosphere. Some of the sunlight striking Earth is absorbed and converted to heat, which warms the surface. The surface emits a portion of this heat as infrared radiation, some of which is re-emitted toward the surface by GHGs. Human activities that generate GHGs increase the amount of infrared radiation absorbed by the atmosphere, thereby enhancing the greenhouse effect and amplifying the warming of Earth.

Increases in fossil fuel combustion and deforestation have exponentially increased concentrations of GHGs in the atmosphere since the Industrial Revolution (IPCC 2007). Rising atmospheric concentrations of GHGs, in excess of natural levels, have resulted in increasing global surface temperatures—a process commonly referred to as global warming. Higher global surface temperatures have, in turn, resulted in changes to Earth's climate system, including increases in ocean temperature and acidity, reduced sea ice, variable precipitation, and increases in the frequency and intensity of extreme weather events (IPCC 2018). Large-scale changes to Earth's system are collectively referred to as climate change.

The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. The IPCC estimates that human-induced warming reached approximately one degree Celsius (°C) above pre-industrial levels in 2017 and is increasing at a rate of 0.2°C per decade. Under the current nationally determined contributions of mitigation from each country until 2030, global warming is expected to rise to three °C by 2100 and continue afterward (IPCC 2018). Large increases in global temperatures could have substantial adverse effects on the natural and human environments in California and worldwide.

3.2.2.1 Greenhouse Gases

The principle anthropogenic (human-made) GHGs are CO_2, CH_4, N_2O, and fluorinated compounds, including sulfur hexafluoride, hydrofluorocarbons (HFCs), and perfluorocarbons. The primary GHGs that would be emitted by the proposed alignments include CO_2, CH_4, and N_2O. This section discusses the principal characteristics of these pollutants.

CO_2 enters the atmosphere through the combustion of fossil fuel (i.e., oil, natural gas, coal), solid waste decomposition, plant and animal respiration, and chemical reactions (e.g., from manufacturing cement). CO_2 is also removed from the atmosphere, or sequestered, when it is absorbed by plants as part of the biological carbon cycle.

CH_4 is emitted during the production and transport of coal, natural gas, and oil. CH_4 emissions also result from livestock and agricultural practices as well as the anaerobic decay of organic waste in municipal solid waste landfills.

N_2O is emitted by agricultural and industrial activities as well as the combustion of fossil fuels and solid waste.

Methods have been set forth to describe emissions of GHGs in terms of a single gas to simplify reporting and analysis. The most commonly accepted method for comparing GHG emissions is the global warming potential (GWP) methodology defined in IPCC reference documents. IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of carbon dioxide equivalent (CO_2e), which compares the gas in question to that of the same mass of CO_2. By definition, CO_2 has a GWP of 1.

Table AQ-4 lists the global warming potential of CO_2, CH_4, and N_2O and their lifetimes in the atmosphere.

Table AQ-4. Lifetimes and Global Warming Potentials of Key Greenhouse Gases

Greenhouse Gas	Global Warming Potential (100 years)	Lifetime (years)
Carbon Dioxide (CO_2)	1	—[a]
Methane (CH_4)	25	12
Nitrous Oxide (N_2O)	298	114

Source: CARB 2020

[a] No lifetime (years) for CO_2 was presented by the California Air Resources Board.

Short-lived climate pollutants have atmospheric lifetimes on the order of a few days to a few decades, and their relative climate-forcing impacts, when measured in terms of how they heat the atmosphere, can be tens, hundreds, or even thousands of times greater than that of CO_2 (CARB 2017). Given their short-term lifespan and warming impact, short-lived climate pollutants are measured in terms of CO_2e using a 20-year time period. The use of GWPs with a time horizon of 20 years captures the importance of the short-lived climate pollutants and gives a better perspective as to the speed at which emission controls will affect the atmosphere relative to CO_2 emission controls. CH_4 has lifetime of 12 years and a 20-year GWP of 72. HFC gases have lifetimes of 1.4 to 52 years and a 20-year GWP of 437 to 6,350. Anthropogenic black carbon has a lifetime of a few days to weeks and a 20-year GWP of 3,200 (CARB 2017).

3.2.2.2 Potential Climate Change Effects

Climate change is a complex process that has the potential to alter local climatic patterns and meteorology. Although modeling indicates that climate change will result in sea-level rise, both globally and in San Francisco Bay, as well as changes in climate and rainfall, among other effects, there remains uncertainty about characterizing precise local climate characteristics and predicting precisely how various ecological and social systems will react to changes in the existing climate at the local level. Regardless of this uncertainty, it is widely understood that substantial climate change has occurred and will continue to occur in the future, although the precise extent will take further research to define. Specifically, the effects from global climate change in California and worldwide include the following:

- Declining sea ice and mountain snowpack levels, thereby increasing sea levels and sea surface evaporation rates, with a corresponding increase in atmospheric water vapor due to the atmosphere's ability to hold more water vapor at higher temperatures (CNRA 2018).
- Rising average global sea levels, due primarily to thermal expansion in the oceans and the melting of glaciers, ice caps, and the Greenland and Antarctic ice sheets (IPCC 2018).
- Changing weather patterns, including changes in precipitation and wind patterns, and more energetic episodes of extreme weather, including droughts, heavy precipitation, heat waves, extreme cold, and intense tropical cyclones (IPCC 2018).
- Declining Sierra Nevada snowpack levels, which account for approximately half of the surface water storage in California. Snow levels could decline by 70% to as much as 90% over the next 100 years.
- Increases in the number of days that could be conducive to ground-level ozone formation (e.g., clear days with intense sunlight) by the end of the twenty-first century in areas with high levels of ozone. The number of days could increase by 25 to 85%, depending on the future temperature scenario.
- Increases in the potential for erosion of California's coastlines as well as seawater intrusion into the Sacramento–San Joaquin Delta and associated levee systems due to the rise in sea level.
- The severity of drought conditions in California could be exacerbated (e.g., durations and intensities could be amplified, ultimately increasing the risk of wildfires and consequential damage).
- Under changing climate conditions, agricultural operations are forecast to experience lower crop yields due to extreme heat waves, heat stress, increased water needs of crops and livestock (particularly during dry and warm years), and new and changing pest and disease threats.

The impacts of climate change, such as increases in the number of heat-related events, droughts, and wildfires, pose direct and indirect risks to public health, with people experiencing worsening episodes of illness and an earlier death. Indirect impacts on public health include increases in incidents of vector-borne diseases, stress and mental trauma due to extreme events and disasters, economic disruptions, and residential displacement.

3.3 Next Steps

The SR 37 PEL Study should consider the full scope of air quality and GHG emissions impacts, including consistency with regional air quality plans and whether the potential alignments would contribute to worsened regional air quality impacts in the SFBAAB; the project's potential to expose sensitive receptors in the project corridor to TACs and health risks; and how the project supports or hinders California's GHG goals and climate change planning documents.

Such a study would evaluate the construction and operational effects of the project by evaluating air quality and GHG emissions, and concentrations of TACs and the corresponding health risks that sensitive receptors would experience. Based on the air quality and GHG evaluation, the SR 37 PEL Study would determine which of the proposed alignments would result in the greatest impacts on regional air quality, health risks, and the state's GHG goals. At this time, it is anticipated that Alignments 7, 9, and 10 would expose the fewest receptors to emissions of TACs, because of its location through the San Pablo Bay. Alignments 1 and 5/6 would utilize the existing SR 37 route and would thus not affect a substantial number of new receptors. The remaining alignments (2–4 and 8 could affect new receptors, such as residences, schools, and hospitals, and the impacts on these new receptors should be evaluated in the air quality study. In general, the alignments that require the least amount of construction activity would result in the least severe air quality and GHG emissions impacts, whereas alignments that are most construction-intensive would result in the most severe impacts. Operational impacts are determined by the volume of vehicles that would use each alignment. Operational impacts in future years would be lower on a per-mile basis relative to existing conditions, because vehicles in the region and statewide will continue to become more fuel efficient and lower emitting due to further regulations and standards and from the turnover of older vehicles.

3.4 References

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Chapter 4
Community Demographics and Land Use

This chapter identifies community boundaries, demographic characteristics, and existing land uses. in the SR 37 PEL Study Area.

4.1 Methodology

This section was drafted based on review of local and regional planning documents and publicly available information pertinent to community demographics and land uses (such as the U.S. Census Bureau). Refer to Section 4, *References*, for a complete list of sources for the information cited herein.

4.2 Existing Conditions

4.2.1 Demographics and Land Use

4.2.1.1 Overview

SR 37 connects suburban and urban centers, while crossing marshes, canals, sloughs, wetlands, and agriculture. Development in the four North Bay counties is a combination of suburbs, smaller cities and towns, and agricultural and industrial areas. According to the California Department of Conservation Farmland Mapping and Monitoring Program, Napa County has the lowest percentage of urban built-up land among the nine San Francisco Bay Area (Bay Area) counties, at 5 percent.[1] Within the Study Area, Vallejo, Petaluma, and American Canyon are the most densely developed areas with population densities higher than their respective counties and ranging from 3,588 to 4,145 persons per square mile in 2020 (U.S. Census Bureau 2022).

In the North Bay, jobs are generally most concentrated in Sonoma and Marin Counties (Table CC-1), while housing is concentrated in Solano County. Much of the workforce for Sonoma and Marin County jobs resides in more housing-rich areas such as Vallejo in Solano County and portions of the East Bay (Figure CC-1) (ABAG and MTC 2021a). This imbalance of jobs and housing creates several associated problems, such as traffic congestion and transit overcrowding in major commute corridors such as SR 37. It also exacerbates the displacement of longtime residents from neighborhoods where home values and rents have increased (ABAG and MTC 2021a).

[1] The Farmland Mapping and Monitoring Program defines urban built-up land as "land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel."

Table CC-1. 2015 Jobs and Households, by County

County	Jobs	% of Jobs in Transit Priority Areas	Households	% of Households in TPAs
Alameda	867,000	61%	552,000	39%
Contra Costa	404,000	27%	383,000	17%
Marin	135,000	28%	109,000	14%
Napa	72,000	6%	50,000	2%
San Francisco	682,000	100%	366,000	99%
San Mateo	393,000	48%	265,000	38%
Santa Clara	1,099,000	59%	623,000	37%
Solano	132,000	6%	142,000	3%
Sonoma	221,000	12%	188,000	8%
Regional Total	4,005,000	55%	2,677,000	37%

Notes: Whole numbers have been rounded (between 1,000 and 1,000,000 to the nearest, 1,000). Figures may not sum because of independent rounding.

Source: Data compiled by MTC and ABAG in 2021

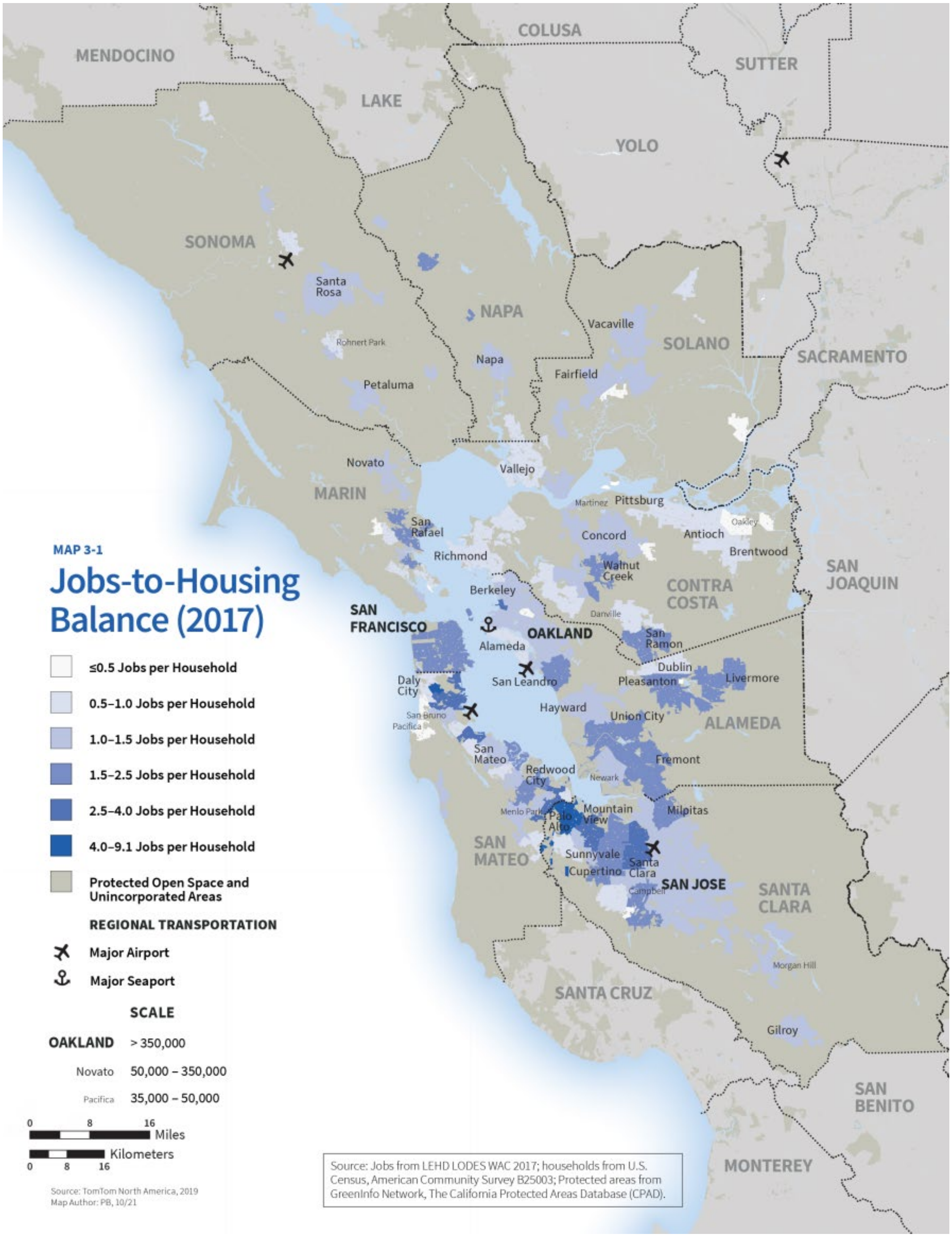


Figure CC-1. Bay Area Jobs to Housing Balance

These issues have been recognized at the regional level and several efforts are underway to address them. Plan Bay Area 2050, adopted by the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) in October 2021, is a long-range strategic plan that focuses on housing, the economy, transportation, and the environment of the Bay Area. Plan Bay Area 2050 identifies growth geographies in the Bay Area, several of which are in the Study Area. Growth geographies are areas where future housing and/or job growth would be focused under the plan's strategies over the next three decades. These areas are identified for growth either by local jurisdictions or due to their proximity to transit or opportunities like well-resourced schools or easy access to jobs. The plan identifies four types of growth geographies: (1) Priority Development Areas (PDAs), (2) Priority Production Areas (PPAs), (3) Transit-Rich Areas (TRAs), and (4) High Resource Areas (HRAs). PDAs are areas generally near existing job centers or frequent transit that are locally identified (i.e., identified by towns, cities, or counties) for housing and job growth. PPAs are industrial areas that have been locally identified for job growth in middle-wage industries like manufacturing, logistics, or other trades. TRAs are areas near rail, ferry, or frequent bus service that were not already identified as PDAs, and HRAs are state-identified places with well-resourced schools and access to jobs and open space that may have historically rejected housing growth.[2]

The majority of PPAs are concentrated in the North Bay and East Bay, where housing is plentiful, but job opportunities are more limited. Vallejo and American Canyon are home to both PDAs and PPAs, while Petaluma has PDAs only and Novato has TRAs and HRAs (Figure CC-2).

[2] For more information regarding Plan Bay Area 2050's identification of growth geographies, please visit https://abag.ca.gov/our-work/land-use/pda-priority-development-areas.

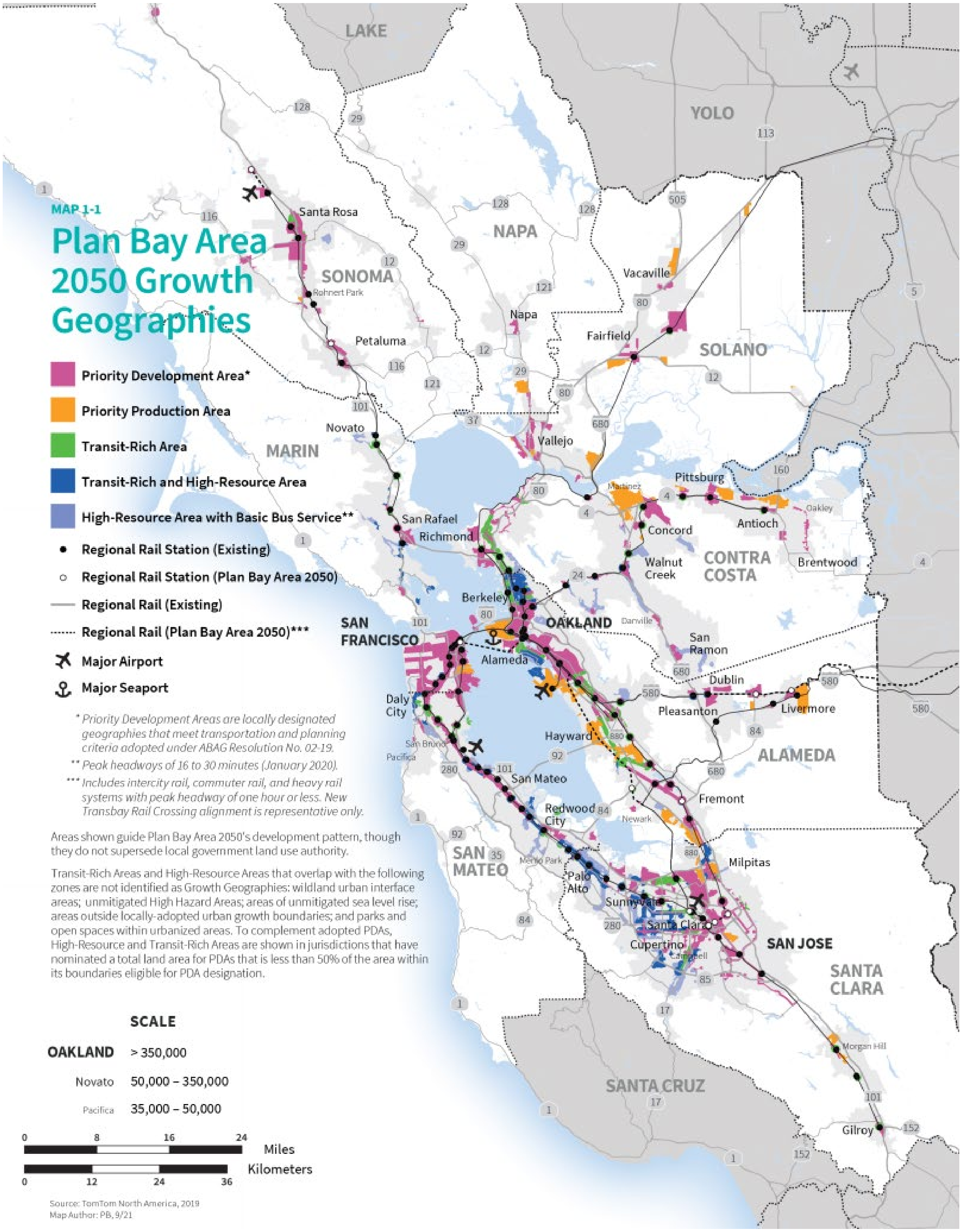


Figure CC-2. Plan Bay Area 2050 Growth Geographies

Even though growth is anticipated and planned for in the North Bay, the four North Bay counties are expected to be home to less than 10% of new households and jobs in 2050, as relatively limited job centers and transit options coupled with wildfire risk make these counties less suited for growth (ABAG and MTC 2021a). In fact, Marin County is projected to see a minor net loss in jobs as its population continues to age and exit the workforce (Figure CC-3).

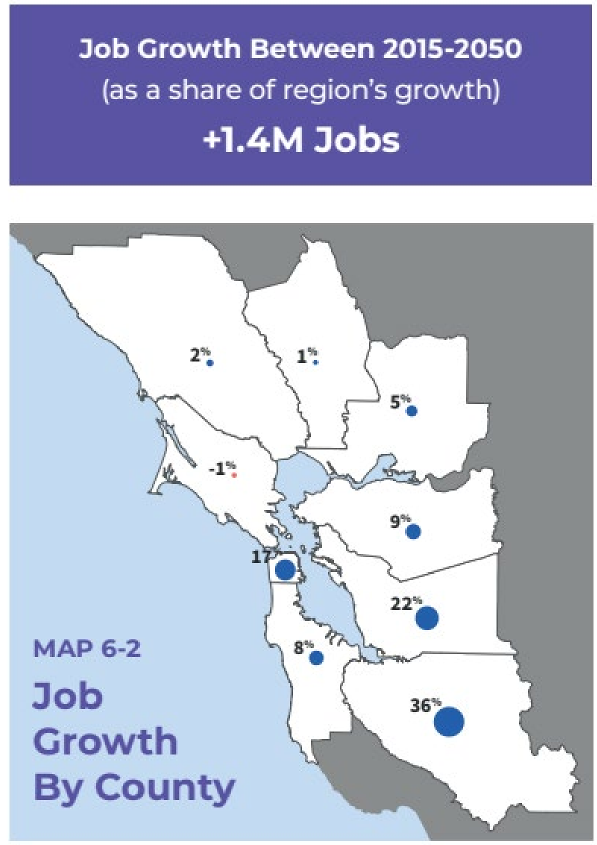


Figure CC-3. Job Growth by County

The following subsections discuss the demographics, land use, economy, and growth patterns of Marin, Sonoma, Napa, and Solano Counties, as well as the cities of Novato, Petaluma, American Canyon, and Vallejo.

4.2.1.2 Marin County

Marin County covers 520.5 square miles of land area, the smallest of the four North Bay counties, and overall, one of the smallest in the state. Marin County is bordered by San Francisco, Solano, Sonoma, and Contra Costa Counties. San Rafael is the Marin County seat.

Demographics

In 2020, Marin County had a population of 262,321—one of the lowest in the Bay Area—and a population density of 485.1 persons per square mile (2010)—one of the highest in the North Bay. It had 104,900 households (2016–2020), with the fewest persons per household in the North Bay at

2.41 persons per household. This implies that while people live in dense pockets in the county, neither housing units nor cities would be considered crowded.

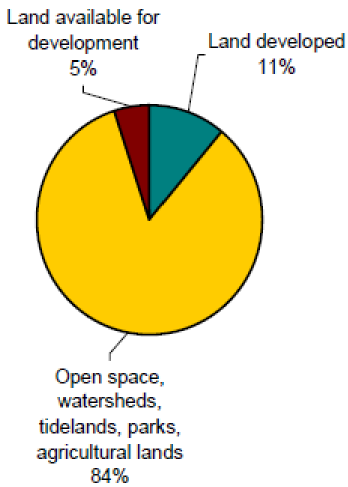
Marin County is one of the least diverse counties in the Bay Area. For detailed information on its racial demographics, please refer to Chapter 21, Equity. It has the lowest percentage of persons who speak a language other than English at home in the North Bay, at 21.1%, and only about 18.3% of its population was born in a foreign country. Marin County has a large aging population with the highest median age in the North Bay, at 47.1 years (US Census 2022). It also has the highest proportion of people with a bachelor's degree or higher in the North Bay, at 60.2%. This is reflected in the county's economic performance, discussed later in this subsection.

Land Use

Nearly three-fourths of Marin County's land is protected from development—the highest proportion for any county in the Bay Area (Caltrans 2015). Only 11 percent of Marin County's area has been developed, primarily within cities and towns, near services, and along major transportation corridors. Most of the additional land potentially available for higher-density development (approximately 5% of the county) is in incorporated cities and towns. Approximately, 84 percent of the county consists of open space, watersheds, tidelands, parks, and agricultural lands (Figure CC-4). Half of this open space consists of federal and state parks. As shown in Figure HAZ-1, included in Chapter 12 Hazardous Materials, most of the land along the planned SR 37 alignments is zoned as "other", and residential uses in this county are sparsely distributed compared to the rest of the Study Area.

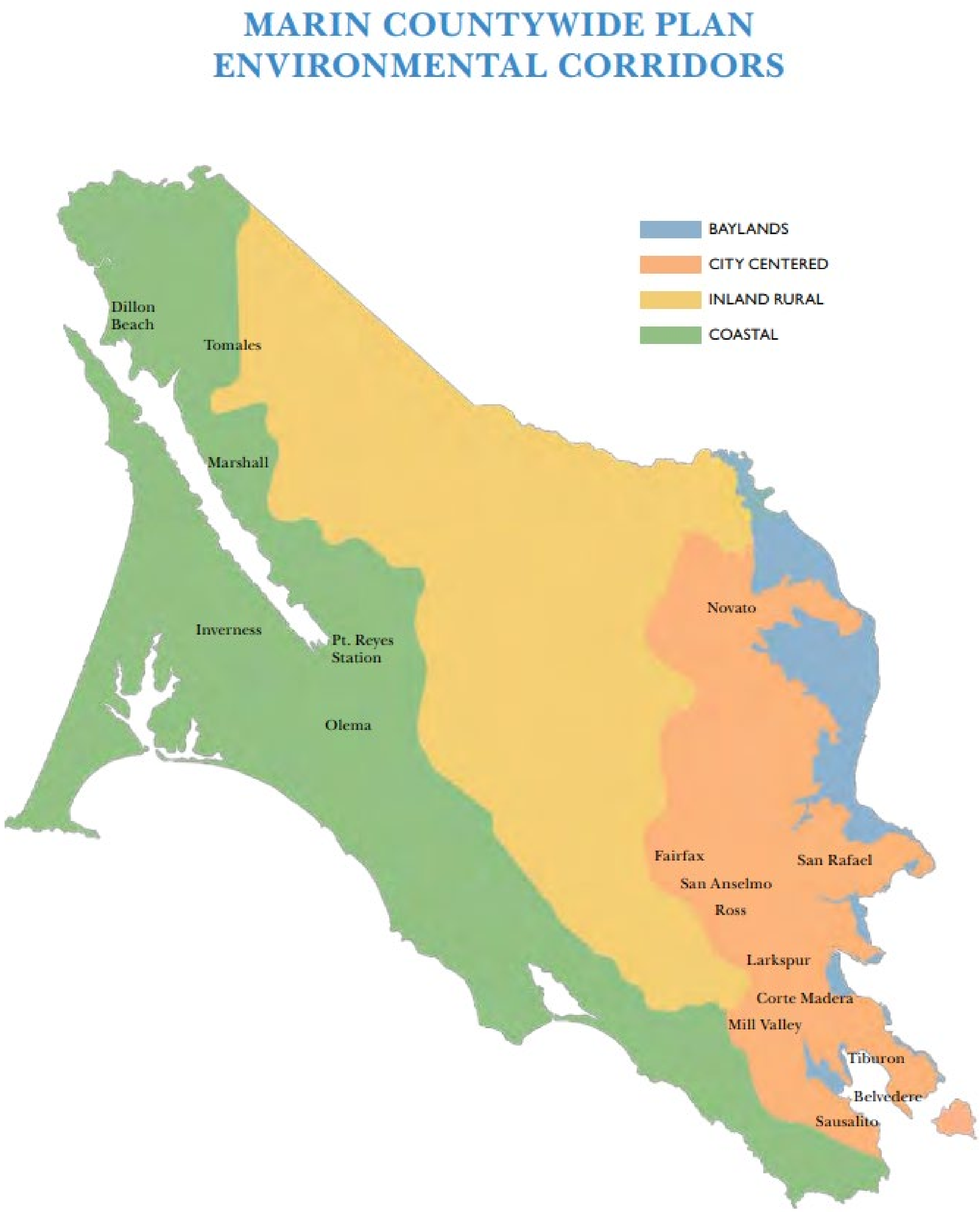
The *Marin Countywide Plan* (County of Marin 2007) recognizes Marin County as a cohesive environmental unit made up of the following regions (called corridors) which serve as county planning units (Figure CC-6): the Coastal Corridor, the Inland Rural Corridor, the City-Centered Corridor, and the Baylands Corridor. Of these, the northern City-Centered and Baylands Corridors fall within the Study Area and are closest to the existing SR 37 alignment. The City-Centered Corridor lies along U.S. Highway (US) 101 in the eastern part of the county near San Francisco and San Pablo Bays, and is designated for both urban development and protection of environmental resources. The Baylands Corridor consists of tidal and undeveloped historic baylands along the shoreline of San Francisco and San Pablo Bays, and is a protected area that consists of marshes, tidelands, and diked lands that were once wetlands and may include adjacent, undeveloped upland habitat.

Most of Marin County's population centers are along US 101 (City-Centered Corridor). This corridor and the Baylands Corridor are the most proximate to the Study Area. Novato lies in the City-Centered Corridor and is discussed in detail later in this subsection.



Source: Caltrans 2015

Figure CC-4. Marin County Land Use



Source: County of Marin 2007

Figure CC-5. Marin County Environmental Corridors

Economy

Marin County is the most prosperous county in the North Bay. It has the highest median household income, $121,671 (2016–2020), and the highest per capita income, $74,446 (2016–2020), in the North Bay (US Census 2022). Until 2010, Marin had the highest per capita income of any county in California. It also has the lowest percentage of persons in poverty in the North Bay, at 6 percent (2020). However, as discussed in Chapter 21, Marin is among the most income-stratified counties in the region, with pockets of extreme wealth and poverty. About 20,000 Marin County households have incomes of less than $45,000 per year. Several efforts are underway in Marin County to reduce this inequity. In 2021, Marin County became one of the few counties in California to implement a Universal Basic Income pilot program (ABAG and MTC 2021a).[3]

About 63.7 percent of Marin County's total population is in the civilian labor force (2016–2020) and it has an unemployment rate of 2.1% (2022), the lowest in the North Bay. In 2012, Marin County was home to 39,815 firms. About 57% of those in civilian labor in Marin County are in the management, business, science, and arts occupations (Figure CC-6). The dominant industries in Marin County are in the 'professional, scientific, and management, and administrative and waste management services' and 'educational services, and health care and social assistance' categories, totaling 41.4percent (Table CC-2), which is reflective of Marin's high proportion of persons with a bachelor's degree or higher (60.2percent). Between 2015 and 2050, jobs are projected to decline in the county by 14percent as the working-age population declines and e-commerce replaces portions of in-person retail demand (ABAG and MTC 2021b). This is the only projected decline in job growth in the Bay Area, a region with an overall job growth rate of 35percent in the same 2015–2050 period (ABAG and MTC 2021c).

[3] Marin County's Discriminatory 'Universal Basic Income'. (2021). Retrieved 17 June 2022, from https://www.wsj.com/articles/marin-countys-discriminatory-universal-basic-income-11617832570

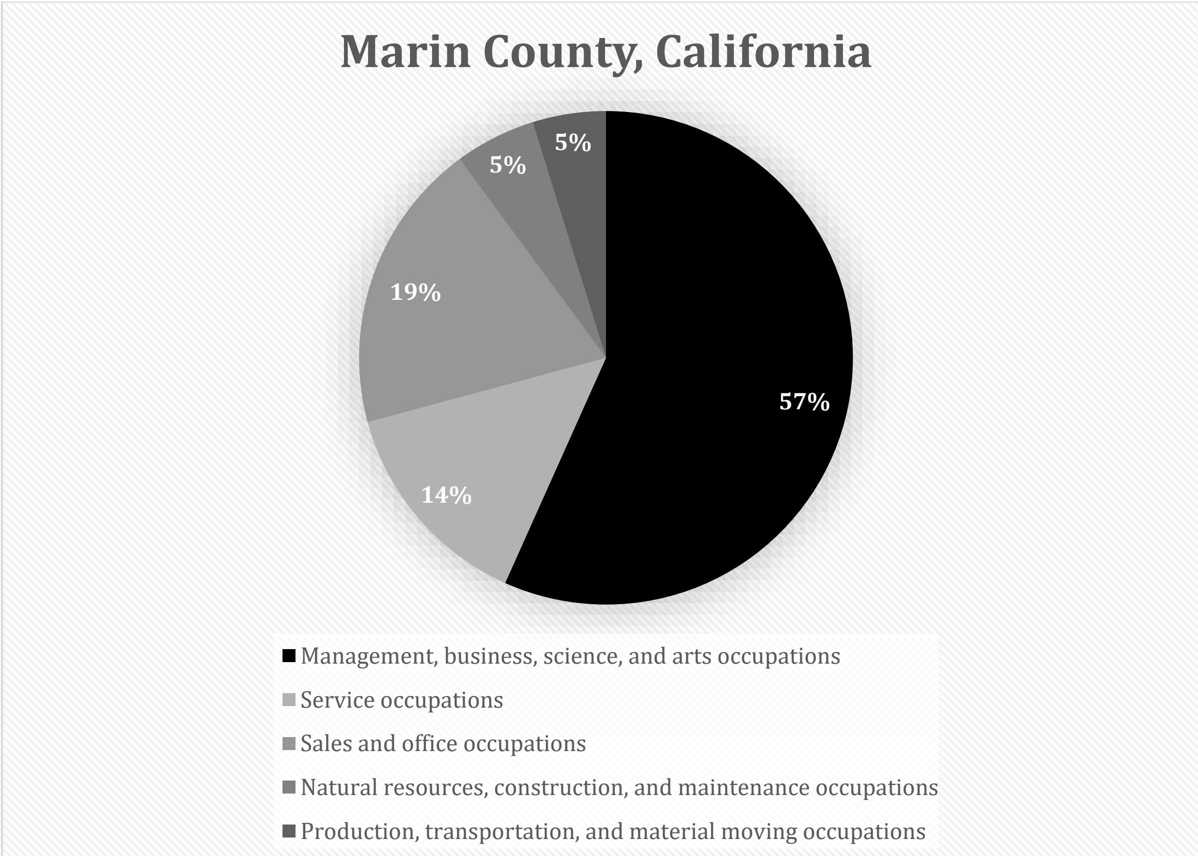


Figure CC-6. Civilian Occupations in Marin County Source: US Census 2022

Table CC-2. Occupation Percentages in Marin County

Industry	Percentage of Jobs by Industry in Marin County, California (2020)
Agriculture, forestry, fishing and hunting, and mining	0.80%
Construction	6.20%
Manufacturing	4.60%
Wholesale trade	2.20%
Retail trade	9.70%
Transportation and warehousing, and utilities	3.00%
Information	3.90%
Finance and insurance, and real estate and rental and leasing	9.70%
Professional, scientific, and management, and administrative and waste management services	20.40%
Educational services, and health care and social assistance	21.00%
Arts, entertainment, and recreation, and accommodation and food services	9.10%
Other services (except public administration)	6.10%
Public administration	3.30%

One of the reasons for the high commute traffic on SR 37 is the stronger job market and higher cost for housing in Marin and Sonoma Counties (Caltrans 2015). Many commuters travel from Solano County, where the median owner-occupied housing unit rate is $437,900, to Marin County, where it is highly unaffordable at $1,053,600 (U.S. Census Bureau 2022).

Growth Patterns

Plan Bay Area 2050 focuses less on growth in Marin County compared to other counties in the Bay Area. Between 2015 and 2050, only 3percent of all new households in the Bay Area are anticipated to be in Marin County, while the number of jobs in the county (as the share of total regional growth) is expected to decrease slightly by 1percent. In Marin County, the plan focuses new housing primarily around Sonoma-Marin Area Rail Transit (SMART) rail stations, in historic downtowns, and on the potential redevelopment of aging malls into new communities. As mentioned earlier, between 2015 and 2050, jobs are projected to decline in the county by 14percent (Figure CC-7).

Source: ABAG 2022

Figure CC-7. Household Growth and Job Growth in Marin County to 2050

Historically, population growth in this county between 1990 and 2000 was low, with 17,193 people and 5,644 households added to the county's population. In recent years, a population decline is being noted in Marin County. Marin County was listed as one of the top 10 counties in California to have had the largest percentage decrease in population in 2022, at -0.9percent (California Department of Finance 2022). As per the Department of Finance's Demographic Research Unit (DOF 2021), while Marin County's population increased by 2percent between 2010 and 2020, it is expected to decline by 11percent by 2060—the largest decline anticipated in the North Bay. The largest decline in population between 2020 and 2060 is anticipated in the non-Hispanic White population, which will decrease by 19percent. The American Indian or Alaska Native population is expected to grow in this time by 25percent.

4.2.1.3 Novato

Novato, located in north Marin County, is a suburban city surrounded by undeveloped hillsides and the San Pablo Bay (Figure CC-8). The city's borders are defined by Mount Burdell to the north, Big Rock Ridge to the west, Indian Valley open space to the southwest, Pacheco Valley and Loma Verde open space to the south, Bel Marin Keys wetlands to the southeast, and the bay plains and Petaluma River to the northeast. Much of the urbanized area of Novato occupies a flat northwest-trending valley that follows Novato Creek, Vineyard Creek, Warner Creek, and other tributaries flowing southeast from the hills to the Bay.

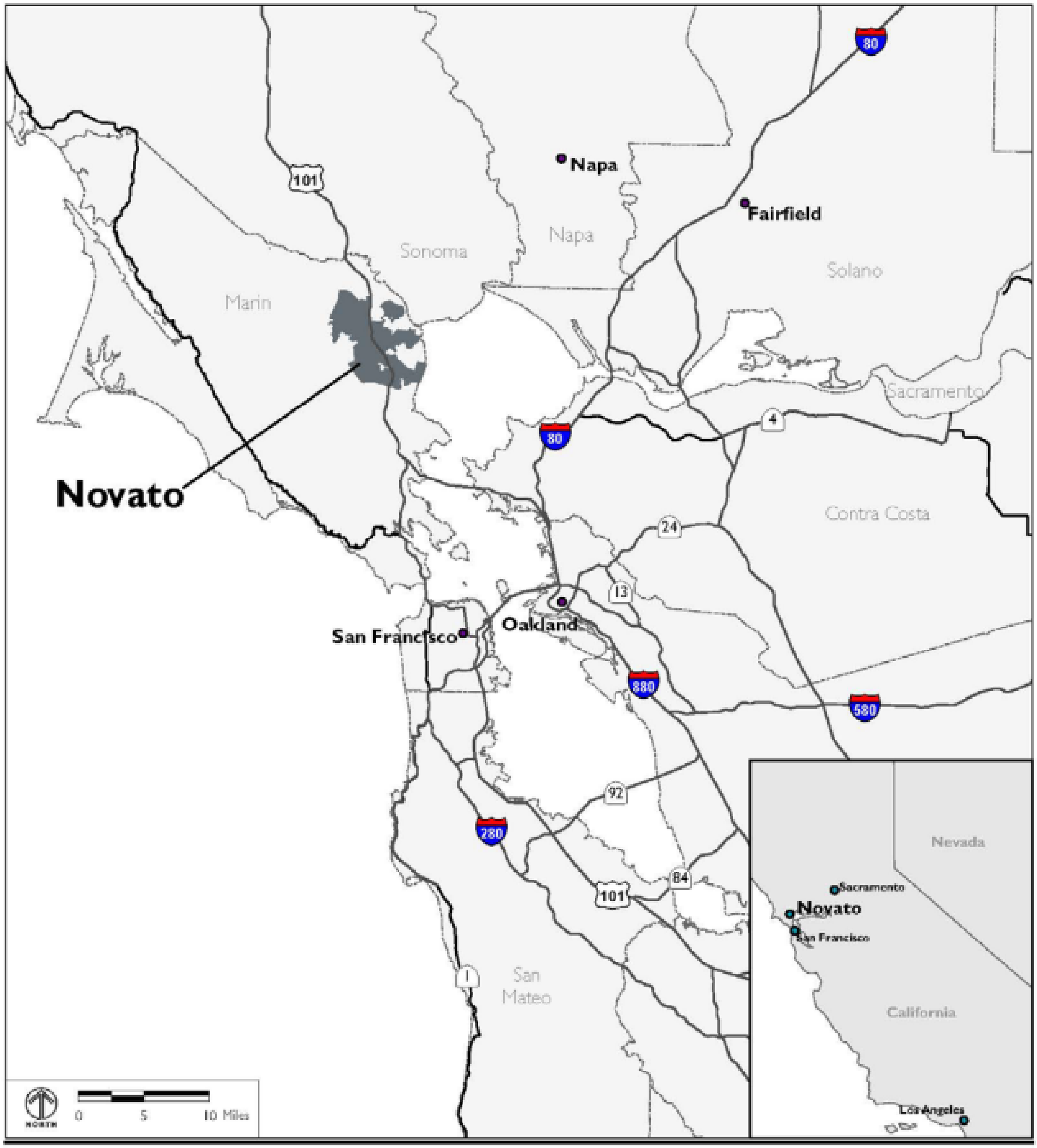


Figure CC-8. Map of Novato

Demographics

Per the 2020 census, the population of Novato is 53,225. Approximately 58percent of the population identifies as non-Hispanic White (Table CC-3). Approximately 20.6percent of the population in Novato is foreign born, and only about 25.7% of the population speaks a language other than English at home. The median age in the city is 46.9, the highest of the four cities discussed in this section (US Census 2022).

Novato has one of the lowest population densities of North Bay cities, at 1,891 persons per square mile (US Census 2022). There are 21,555 households in Novato and an average of 2.46 persons per household—the smallest household size of the four cities. Approximately46.3 percent of the population in Novato has a bachelor's degree or higher, which is reflected in Novato's high per capita income—discussed later in this sub-section.

Table CC-3. Novato Race and Ethnicity

Race/Ethnicity	No. of Persons	Percentage of Total Population
Total Population (All Races)	53,225	
Hispanic or Latino	13,615	26%
White alone	30,835	58%
Black or African American alone	1,375	3%
American Indian and Alaska Native alone	95	0.002%
Asian alone	3,900	7%
Native Hawaiian and Other Pacific Islander alone	100	0%
Some Other Race alone	414	1%
Population of two or more races	2,891	5%

Source: US Census 2022

Land Use

Development in Novato is largely low-density residential composed of single-family one- and two-story homes. Novato does have a small share of multifamily housing located along arterial and collector streets. Downtown Novato is characterized by one and two-story commercial and mixed-use buildings. Commercial development includes neighborhood shopping centers and large regional retail shopping centers can be found along US 101. About 10percent of the land in Novato is vacant, according to the County Assessor. Large pieces of vacant land are concentrated in the area between the unincorporated Bel Marin Keys area and San Pablo Bay, between US 101 and the Northwestern Pacific Railroad line in the southern portion of the city, along Indian Valley Road in the southwest portion of the city, and west of US 101 in the northern part of the city. While Novato is surrounded by agricultural land to the north, south, and west, there is little agricultural land within the city limits (City of Novato 2014).

Table CC-4 shows existing land uses in Novato, which closely mirror planned land uses shown in Figure HAZ-1, included in Chapter 12 Hazardous Materials. Most of the city is planned as either residential or "other", with some commercial and industrial uses located at the heart of the city along US 101.

Table CC-4. Novato Existing Land Use Designations

Land Use	Acres	Percent of Total
Single-Family Residential	5,693	24.9%
Multi-Family Residential	394	1.7%
Mixed Use	30	0.1%
General Commercial	436	1.9%
Retail	155	0.7%
Office	284	1.2%
Industrial	252	1.1%
Agriculture	2,162	9.5%
Open Space and Parks	5,694	25%
Vacant	2,282	10%
Public/Quasi-Public	5,418	23.7%
Unknown	22	0.1%
Grand Total	22,823	100.0%

Source: City of Novato GIS, 2008

Note: the total acreage for Existing Land Use and General Plan Land Use are slightly different because they are from different data sources.

Economy

The median household income in Novato is $101,629 (2020), and the per capita income is $55,813—the highest of the four cities discussed in this section. In 2012, Novato was home to 6,415 firms of which 1,200 (19percent) were minority owned. Approximately 62.3percent of the city's population is in the civilian labor force—the lowest proportion in the four cities. It has an unemployment rate of 5percent (2021), which is higher than the county rate. Approximately 6.4percent of the city's population is in poverty, the lowest in the four cities (US Census 2022).

Novato's largest employers are BioMarin Pharmaceuticals (850 employees), the Novato Unified School District (771 employees) and the Fireman's Fund Insurance Company (750 employees). The city's top 14 employers comprise a mix of industries, ranging from medical and professional services to public agencies and large retailers (Table CC-5). The Buck Institute for Research on Aging, with approximately 272 employees, also represents a major Novato employer.

Table CC-5. Major Novato Employers [a]

Company/Organization	Number of Employees	Industry Type
BioMarin Pharmaceuticals [b]	850	Pharmaceuticals
Novato Unified School District	771	School District
Fireman's Fund	750	Insurance
Novato Community Hospital	289	Hospital
Buck Institute for Research on Aging	272	Medical Research
Frank Howard Allen, Realtors [b]	248	Real Estate
W. Bradley Electric	230	Electrical Contractors
Brayton Purcell LLP	209	Legal Services
Bank of Marin [b]	197	Banking

Company/Organization	Number of Employees	Industry Type
City of Novato	187	Government
Cagwin & Dorward [b]	182	Landscape Contracting
Costco Wholesale [c]	120	Retail
Safeway [c]	120	Food Sales
Target [c]	100	Retail

Sources: North Bay Business Journal Book of Lists, 2013; Novato Unified School Districts, 2013; Buck Institute for Aging, 2013; City of Novato, 2013

[a] This list represents the largest businesses and organizations based in Novato, employing at least 100 people. In 2013, over 3,100 businesses were registered as businesses within the City of Novato.

[b] Novato-based employers with multiple locations in Marin County. On October 29, 2013, Frank Howard Allen was acquired by Coldwell Banker Residential Brokerage.

[c] Number of employees working at Novato locations estimated using building size and data from the U.S. Energy Information Administration, Commercial Buildings Energy Consumption Survey, 2003.

Novato generates approximately 20percent of Marin's economic value and has jobs across sectors. Health care, private education, and professional/scientific services are the top job industries in the city, which reflects the high level of educational attainment in the city. Expansion in these sectors reflects job growth in well-paying, high-skilled jobs, offsetting losses in retail and finance/insurance industries. Novato is home to 24,200 employed residents and 20,900 jobs. Jobs are concentrated in health, educational and recreational services (31percent) and financial and professional services (30percent). Retail jobs comprised about 12percent of all jobs in Novato. Overall, the distribution of jobs across sectors in Novato is similar to Marin County (Table CC-2) (City of Novato 2014).

Growth Patterns

Novato will add 2,980 jobs through 2035, a job growth rate of 14percent, chiefly in the financial and professional services and health, education and recreational services sectors. These sectors are expected to grow by 25percent and 16percent, respectively, over 25 years, the largest gains among all industries. The retail category is expected to grow by just 1percent, while the agriculture and natural resources and manufacturing, wholesale and transportation categories are projected to decline (City of Novato 2014). Novato's total jobs are expected to grow by 1,380 jobs between 2020 and 2040 and its population is projected to grow by about 2,970 people between 2020 and 2040 (ABAG and MTC 2018).

4.2.1.4 Sonoma County

Sonoma County covers 1,575.9 square miles of land, making it the largest county by acreage in the nine-county Bay Area. It is bordered by Napa, Mendocino, Solano, Lake County, Contra Costa, and Marin Counties (Figure 1-1 included in Chapter 1, Introduction). Sonoma's county seat and largest city is Santa Rosa, which is also the largest city between San Francisco and Portland, Oregon.

Demographics

In 2020, Sonoma County had a population of 488,863—the largest in the North Bay—and a population density of 307.1 persons per square mile (2010). It had the highest number of households in the North Bay at 188,958 households (2016–2020), with 2.58 persons per household (US Census 2022).

For detailed information on Sonoma County's racial demographics, please refer to Chapter 21, Equity. Sonoma County has the lowest percentage of population born in a foreign county, at 16.6percent (2016–2020), yet 25.9percent of its population speaks a language other than English at home. The median age in Sonoma County is 42.4 years (2019). Approximately 36.4percent of the population in Sonoma County has a bachelor's degree or higher, which is slightly above the state average of 34.7percent.

Land Use

Sonoma County has the largest amount of undeveloped acreage in the Bay Area. Urban development in the county is concentrated in the southern half and the center of the county along the US 101 corridor in the cities of Petaluma, Cotati, Rohnert Park, Santa Rosa, and Windsor. Two-thirds of the county's population lives in these five cities. In 2012, about 70percent of the county's population (340,272) lived in the nine city urban service areas and the remaining 30percent (146,739 people) lived in the unincorporated area outside of the city urban service areas (County of Sonoma 2022).

The General Plan details land use policies specific for the nine planning areas of Sonoma County: Sonoma Coast/Gualala Basin, Cloverdale/Northeast County, Healdsburg and Environs, Russian River Area, Santa Rosa and Environs, Sebastopol and Environs, Rohnert Park-Cotati and Environs, Petaluma and Environs, and Sonoma Valley.[4] Most of the county along the various SR 37 alignments is zoned for agricultural uses, which reflects the county's high undeveloped acreage (Figure HAZ-1, included in Chapter 12, Hazardous Materials). As can be seen in this map, pockets of residential and commercial use exist in and around Petaluma.

Economy

Sonoma County has the second lowest median household income, $86,173 (2016–2020), and per capita income, $44,071 (2016–2020), in the North Bay. Approximately 7.8percent of its population is in poverty (US Census 2022).

Approximately 64.8percent of Sonoma County's total population is in the civilian labor force (2016–2020)—the second highest in the North Bay, and it has an unemployment rate of 2.6percent (2022). Sonoma County is an important regional center for employment. In 2012, it was home to the highest number of firms in the North Bay at 52,975 firms. The greatest proportion of Sonoma County's population is in the management, business, science, and arts occupations, at 39.6percent (Figure CC-9). The dominant industries in Sonoma County are in the professional, scientific, and management, and administrative and waste management services and educational services, and health care and social assistance categories, totaling 33.4percent (Table CC-6). Approximately 2.4percent of the population works in agriculture, twice the state average—which reflects the critical role agriculture plays in Sonoma County's economy. In areas with less urban development, the wine industry and hospitality businesses are crucial components of the Sonoma County job market (Caltrans 2015). In California's wine country region, which also includes Napa, Mendocino, and Lake Counties, Sonoma County is the largest producer. It has 131 approved American Viticultural Areas and more than 350 wineries (Sonoma County Tourism n.d.). In the immediate SR 37 area are the Petaluma Gap,

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[4] A land use map depicting the various land uses for the nine county sub-areas as per the General Plan's Land Use Element is available to view at https://permitsonoma.org/longrangeplans/adoptedlong-rangeplans/generalplan/organizationandoverview/landuseelement/landuseelementmaps/landusetheninesub-countyplanningareas.

Carneros, and Sonoma Valley American Viticultural Areas (Caltrans 2015). More than 8.4 million tourists visit each year, spending more than $1 billion in 2016 (Sonoma County Economic Development Board 2020).

Jobs are projected to grow 14percent in the county between 2015 and 2050, which is lower than the Bay Area average job growth rate of 35percent in the same period (ABAG and MTC 2021c). Sonoma County is seeing a strengthening in its technology sector, similar to other Bay Area communities (Caltrans 2015 and US Census 2022).

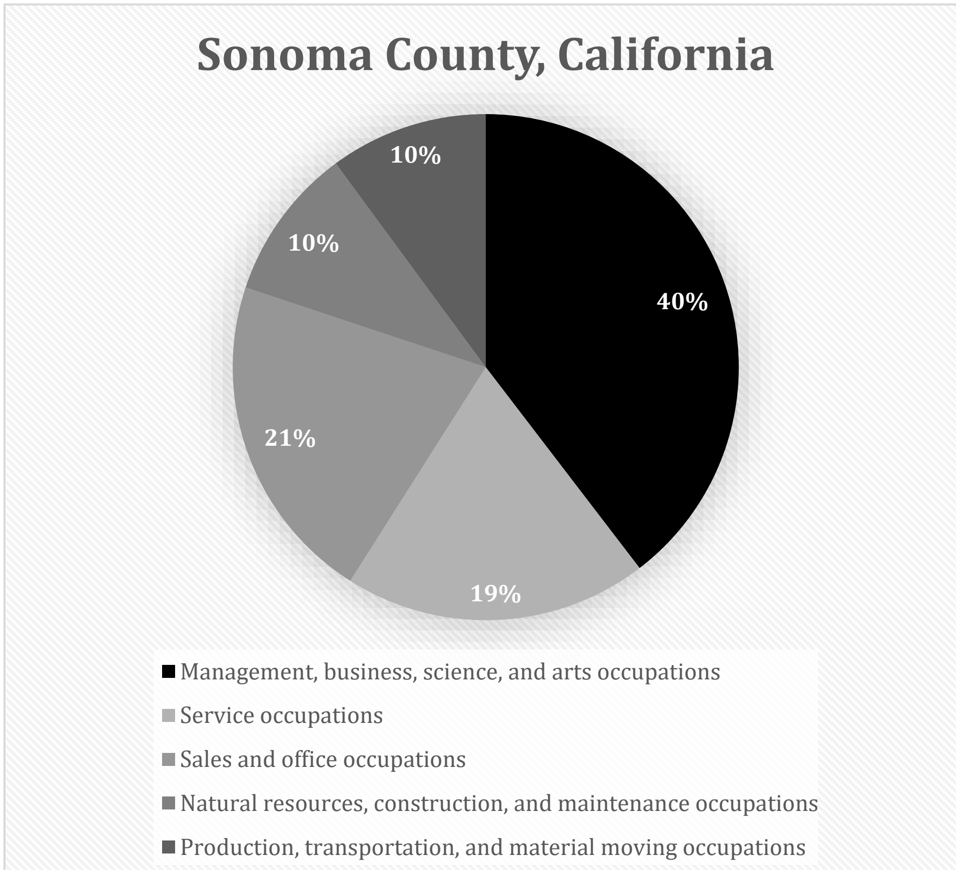


Figure CC-9. Sonoma County Employment

Table CC-6. Sonoma County Employment Percentages by Industry

Industry	Percentage of Jobs by Industry in Sonoma County, California (2020)
Agriculture, forestry, fishing and hunting, and mining	2.40%
Construction	8.10%
Manufacturing	10.00%
Wholesale trade	2.60%
Retail trade	11.70%
Transportation and warehousing, and utilities	3.90%
Information	2.00%
Finance and insurance, and real estate and rental and leasing	5.20%
Professional, scientific, and management, and administrative and waste management services	12.10%
Educational services, and health care and social assistance	**21.30%**
Arts, entertainment, and recreation, and accommodation and food services	10.40%
Other services (except public administration)	6.00%
Public administration	4.40%

Note: Numbers are approximate and may not add up to 100.
Source: US Census 2022

Growth Patterns

According to the Demographic Research Unit at the California Department of Finance, between 2010 and 2020, Sonoma County experienced the lowest population growth in the North Bay at only 1percent (California Department of Finance 2021). The population is expected to grow 6percent between 2020 and 2060. The Black community increased in population by 11percent between 2010 and 2020 and is expected to grow by 46percent—the highest growth in any race—between 2020 and 2060. The Hispanic and multiracial non-Hispanic population is expected to grow by 21percent and 41percent, respectively. The non-Hispanic American Indian or Alaskan Native and non-Hispanic White population is expected to decline by 9percent and 3percent, respectively, between 2020 and 2060.

Plan Bay Area 2050 focuses Sonoma County housing and job growth in established community centers along the US 101 corridor where most of the county's urban density is concentrated. Approximately 90percent of the growth is planned to be in already urbanized areas, with 10percent growth anticipated in the county's rural and agricultural zones (ABAG and MTC 2021d).

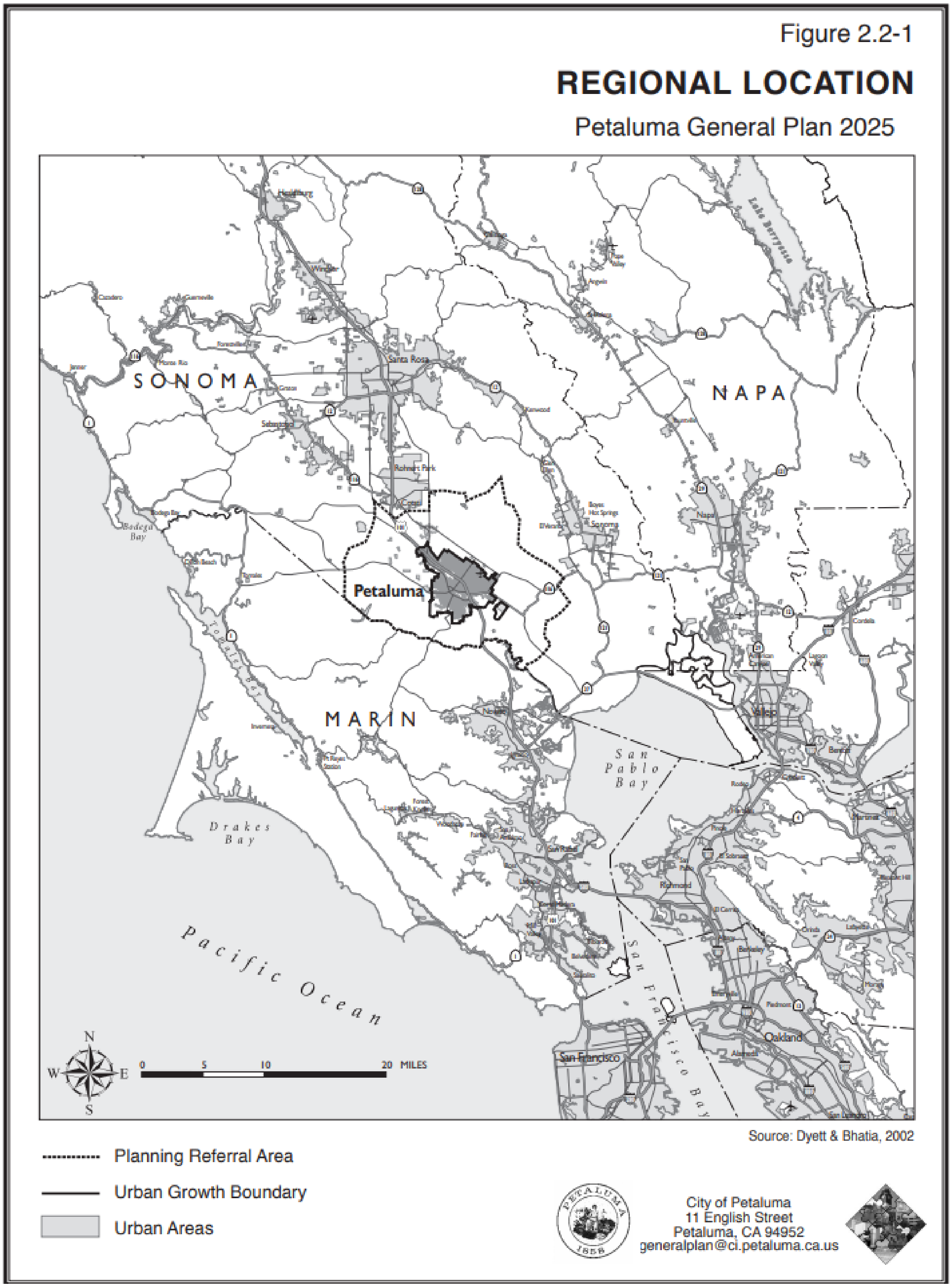
Between 2015 and 2050, just 2percent of all new households and 2percent of jobs in the Bay Area are anticipated to be in Sonoma County (Figure CC-10). Household growth is expected to be concentrated in Petaluma, Santa Rosa, and surrounding communities. Compared to other parts of the Bay Area, many Sonoma County residents both live and work in the county and the expected growth by 2050 will maintain a healthy jobs to housing ratio to continue this trend (ABAG and MTC 2021d). As most of Sonoma County's job and household growth is envisioned in urbanized corridors, growth is expected to be contained within urban growth boundaries, preserving agricultural and open space in rural parts of the county (ABAG and MTC 2021d).

Source: ABAG and MTC 2021d

Figure CC-10. Sonoma County Household and Job Growth

4.2.1.5 Petaluma

Petaluma is in southwestern Sonoma County, just north and east of the Marin County border (Figure CC-11). Petaluma originated as a settlement along the banks of the Petaluma River, then spread outward over the Petaluma River Valley. The Petaluma River and US 101 divide the city on a north-south axis. US 101 is an important north-south transportation route for the region, connecting the Bay Area to Mendocino and Humboldt Counties.



Source: City of Petaluma 2006.

Figure CC-11. Petaluma Regional Location

Demographics

Petaluma's population is aging, diversifying, and affluent. Its population between 55 and 74 is increasing and 32% of its residents are 55 and older. The median age in Petaluma is 41.7 years—the second highest in the North Bay. The city is predominantly White, with 64% of its population identifying as non-Hispanic White. Petaluma's Hispanic population constitutes 23percent of its total population (Table CC-7). Only 22.2percent of its population speaks a language other than English at home and 15.2percent of the population is foreign born (2016–2020)—both statistics being the lowest in the four North Bay cities discussed in this section (US Census 2022).

Petaluma has a total population of 59,776 and the highest population density of the four cities, at 4,029 persons per square mile (2010). There are 22,766 households in Petaluma and an average of 2.65 persons per household. Approximately 40.5percent of the population in Petaluma has a bachelor's degree or higher, which is reflected in Petaluma's high per-capita income—discussed under *Economy*.

Table CC-7. Petaluma Race and Ethnicity

	Petaluma city, California	
Race/Ethnicity	**No. of Persons**	**Percentage of Total Population**
Total Population (All Races)	59,776	
Hispanic or Latino	13,606	23%
White alone	38,538	64%
Black or African American alone	778	1%
American Indian and Alaska Native alone	179	0.3%
Asian alone	2,809	5%
Native Hawaiian and Other Pacific Islander alone	148	0.1%
Some Other Race alone	383	1%
Population of two or more races	3,335	6%

Note: Numbers are approximate and may not add up to 100.
Source: US Census 2022.

Land Use

Petaluma's current land use pattern is a result of its historical growth along the banks of the Petaluma River. Petaluma's existing land use distribution is dominated by residential land uses (Table CC-8). Within the city's urban growth boundary, 43percent of all land is designated as residential, 40percent of which consists of single-family residential neighborhoods. Older residential neighborhoods were developed west of the Petaluma River in the late 1800s and early 1900s. It has distinct historical residential neighborhoods in downtown and surrounding areas that are characterized by small lots and alleys between blocks providing a walkable urban core. After US 101 was constructed in the 1950s, new suburban neighborhoods expanded to the east (City of Petaluma 2006). Large commercial shopping areas and business/industrial parks are located along the US 101 corridor.

Table CC-8. Petaluma Existing Land Use Acreage

Use Name	Acreage (City Limits)	Percent of Total (City Limits)
Residential	**3,60**	**43.4%**
Single Family Detached	3,073	
Single Family Attached	82	
Multifamily	205	
Commercial/Mixed Use	**745**	**10%**
Commercial Centers	366	
Office	187	
Accommodation	16	
Commercial Recreation	170	
Mixed Use Commercial	1	
Mixed Use Residential	6	
Industrial	**431**	**6%**
Light Industrial	258	
Wholesale/Warehousing	159	
Heavy Industrial	14	
Public/Institutional	**1,540**	**20%**
Higher Education	40	
Primary/Secondary Education	197	
Hospitals	23	
Special Use	69	
Cemeteries	1	
Civic Facilities	101	
Transportation	263	
Utilities/Communications	412	
Vacant	430	
Water	4	
Green Space	**1,668**	**22%**
Parks/Recreation	836	
Open Spave	399	
Golf Course	214	
Agriculture	218	
Vacant	**836**	**10%**
Total Acreage	**7,745**	**100%**

Source: City of Petaluma, 2021.

Note: Land use acreage does not include streets, river, or areas outside of the UGB. Numbers are approximate and may not add up to 100.

Commercial uses were developed along Petaluma Boulevard and Lakeville Highway, with access from US 101 provided in the 1950s. In the past few decades, businesses have also located along East Washington Street and McDowell Boulevard. These areas, along with downtown, constitute the city's major commercial areas. Commercial land uses total approximately 10percent of the city's land area (City of Petaluma 2007).

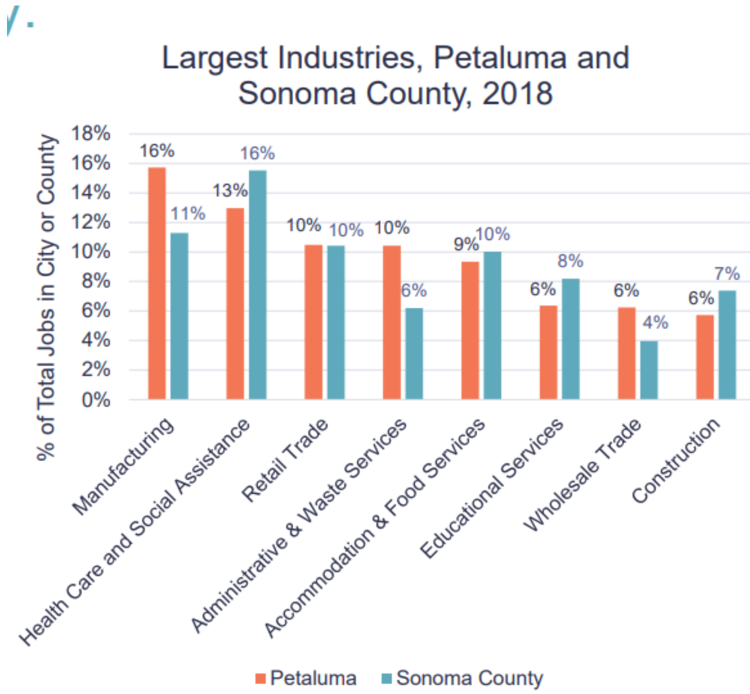
Heavy commercial, industrial, and warehouse facilities are clustered along the Petaluma River corridor east of downtown, where shipping and rail access to facilities was important through the mid-1900s. Light industrial activities are also clustered in business parks at the northern and southern edges of Petaluma adjacent to US 101. Industrial uses constitute 6percent of the city's total acreage (City of Petaluma 2006).

Public lands and institutional uses, such as Petaluma Valley Hospital and Petaluma Municipal Airport comprise approximately 20percent of the city's acreage. Green space constitutes 22percent of the city of which 2.5percent comprises City-owned parkland. Agricultural lands, located in the northern end of the city, comprise 2.2percent of the land within the Petaluma (City of Petaluma 2021).

Economy

Petaluma has an affluent population and healthy economy. The median household income is $92,762 (2020), and the per-capita income is $46,303. In 2012, Petaluma was home to 6,969 firms, one of the highest in the North Bay, of which only 1,206 (17percent) were minority owned. Approximately 64.4percent of the city's population is in the civilian labor force and 6.6percent of it is in poverty. It has an unemployment rate of 5percent (2021), which is higher than the county rate.

The largest industry in Petaluma is in the manufacturing sector and it constitutes 16percent of the total jobs in the city—higher than the county average (Figure CC-12). The city has historically been an agricultural center, with a focus on egg, poultry, and dairy production. Some of the earliest activities in the city focused on supplying basic agricultural and timber products to the Bay Area via the Petaluma River. Petaluma's economy has expanded since to include telecommunications, research and development, manufacturing, retail trade, services, and tourism as well as agricultural products (City of Petaluma 2007).



Source: City of Petaluma 2021

Figure CC-12. Largest Industries, Petaluma and Sonoma County, 2018

Petaluma's economy in the last two decades shows continuous and diverse employment growth. The five-sector economic classification system used by ABAG shows sizable employment growth during the 1990s: the services sector grew by 70percent; the manufacturing and wholesale trade sector grew by 33percent, and "other" (including the subsectors of transportation, finance, and government) grew by 30percent. The natural resources sector (agriculture and mining) remained about the same. Retail employment change has been negligible locally while retail employment has declined regionally since 1990 (City of Petaluma 2007).

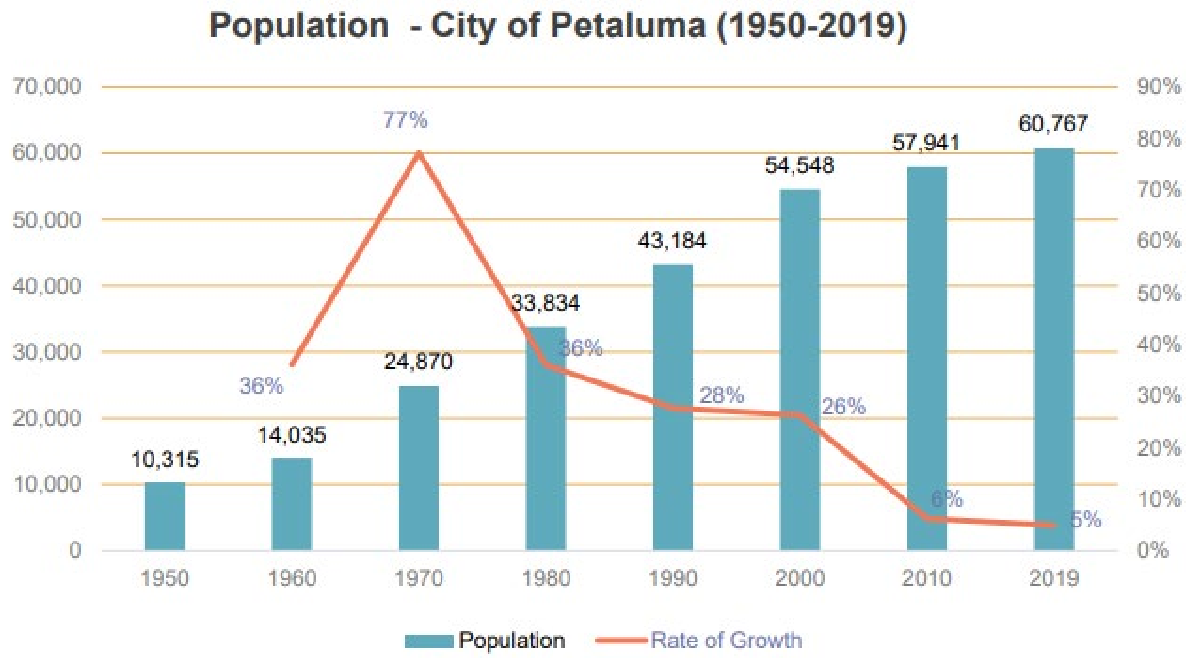
According to the City of Petaluma's 2021 Comprehensive Annual Financial Report, the top five employers in the city are the Petaluma School District, the Petaluma Poultry Processors, Lagunitas Brewing Company, Petaluma Valley Hospital, and the City of Petaluma.

Growth Patterns

Petaluma's economic and development growth patterns have been discussed in the previous sub sections. This subsection focuses on population growth in the past decade as well as forecasted growth.

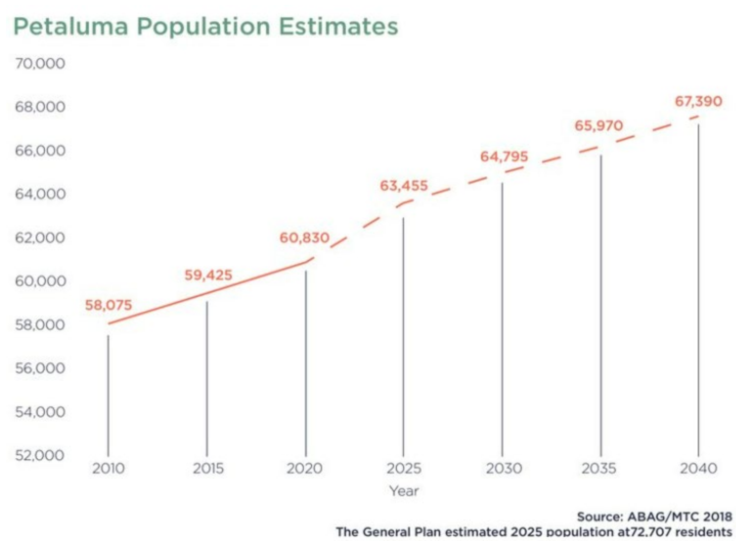
The city saw significant population growth in the late 1960s, especially following construction of US 101. After such fast growth, the City adopted one of the state's earliest and most aggressive "growth control" measures. In Petaluma's case, this consisted of limiting housing development to 500 units per year and to adopting an urban growth boundary (City of Petaluma 2007; Sheehy 2021).

In recent times, Petaluma's population has grown at a faster rate over the past decade than Sonoma County (3percent). Between 2010 and 2019 the population increased from about 58,000 to 60,800, a growth rate of 5percent (Figure CC-13). Petaluma is expected to grow in the next several decades from 60,830 in 2020 to 67,390 in 2040, which is a growth rate of 10.7percent (Figure CC-14) (City of Petaluma 2021).



Source: City of Petaluma 2021

Figure CC-13. Petaluma Population, 1950–2019



Source: City of Petaluma 2021

Figure CC-14. Petaluma Population Predictions

4.2.1.6 Napa County

Napa County covers 748.3 square miles of land area. It is bordered by Solano, Lake, Sonoma, and Yolo Counties. Napa is the largest city and county seat of Napa County.

Demographics

In 2020, Napa County had the smallest population and population density in the North Bay, with a population of 138,019 and a population density of 182.4 persons per square mile (2010). It had the fewest households in the North Bay at 48,484 households (2016–2020), with 2.78 persons per household.

For detailed information on Napa County's racial demographics, please refer to Chapter 21. Beginning in the 1970s, an increasing number of the county's Hispanic farm workers, previously a seasonal population, began to live in the county year-round (County of Napa 2008). As of 2006, more than one-fourth of all persons in the county spoke Spanish as their primary language. Among North Bay counties, Napa County has the highest percentage of population born in a foreign county, at 21.2percent (2016–2020), and 34.2percent of its population speaks a language other than English at home—also the highest in the North Bay. Only 37.2percent of the population in Napa County has a bachelor's degree or higher (US Census 2022).

Napa County's population is aging—the median age is 41.8 years (US Census 2022). This trend has been accentuated by the County's longstanding policy of limited residential growth, which has prevented an influx of large numbers of young families, and the relatively unaffordable prices of homes, which tend to favor older homeowners with higher incomes. Since the County's growth management policies remain the same, and because housing prices are expected to remain high, this trend toward an older population is expected to continue.

Land Use

According to the data collected through the digital land use database in GIS maintained by the County, 94percent of the county's land area is unincorporated. The county assessor has designated a substantial portion of the land within Napa County as rural lands (50percent); this designation includes non-farming and non-grazing operations such as vineyards, residential parcels larger than 10 acres with residences, and vacant residential parcels larger than 10 acres. Approximately 72percent of rural lands are vacant due to steep terrain, mountain ridges, and narrow valleys (County of Napa 2008).

In Napa County, preservation of the county's agricultural lands has been a priority since the mid-twentieth century, with a focus on vineyard lands. Vineyard lands grew from about 15,000 acres in the mid-1930s to nearly 50,000 acres in 2007. This emphasis on preserving agricultural land may shift in the next few years due "to pressure to provide affordable housing for the Napa County workforce, the need for additional high-wage employment, the need for industrial land to support the agricultural industry, and the potential for continuing annexations by the incorporated cities and town (County of Napa 2008)."

The first city, Napa, was incorporated in 1872, and the incorporation of American Canyon in 1992 is likely to be the last in the county. The settlement pattern in Napa County is characterized as small, widely spread, and rural, with a few urbanized areas in the unincorporated county. In 1900, nearly two-thirds of the population lived in unincorporated areas, which declined to 44percent by 1970. As of 2006, unincorporated areas accounted for only 20percent of the county's residents (County of Napa 2008).

Historically, residential and commercial development in Napa County has occurred within the incorporated areas of the county, while unincorporated areas have remained agricultural, rural residential, and open space. The County's current General Plan focuses development in existing incorporated and urban areas.

Table CC-9 and Figure CC-15, depict the land use categories adopted by the Napa County General Plan (County of Napa 2008).[5]

Table CC-9. Land Use Categories and Zoning

General Plan Land Use Category	Appropriate Zoning Designations
Urban Residential	RC - Residential Country RS - Residential Single RM - Residential Multiple RD - Residential Double PD - Planned Development CL - Commercial Limited CN - Commercial Neighborhood
Rural Residential	RC - Residential Country
Study Area	Study area properties shall be subject to site - specific planning prior to rezoning.
Industrial	IP - Industrial Park I - Industrial GI - General Industrial
Public-Institutional	AV - Airport PL - Public Lands
Agriculture, Watershed, and Open Space	AW - Agricultural Watershed TP - Timberland Preserve
Agricultural Resource	AP - Agricultural Preserve
Napa Pipe Mixed Use	NP-MUR-W - Napa Pipe Mixed Use Residential Waterfront NP-IBP-W - Napa Pipe Industrial/Business Park Waterfront NP-IBP - Napa Pipe Industrial/Business Park I - Industrial

Source: County of Napa 2008.

In addition to the zones listed above, AW - Agricultural Watershed uses and/or zoning may occur in any land use designation. Note: Multiple additional zoning designations currently exist within each General Plan Land Use Category and may remain in place. This table is not intended to constrain the legal use of property consistent with both zoning and General Plan Land Use Category. Also, in the Deer Park Rural Residential area, rezoning from residential districts shall be permitted to achieve minimum parcel sizes consistent with Policy AG/LU-35, and to develop, improve and expand hospital related facilities through either expansion of the Planned Development zoning district or a future healthcare related zoning district that shall be deemed consistent with the Deer Park Rural Residential area. On parcel 049-160-009 in the Monticello Road area, rezoning to RS may be allowed consistent with Policy AG/LU-35.

[5] The General Plan re-designated about 230 acres of industrial land immediately south of the city of Napa as a "Study Area," indicating the need for additional study to determine the appropriateness of the area for nonindustrial uses.

FIGURE AG/LU-3: LAND USE MAP

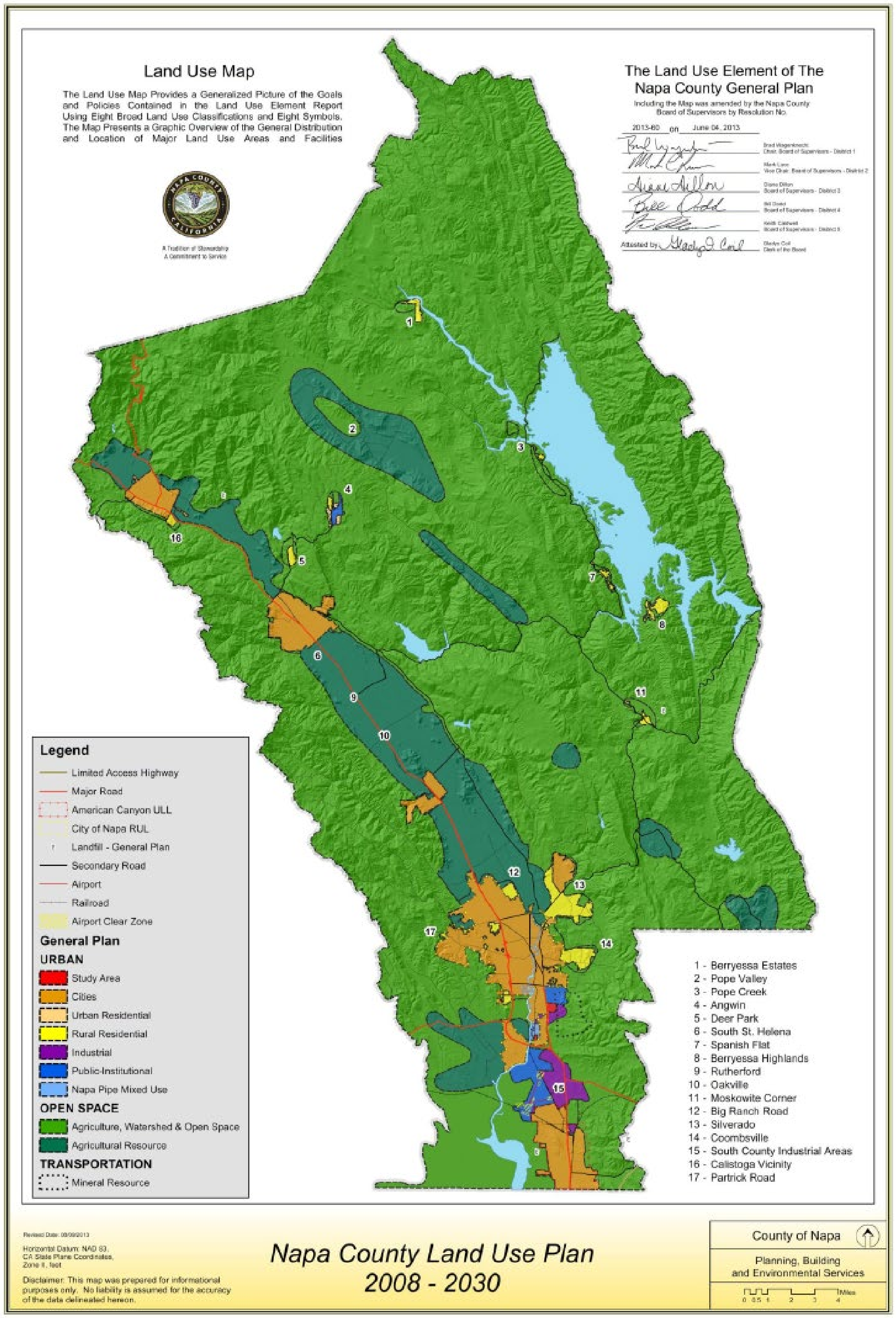


Figure CC-15. Napa County Land Use Map

Table CC-10 provides a detailed land use breakdown for unincorporated areas based on parcel-level information obtained by the Napa County Assessor's Office, as published in the 2005 Baseline Data Report. Most of the land falls in the rural lands use category (50.6percent), while parks and open space, grazing, and farming together account for 38.4percent of land use.

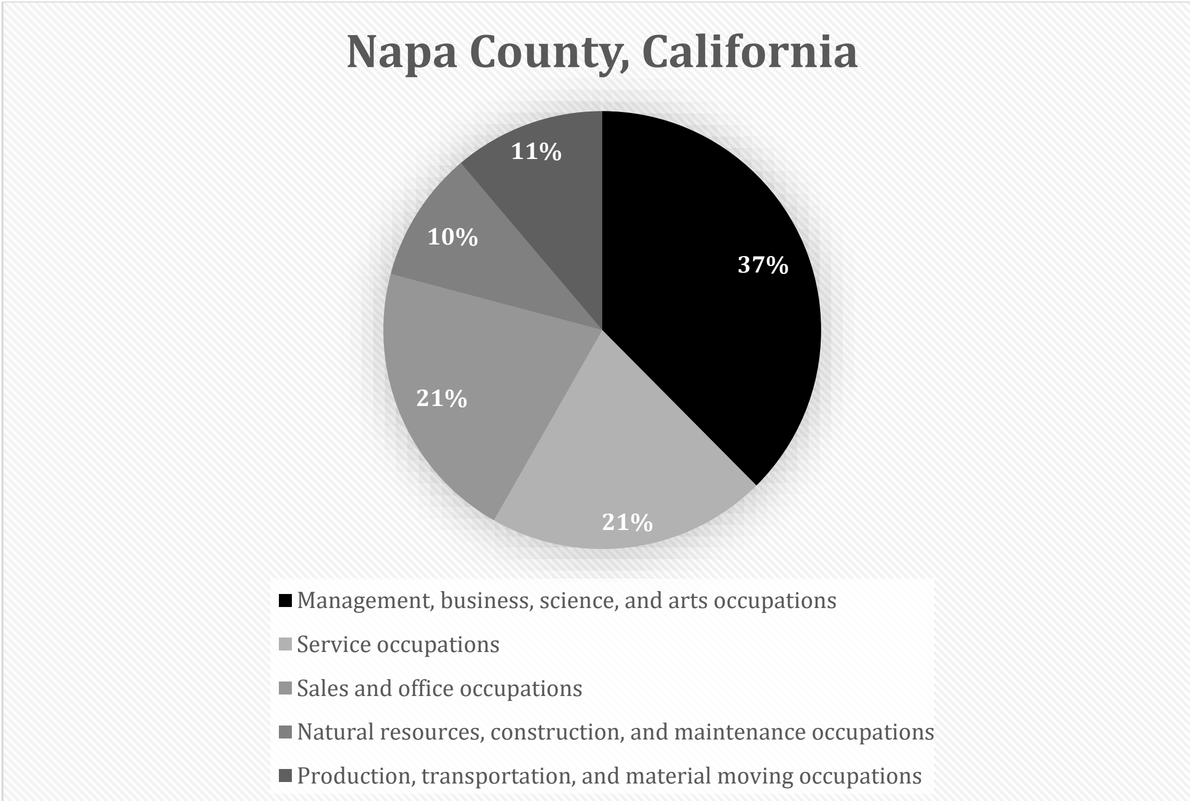
Table CC-10. Napa County Land Use Categories

Land Use Category	Existing/ Developed Acres	Percent of Total	Designated/ Vacant Acres	Percent of Total	Total Acreage	Percent of Total
Commercial	2,374	0.5%	814	0.2%	3,188	0.6%
Industrial	1,474	0.3%	1,474	0.3%	2,948	0.6%
Public / Quasi-public	6,645	1.3%	208	0.0%	6,850	1.4%
Parks & Open Space	89,823	17.7%	0.00	0.0%	89,823	17.7%
Urban / Suburban Residential	3,751	0.7%	648	0.1%	4,399	0.9%
Rural Residential	8,406	1.7%	2,329	0.5%	10,735	2.1%
Rural Lands	72,552	14.3%	183,711	36.3%	256,263	50.6%
Farming	50,586	10.0%	103	0.0%	50,689	10.0%
Grazing	54,024	10.7%	0	0.0%	54,024	10.7%
Total Unincorporated County	*289,632*	*57.2%*	*189,287*	*37.4%*	*478,919*	*94.5%*
Incorporated Areas	-		-		27,828	5.5%
Total County Land Area						*100%*

Economy

Napa County has the second-highest median household income, $92,219 (2016–2020), and per-capita income, $46,912 (2016–2020) in the North Bay. Approximately 7.9 percent of its population is in poverty (2020)—the second highest proportion in the North Bay.

Approximately 65percent of Napa County's total population is in the civilian labor force (2016–2020)—the highest in the North Bay, and it has an unemployment rate of 2.7percent (2022). In 2012, Napa County was home to the lowest number of firms in the North Bay at 14,236 firms. The greatest proportion of Napa County's population is in the management, business, science, and arts occupations, at 37percent (Figure CC-18). The dominant industries here are in the manufacturing (which includes the winemaking) and educational services, and health care and social assistance categories, totaling 34.2percent (Table CC-11). Approximately 5percent of the population works in agriculture, five times the state average, which reflects the critical role agriculture plays in Napa County's economy. In rural areas, the wine industry and visitor-serving businesses are essential elements of the Napa County job market.



Source: US Census 2022.

Figure CC-16. Napa County Employment

Table CC-11. Napa County Industry Percentages

Industry	Percentage of Jobs by Industry in Napa County, California (2020)
Agriculture, forestry, fishing and hunting, and mining	5.00%
Construction	5.60%
Manufacturing	13.20%
Wholesale trade	2.50%
Retail trade	9.80%
Transportation and warehousing, and utilities	3.50%
Information	1.40%
Finance and insurance, and real estate and rental and leasing	4.80%
Professional, scientific, and management, and administrative and waste management services	10.40%
Educational services, and health care and social assistance	21.00%
Arts, entertainment, and recreation, and accommodation and food services	14.30%
Other services (except public administration)	4.50%
Public administration	3.90%

Note: Numbers are approximate and may not add up to 100. Source: US Census 2022

Growth Patterns

Napa County's growth over time has been slow compared to the rest of the Bay Area. Napa County remains small in terms of population compared to other Bay Area counties.

Most of the county's growth and development have occurred within the cities of Napa and American Canyon. The city of American Canyon (discussed below) has experienced the most significant growth and land conversion over the past decade. The town of Yountville and the city of St. Helena have experienced limited growth. The city of Calistoga has experienced moderate growth in the past decade. With significant portions of the county in viticultural or agricultural use or open space, there has been little development or growth within the unincorporated areas of the county over the past 15 years. There has also been little commercial development activity in these areas (County of Napa 2008).

The population of Napa County grew by 2percent between 2010 and 2020. The non-Hispanic White population declined by 5percent between 2010 and 2020 and is expected to decline by 10percent between 2020 and 2040. The non-Hispanic multiracial demographic is expected to grow by 43percent between 2020 and 2040, while the non-Hispanic White and Hispanic populations are expected to grow by 18percent and 20percent respectively. The Native Hawaiian or Pacific Islander population is expected grow by 34percent in this time (DOF 2021).

Plan Bay Area 2050 focuses less on growth in Napa County compared to other counties. Between 2015 and 2050, less than 1percent of all new households and only 1percent of jobs in the Bay Area are anticipated to be in Napa County (Figure CC-17). New household and job opportunities are focused in areas prioritized by Napa County's local governments, especially along the SR 29 corridor between American Canyon, which is a PDA, and the city of Napa. As both job and household growth are envisioned mostly in urbanized corridors, the plan maintains urban growth boundaries and preserves agricultural and open space in rural parts of the county (ABAG and MTC 2021e).

Source: ABAG and MTC 2021e

Figure CC-17. Napa County Household and Job Growth

4.2.1.7 American Canyon

American Canyon covers an area of approximately 6.5 square miles at the southern end of Napa County. It is bounded geographically by the Napa River to the west, the eastern foothills of the Sulphur Springs Mountain Range to the east, the city of Vallejo to the south, and the Napa Airport to the north.

Demographics

American Canyon's 2020 population was 21,837, one of the lowest of the North Bay cities. American Canyon is a diverse city. Only 20percent of the population identifies as non-Hispanic White (Table CC-12). Approximately 31percent of the population identifies as Hispanic or Latino and 35percent of the population identifies as non-Hispanic Asian. Approximately 33percent of the population in American Canyon is foreign born and 46.3percent of the population speaks a language other than English at home. The median age in American Canyon is 37.9, implying that it has the smallest ageing population of the four cities discussed in this section.

American Canyon has high population density relative to other North Bay cities, with 4,022 persons per square mile (2010). It has the fewest households and the largest household size of the cities studied in this section. There are only 5,118 households in American Canyon and an average of 3.94 persons per household. Only 32percent of the population in American Canyon has a bachelor's degree or higher, which is lower than the state average.

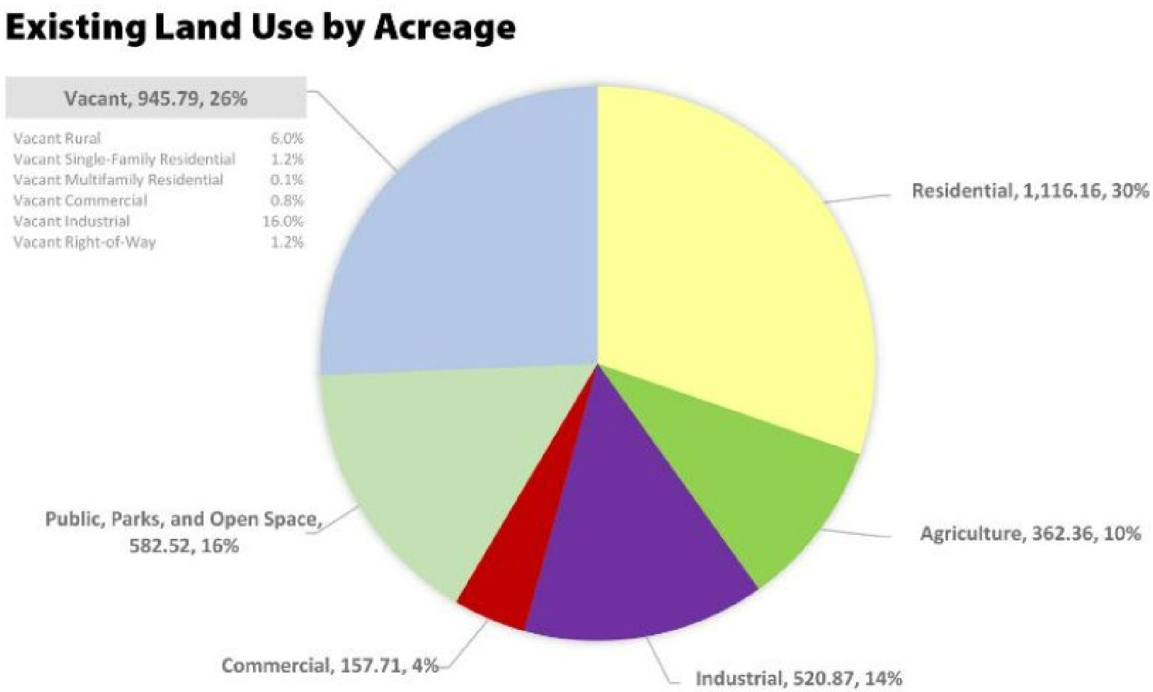
Table CC-12. American Canyon Race and Ethnicity

Race/Ethnicity	No. of Persons	Percentage of Total Population
Total Population (All Races)	21,837	
Hispanic or Latino	6,705	**31%**
White alone	4,474	20%
Black or African American alone	1,428	7%
American Indian and Alaska Native alone	39	0%
Asian alone	7,623	**35%**
Native Hawaiian and Other Pacific Islander alone	146	1%
Some Other Race alone	102	0%
Population of two or more races	1,320	6%

Source: US Census 2022.

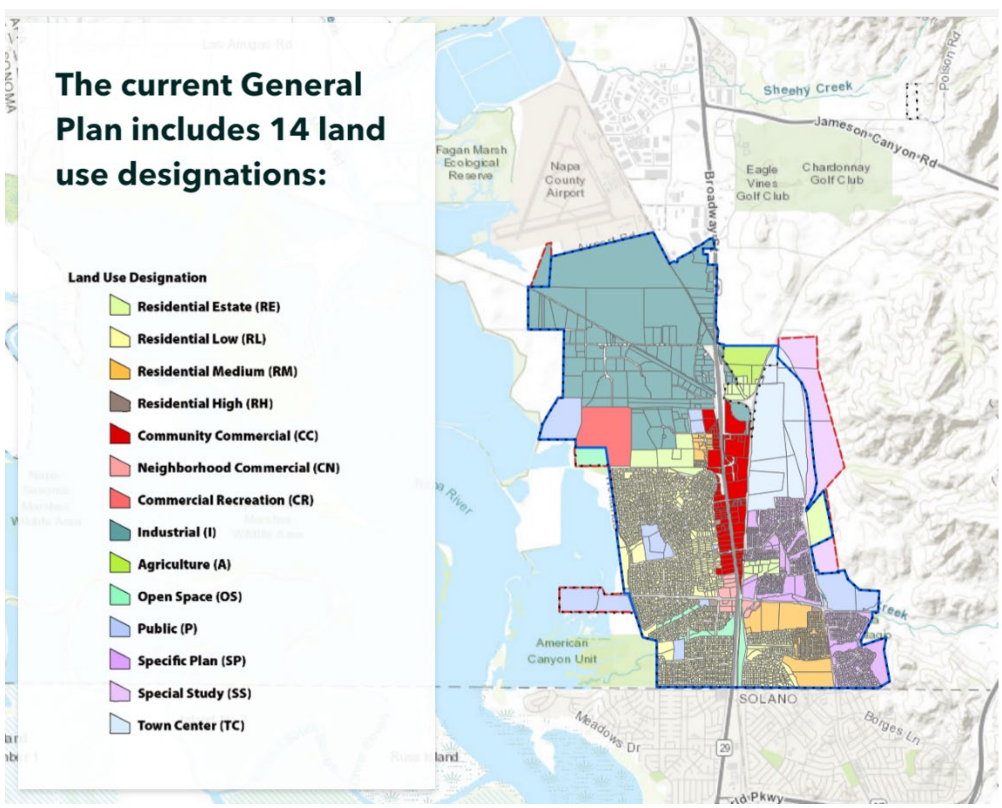
Land Use

According to the County Assessor's Office (2020), about 30percent of American Canyon's existing land use is comprised of residential development (i.e., single-family, multifamily, mobile home parks) (Figure CC-18) (US Census 2022). About 26percent of the city's land area is vacant, primarily vacant land zoned for industrial use. Public facilities, parks, and open space make up next largest category at 15.6percent. Existing industrial uses occupy 13.9percent of the city, while commercial uses comprise 4.2percent. Figure CC-19 shows the land use map of the city. Most of commercial land use is concentrated along Broadway Street in the heart of the city, while the northwest is industrial (City of American Canyon 2020). The Updated 2040 Land Use Diagram envisions the land use of the city to shift across designations (Figure CC-20). It plans for the largest land use designation to be industrial at 33.2percent, followed by residential at 22.7percent (City of American Canyon 2020).



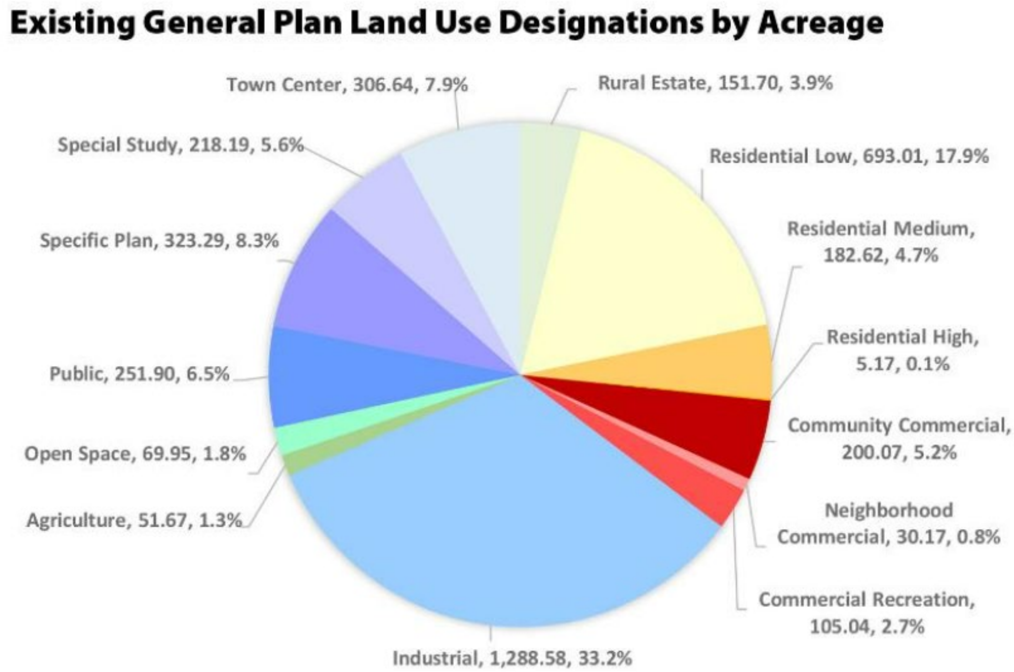
Source: US Census 2022

Figure CC-18. American Canyon Existing Land Use Acreage



Source: City of American Canyon 2020.

Figure CC-19. American Canyon Land Use Map



Source: City of American Canyon 2020

Figure CC-20. American Canyon Existing General Plan Land Use Designations

Economy

The median household income in American Canyon is $108,884 (2020) but the per-capita income is only $35,509. This could be a result of large household sizes compared to other North Bay cities. In 2012, American Canyon was home to only 1,133 firms, of which 713 (63percent) were minority owned—higher than the county statistic of only 22percent minority-owned firms. Approximately 69percent of the city's population is in the civilian labor force and 7percent of it is in poverty. American Canyon has a relatively high unemployment rate 6.6percent in 2021 (US Census 2022).

American Canyon's largest employment clusters are service sector industries, though manufacturing is also significant. The largest industries in the city are retail, administration and support, health care, and social assistance (Table CC-13). Together these three industries support over 1,700 jobs and make up about 41.6percent or half the jobs in the city. There also is a notable manufacturing base that supports 461 jobs. However, the city's economy is shifting from a manufacturing base to a service sector base. The top industries for employment have shifted since 2010. Manufacturing, once the largest employer (supporting 20percent of the workforce in 2010) has dropped to only 11percent of local employment. Since 2014, health care has added more jobs in American Canyon than any other sector. American Canyon's job growth is discussed later in this section.

Table CC-13. American Canyon Employment by Sector

NAICS Industry Sector	American Canyon		Napa County	
	Employment	**Share of Total**	**Employment**	**Share of Total**
Retail Trade	704	17.2%	6,032	8.1%
Administration & Support, Waste Management and Remediation	519	12.7%	4,612	6.2%
Health Care and Social Assistance	480	11.7%	10,663	14.2%
Manufacturing	461	11.3%	12,088	16.1%
Accommodation and Food Services	346	8.5%	11,196	15.0%
Transportation and Warehousing	336	8.2%	1,866	2.5%
Construction	316	7.7%	4,141	5.5%
Professional, Scientific, and Technical Services	221	5.4%	2,195	2.9%
Wholesale Trade	211	5.2%	1,932	2.6%
Public Administration	146	3.6%	3,168	4.2%
Arts, Entertainment, and Recreation	119	2.9%	1,063	1.4%
Other Services (excluding Public Administration)	80	2.0%	2,195	2.9%
Educational Services	68	1.7%	5,3S2	7.1%
Real Estate and Rental and Leasing	59	1.4%	727	1.0%
Finance and Insurance	19	0.5%	1,426	1.9%
Agriculture, Forestry, Fishing and Hunting	4	0.1%	5,087	6.8%
Management of Companies and Enterprises	0	-	566	0.8%
Mining, Quarrying, and Oil and Gas Extraction	0	-	27	0.0%
Information	0	-	400	0.S%
Utilities	0	-	122	0.2%
Total Employment	**4,089**	**100%**	**74,858**	**100%**

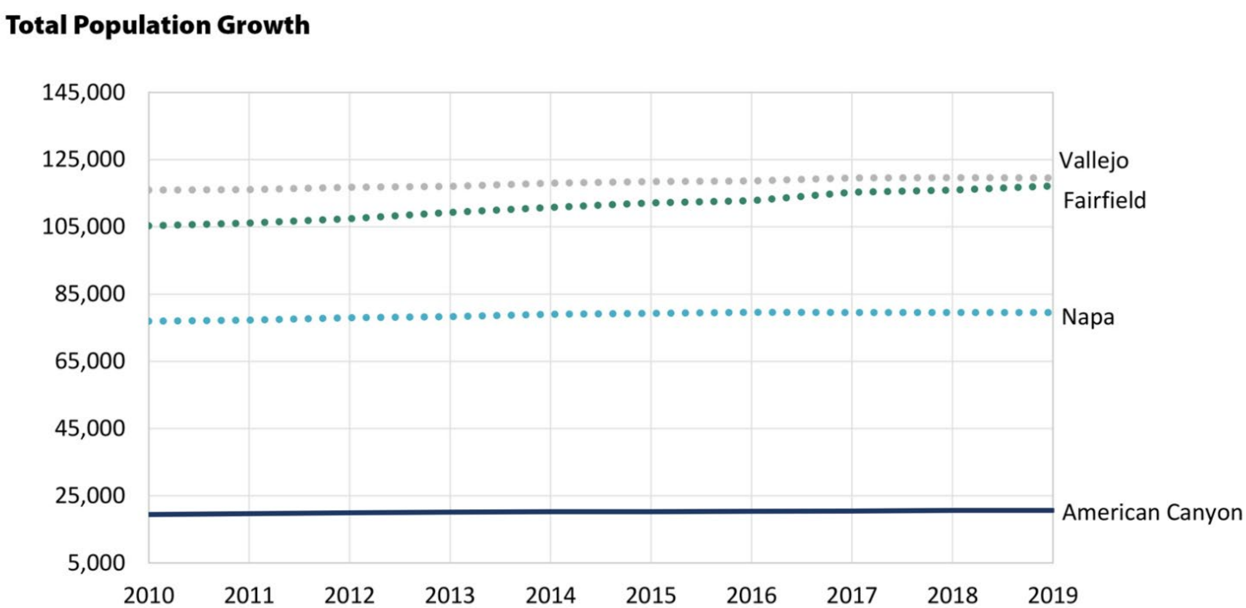
Source: City of American Canyon 2020.

American Canyon’s top three employers are Walmart, Napa Valley Unified School District, and A Bright Future, a nonprofit providing supportive services for individuals with disabilities.

The number of employed residents in the city outnumbers local jobs in American Canyon by more than two to one, implying that most American Canyon residents commute out of the city for work. Though the city’s job base has grown, the number of working residents has grown faster. About 96percent of working residents commute out of American Canyon to their jobs, and only about 4percent of employed American Canyon residents hold jobs within the city. Meanwhile, about nine out of ten local jobs are filled by in-commuters.

Growth Patterns

American Canyon started growing in the 1950s and by 1963 it was home to 27 businesses and was the largest industrial zone in the county. Despite this growth, the area remained an unincorporated area of Napa County until its incorporation in 1992. Since then, the city has grown to a population of more than 20,000. The population doubled between 2000 and 2010, but population growth since has slowed down (Figure CC-21). Even so, its growth rate of 6percent since 2010 has been higher than the growth rates of its more populous neighbors Napa and Vallejo.



Source: City of American Canyon 2020.

Figure CC-21. Population Growth in Cities in Napa County, 2010–2019

Relative to its neighbors, American Canyon has seen larger growth in jobs. American Canyon’s employment base constitutes about 5percent of Napa County employment, with more than 4,000 jobs. Up from 3,000 jobs in 2010, the approximately 40percent job growth in American Canyon (5percent annually on average) surpasses job growth rates in nearby communities.

4.2.1.8 Solano County

Solano County covers 821.8 square miles of land area. Solano County is bordered by Napa, Sonoma, Contra Costa, Marin, Yolo, and Sacramento Counties. Land area is divided into two topographic sections: the western quarter extends into the foothills of the coastal range, while the rest of the county is part of the Sacramento Valley, characterized by generally level topography. The unincorporated area of the county includes approximately 773 square miles (County of Solano n.d.). Cities make up about 14percent of the total land area. The County serves seven jurisdictions—Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, and Vallejo—in addition to the unincorporated areas. The city of Fairfield is the county seat.

Demographics

Solano County has the second largest population and highest population density in the North Bay, with a population of 453,491 and a population density of 503 persons per square mile. It also has the second highest number of households in the North Bay at 151,191 households (2016–2020), with the largest household size in the North Bay—2.87 persons per household (US Census 2022).

Solano is one of the most diverse counties in the Bay Area. For detailed information on Solano County's racial demographics, please refer to Chapter 21, Equity. Approximately 19.7percent of Solano County's population was born in a foreign county and 29.1percent speak a language other than English at home—the second highest in the North Bay.

Only 27.1percent of the population in Solano County has a bachelor's degree or higher—the lowest in the North Bay. This is reflected in the low-income levels here, discussed under *Economy*. Solano County has the youngest population in the North Bay—as of 2019 the median age is 38.5 years (Data USA 2022).

Land Use

Solano County has almost 50percent of the Bay Area's farmland and more than half of its wetlands (Caltrans 2015). Based on the Solano County General Plan, about 20percent of the unincorporated land area is some type of undeveloped natural resource land (County of Solano 2008). This includes marsh and watershed lands in the southern and western portions of the county comprising 101,307 acres. Over 329,000 acres of land are in agricultural use, approximately 70percent of the unincorporated land area. Agricultural land is concentrated in the eastern portion of the county and is also found dispersed throughout the county. Watershed lands are also in agricultural use.

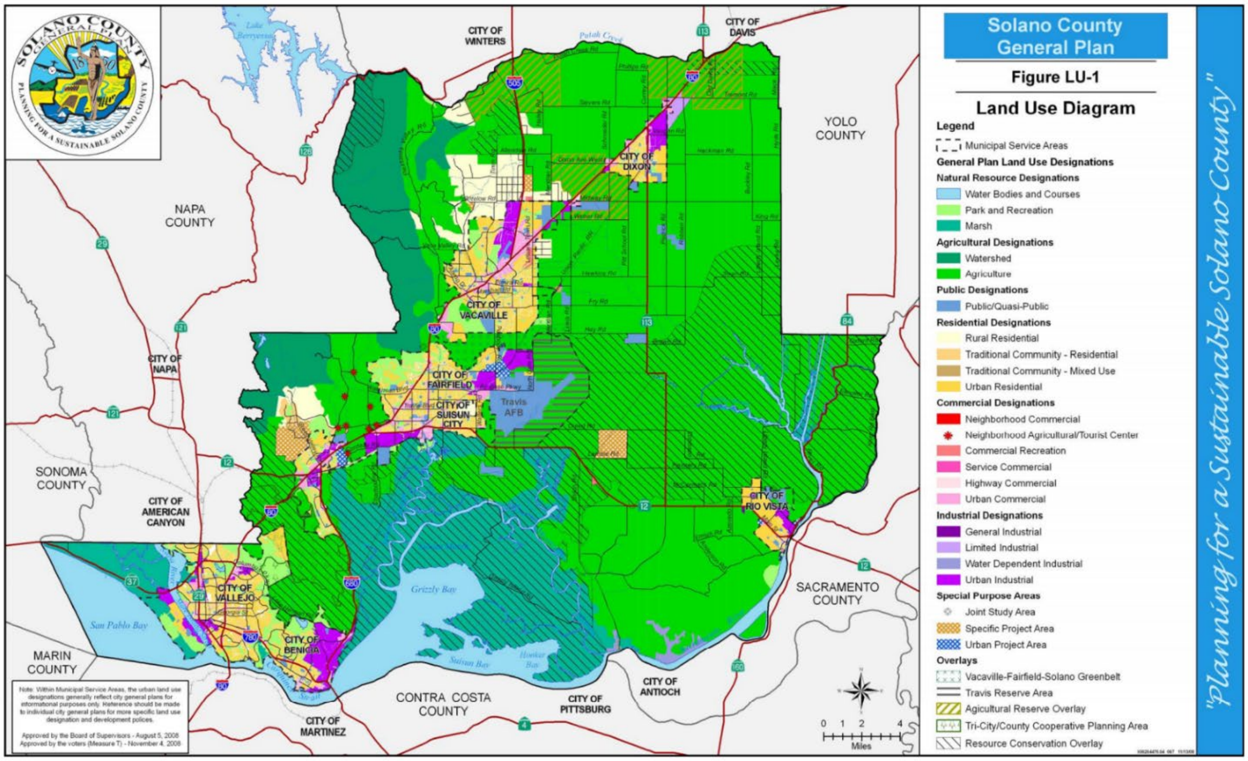
Table CC-14 provides Solano County's existing land use distribution. Residential land uses occupy approximately 6,878 acres, developed mostly at rural residential densities of one dwelling unit per 2.5 or more acres. Industrial land uses account for about 2,125 acres of land area in the unincorporated county. Most of the existing industrial development in the county is within cities. Approximately 640 acres are in commercial land use, which includes retail, commercial services, and service stations. Highway-oriented commercial development represents the predominant commercial land use in the unincorporated area with most of such land located along Interstate (I-) 80.

Table CC-14. Solano County Existing Land Use Distribution

Land Use Categories	Total	Percentage of Total
Water	51,092	8.8%
Park and Recreation	791	0.1%
Marsh	64,731	11.1%
Watershed	36,575	6.3%
Agriculture	329,076	56.5%
Public / Quasi-Public	1,517	0.3%
Residential	6,878	1.2%
Commercial	640	0.1%
Industrial	2.125	0.4%
Vacant Land	1,011	0.2%
TOTAL Unincorporated Area	**494,437**	**84.9%**
TOTAL Incorporated Area	**81,678**	**14.0%**
Existing Roadway/Railroad Right of Ways	6,140	1.1%
TOTAL County	**582,255**	**100.0%**

Other uses of land in the county include public use (e.g., schools, cemeteries, federal lands), which accounts for about 1,517 acres; parks and recreation land (791 acres); and vacant land, which includes about 1,011 acres.

The land use plan put forth in the Solano County General Plan envisions land use distributions for the year 2030 (Figure CC-22). The majority of Solano's land remains in agricultural or open-space designations. The unincorporated area includes primarily agricultural and open space land, along with some rural residential, commercial, and industrial areas.



Source: Solano County 2008

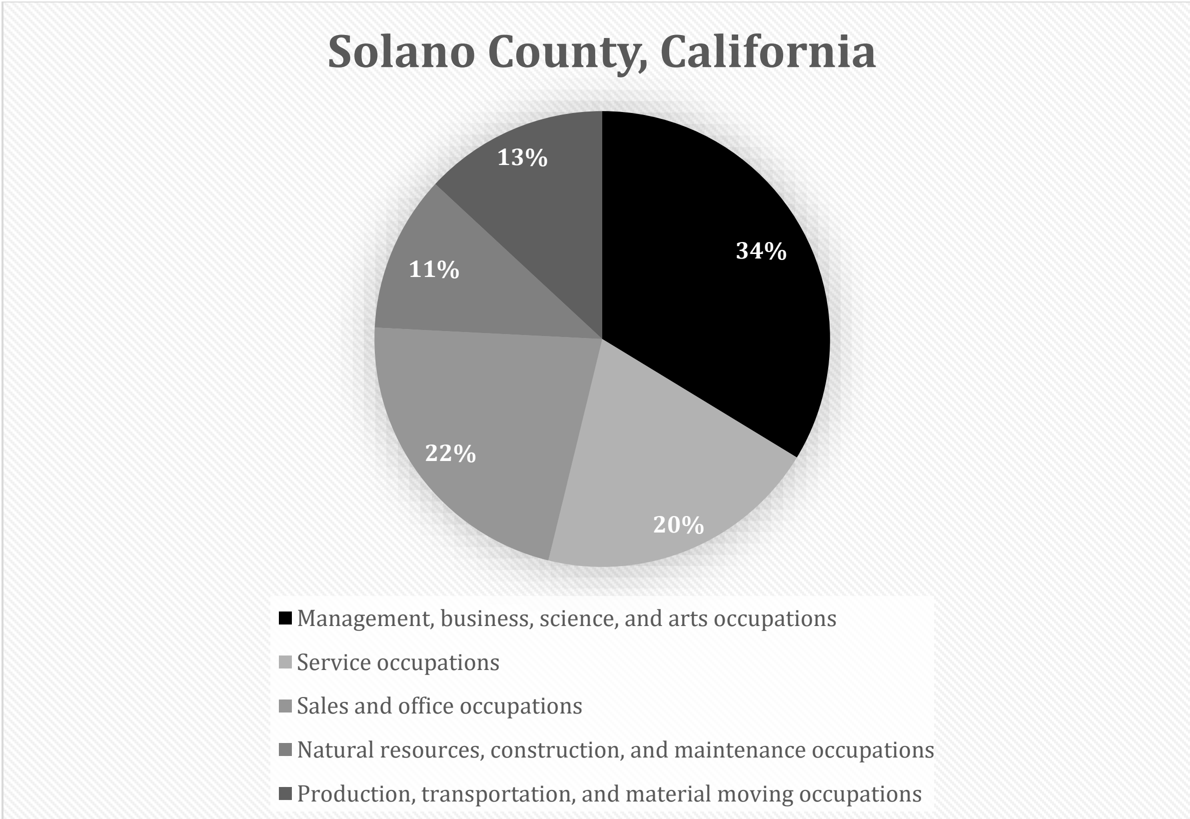
Figure CC-22. Solano County Land Use Diagram

Economy

Solano County has the lowest median household income, $84,638 (2016–2020), and per-capita income, $36,685 (2016–2020), in the North Bay. Approximately 9.3percent of its population is in poverty (2020)—the highest in the North Bay (US Census 2022).

Only 62.3percent of Solano County's total population is in the civilian labor force (2016–2020)—the lowest in the North Bay, and it has an unemployment rate of 4percent (2022)—the highest in the Bay Area. In 2012, Solano County was home to 25,724 firms. The greatest proportion of Solano County's population is in the management, business, science, and arts occupations, at 34percent (Figure CC-23). The dominant industries here are in educational services, and health care and social assistance, retail trade, and professional, scientific, and management, and administrative and waste management services industries, totaling 44.2percent (Table CC-16).

Only about 1.4percent of the population works in the agricultural industry. The gross value of agricultural production was $291.7 million in 2011, an increase of 12percent from 2010, according to the *Solano County Crop and Livestock Report* (County of Solano 2011). Agriculture is diversified with over 80 different commodities including fruits, nuts, vegetables, grains, seed, nursery stock, and livestock. Statewide, Solano ranked 27th out of 58 counties in agricultural production. The county ranked second among California counties in the production of Sudan grass hay and third in the production of sheep and lamb.



Source County of Solano 2011.

Figure CC-23. Solano County Employment

Table CC-15. Solano County Employment by Industry

Industry	Percentage of Jobs by Industry in Solano County, California (2020)
Agriculture, forestry, fishing and hunting, and mining	1.40%
Construction	8.40%
Manufacturing	8.40%
Wholesale trade	2.20%
Retail trade	11.20%
Transportation and warehousing, and utilities	6.60%
Information	1.90%
Finance and insurance, and real estate and rental and leasing	5.70%
Professional, scientific, and management, and administrative and waste management services	9.50%
Educational services, and health care and social assistance	23.50%
Arts, entertainment, and recreation, and accommodation and food services	9.40%
Other services (except public administration)	4.70%
Public administration	7.20%

Source: US Census 2022

Growth Patterns

Solano County is growing faster that its neighboring counties, with a projected jobs increase of 53percent between 2015 and 2050, higher than the Bay Area job growth rate of 35percent in the same period (ABAG and MTC 2021c). Its population is expected to increase by 24percent between 2015 and 2050 (ABAG and MTC 2021c). Once a rural county, Solano has seen rapid suburbanization, primarily because of affordable land prices and large-tract housing developments. The county has also seen significant commercial and retail growth, primarily along I-80.

The population of Solano County grew by 7percent, the highest growth rate in North Bay, between 2010 and 2020. Between 2010 and 2020, the Hispanic and the non-Hispanic multiracial groups grew the fastest with a growth rate of 15percent and 17percent, respectively. Between 2020 and 2040, these groups are expected to be grow by 47percent and 65percent, respectively. The American Indian or Alaska Native and Asian population is expected to decline by 3percent between 2020 and 2040 (California Department of Finance 2021).

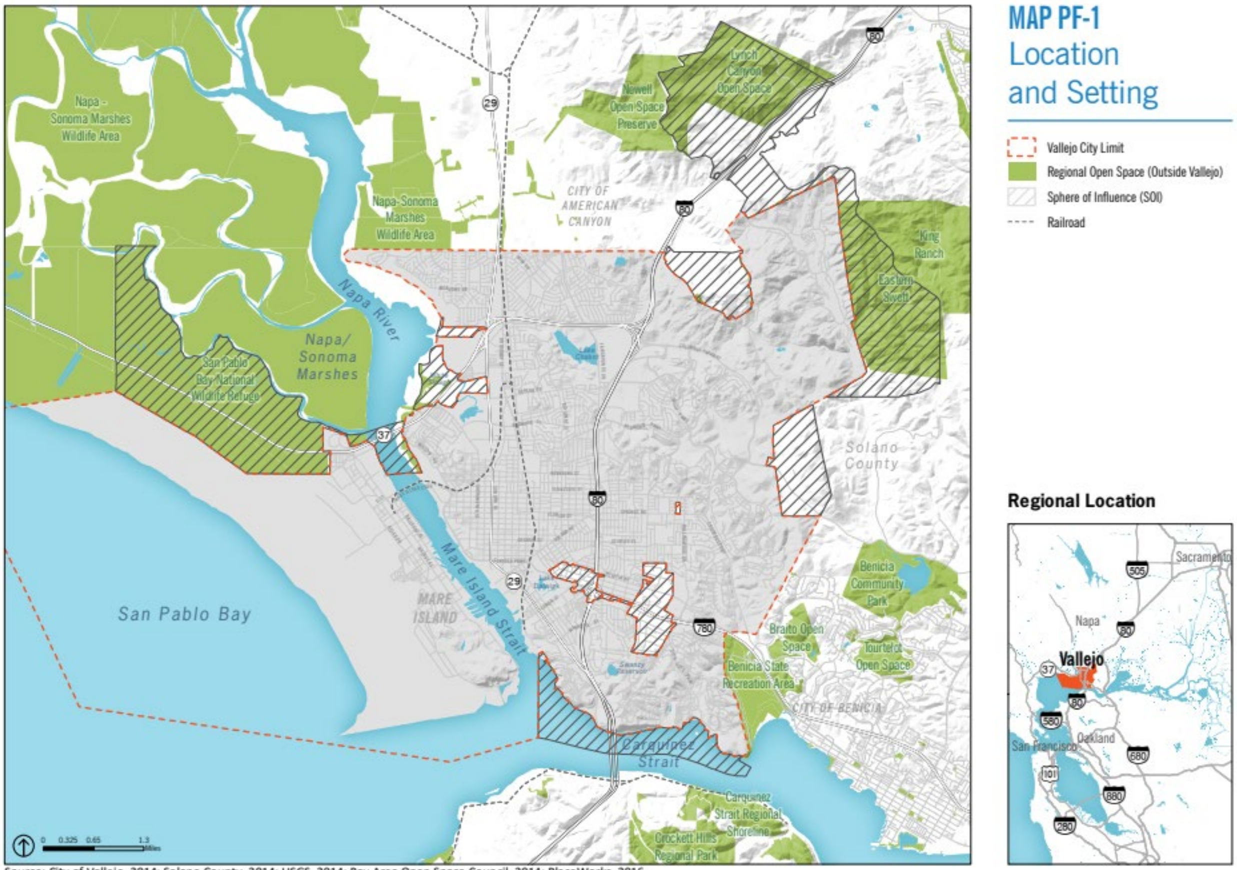
Plan Bay Area 2050 focuses housing and job growth in areas prioritized by local governments in the southern and central parts of Solano County. Between 2015 and 2050, only 3percent of all new households and 5percent of all new jobs in the Bay Area are anticipated to be located here (Figure CC-24). Household growth is anticipated in historic downtowns and station areas in cities like Fairfield, Vacaville, and Vallejo. New jobs are envisioned along Solano County's major transportation corridors, with employment opportunities located alongside existing and new homes.

Source: ABAG 2022

Figure CC-24. Solano County Household Growth and Job Growth

4.2.1.9 Vallejo

Vallejo is a diverse and populous community that serves as a gateway to the inner Bay Area and the Napa Valley. The city encompasses an area of approximately 50 square miles, framed by San Pablo Bay and the Napa/Sonoma Marshes on the west, the Carquinez Strait to the south, and unincorporated Solano open space lands to the northeast (see Figure CC-25). Please refer to Chapter 21, Equity for an in-depth discussion of Vallejo's history and present-day diversity.



Source: City of Vallejo, 2014; Solano County, 2014; USGS, 2014; Bay Area Open Space Council, 2014; PlaceWorks, 2016.

Figure CC-25. Map of Vallejo and Surrounding Area

Demographics

Vallejo is the largest city in Solano County and the tenth largest in the Bay Area, with 126,090 residents in 2020. Besides having a large population, Vallejo has a high population density of 3,780 persons per square mile. It has one of the highest number of households as compared to other North Bay cities, at 41,863 households (2016–2020). The average household size in Vallejo is 2.86 persons per household (US Census 2022).

Vallejo is a culturally and ethnically diverse community. The population has an equal share of Hispanic, White, African American, and Asian (Filipino) residents (Table CC-17). For detailed information on Vallejo's racial demographics, please refer to Chapter 21. Approximately 26.2percent of Solano's population was born in a foreign country and 37.3percent speaks a language other than English at home—the second highest in the four cities.

Only 26.7percent of the population of Vallejo has a bachelor's degree or higher—the lowest in the four cities and lower than the county average. This is reflected in the low-income levels, discussed under *Economy*. Vallejo has a young population—the median age here is 38.4 years (2019).

Table CC-16. Vallejo Race and Ethnicity

Race/Ethnicity	No. of Persons	Percentage of Total Population
Total Population (All Races)	126,090	
Hispanic or Latino	35,835	**28**%
White alone	26,440	**21%**
Black or African American alone	24,446	19%
American Indian and Alaska Native alone	431	0%
Asian alone	29,152	**23%**
Native Hawaiian and Other Pacific Islander alone	1,255	1%
Some Other Race alone	1,037	1%
Population of two or more races	7,494	6%

Source: US Census 2022

Land Use

As per the City of Vallejo General Plan 2040, the urbanized area of Vallejo is primarily residential with single-family and multifamily development occupying 40percent of the land within the city limit (see Figure CC-26). Commercial uses account for approximately 8percent of existing land uses while industrial and manufacturing uses, concentrated primarily on Mare Island, make up 5percent of land in the city. As discussed earlier in this section, several PPAs are in Vallejo. Vacant and undeveloped land accounts for 6percent of the total land area, with wetlands, parks, and natural open space comprising the balance. Vacant properties are concentrated in the central and western parts of the city, near Sonoma Boulevard and the downtown/waterfront area (City of Vallejo 2017).

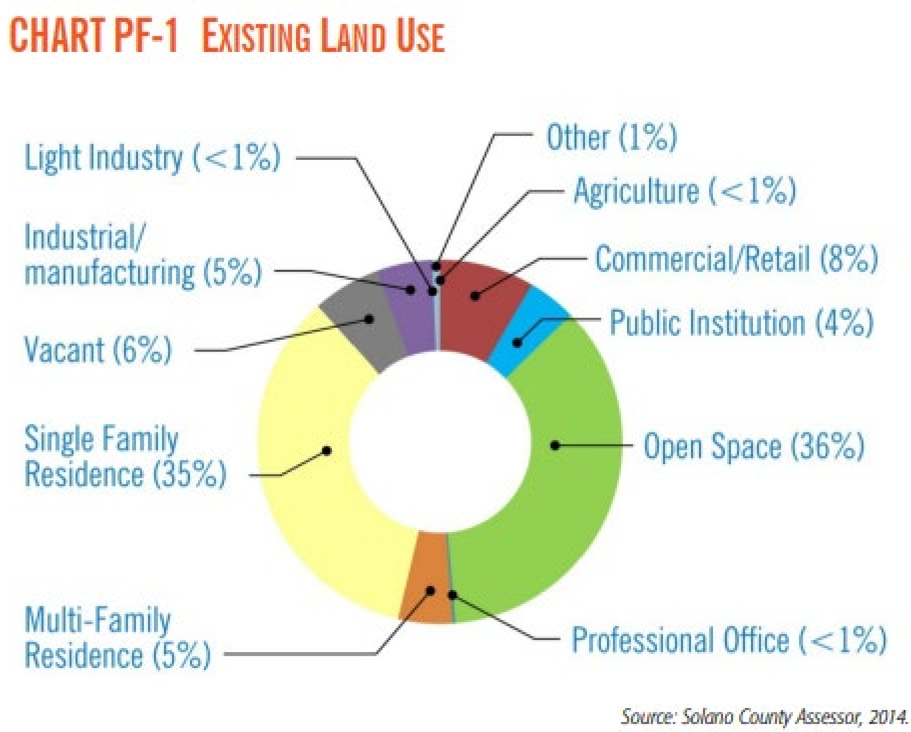


Figure CC-26. Vallejo Existing Land Uses

Figure CC-27 depicts the distribution of land uses in Vallejo. Most of Mare Island and northeast Vallejo have been designated as parks, recreation, and open space. Residential uses may be found throughout the city but are concentrated along major highways running through the city. A portion of the city is comprised of wetlands which are to be conserved.

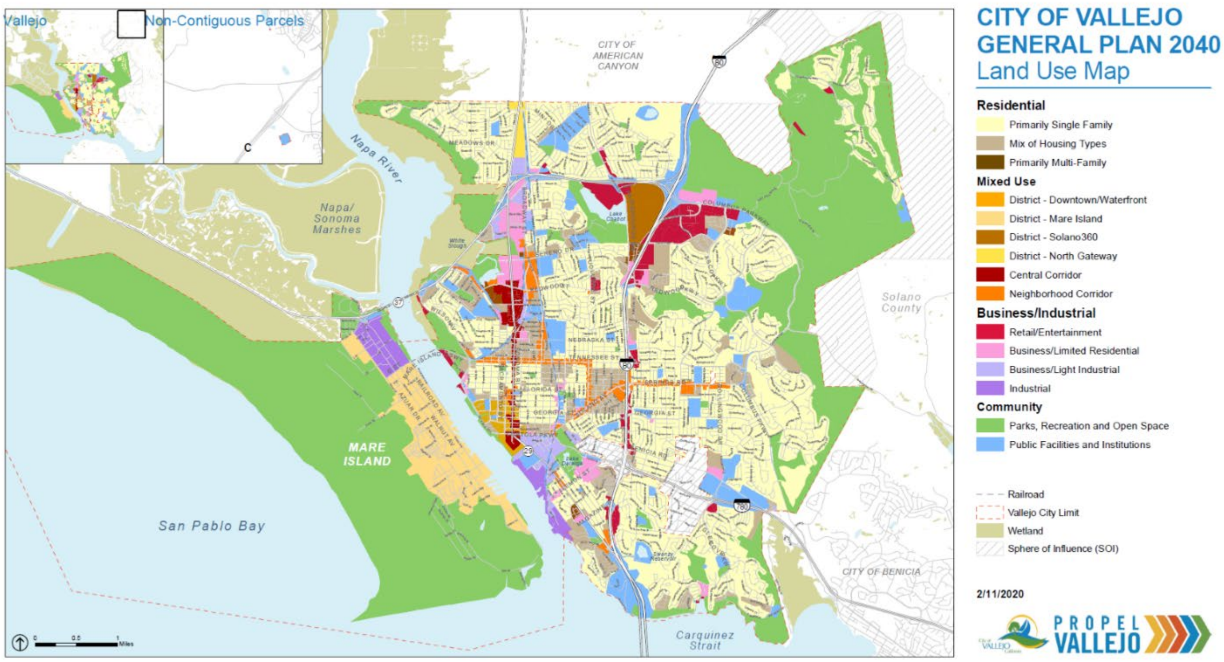


Figure CC-27. Vallejo Land Use Map

Economy

Vallejo's economy has been steadily growing over the past two decades (Figure CC-28) (City of Vallejo 2017). Total employment was at 31,000 jobs in 2016. Jobs are concentrated in the health care, retail trade, government, accommodation and food services, and arts, entertainment, and recreation sectors (Figure CC-29). These industry sectors are also reflected in Vallejo's top employers, which are led by the Kaiser Permanente Medical Center (Figure CC-30).

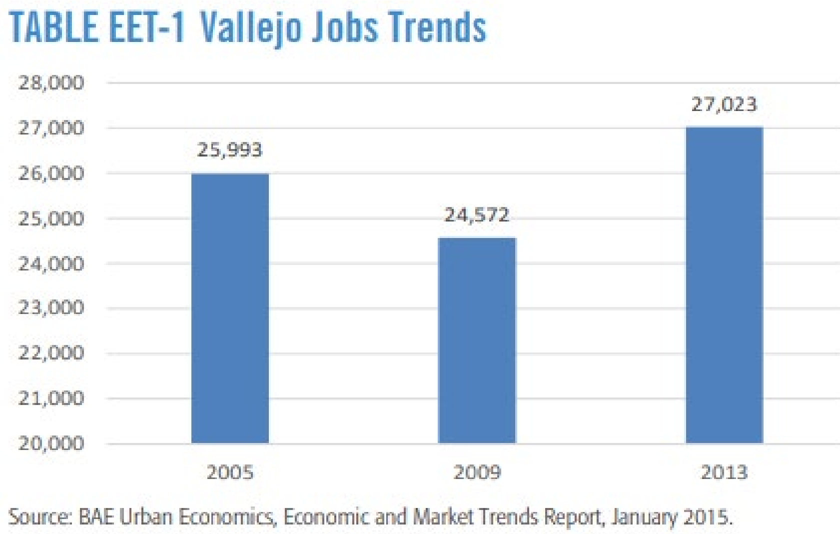


Figure CC-28. Vallejo Job Trends

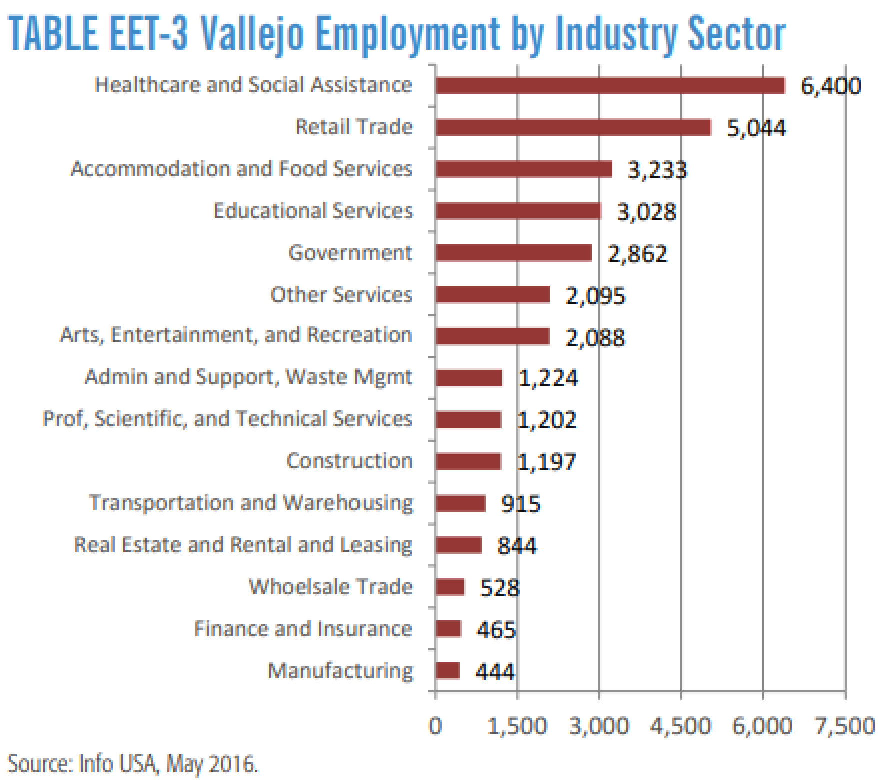


Figure CC-29. Vallejo Employment by Industry

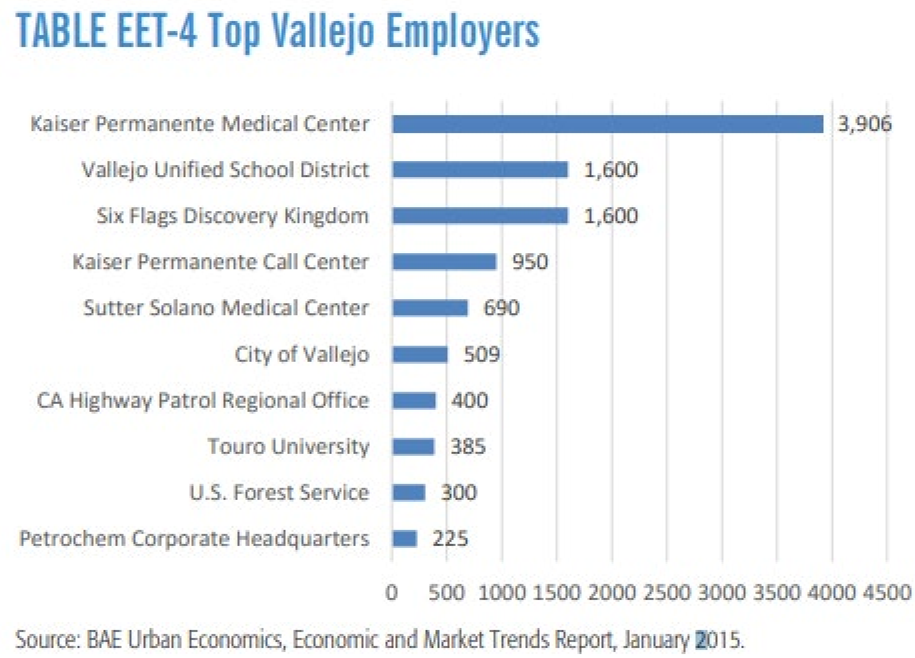


Figure CC-30. Vallejo Top Employers

However, at 11.7percent Vallejo's unemployment is higher than Solano County, the Bay Area, and California and is the highest of the four cities compared in this section. Vallejo also has the lowest median household income and per-capita income in the four cities, which are $73,869 and $32,826, respectively. In 2012, Vallejo was home to 6,703 firms. Approximately 64.1percent of the city's population is in the civilian labor force. Vallejo has the highest unemployment rate in the region, at 8.8percent (US Census 2022).

Growth Patterns

Originally settled by the Native American Patwin and Carquin peoples, the town of Vallejo was eventually built by European colonizers with streets laid out in a simple grid pattern along the waterfront. When California gained statehood in 1850, General Mariano Guadalupe Vallejo donated 156 acres of land to the United States, and for three years the city was the seat of state government. In the early days, growth was slow but with the establishment of the first west coast U.S. naval facility on Mare Island in 1854 and the arrival of the transcontinental railroad in 1870, the population and the local economy began to grow. The waterfront played a pivotal role in the history of the city, and its commercial importance brought prosperity to Vallejo (City of Vallejo 2017).

Rail connections to agricultural areas made Vallejo the nation's largest wheat shipping port in the late nineteenth century. The Navy became the primary contributor to the local economy during World War II, as the local population swelled from 20,000 residents in 1940 to 90,000 in 1945. Development in the early twentieth century was concentrated near the waterfront, across the Napa River from the shipyard. The downtown area was rebuilt with two- and three-story buildings between 1910 and 1920; however, the development of highways and freeways began to change the local land use pattern. SR 37, running 21 miles along the northern shore of San Pablo Bay, was built in 1917, connecting Vallejo to Novato (City of Vallejo 2017).

The economic downturn of the 1990s and the closure of the Mare Island Shipyard in 1996 negatively affected the local economy. Activity in the downtown area continued to decline over the 20 years that followed. Recent investments in the downtown and waterfront area, including development of the Vallejo Station intermodal transit complex, support downtown revitalization and continue to recognize the waterfront as a critical asset for the community. Attraction and support of a now thriving population of artists and entrepreneurs in and around downtown and Mare Island has signaled an upsurgence in the economic and cultural identity of the city (City of Vallejo 2017).

According to Plan Bay Area 2050, much of the growth affecting the corridor will occur in PDAs, which includes Vallejo. Unlike its neighboring geographies in the North Bay, Vallejo has a growing young adult population, with the proportion of residents between the ages of 18 and 35 increasing much faster than all of Bay Area since 2000.

4.3 Next Steps

In screening alternatives to carry forward from the PEL process, it is advisable to consider how alternatives would foster or impede growth within PDAs or conflict with PPAs. Population and job growth along the I-80 corridor in Solano, as well as proposed development on Mare Island may affect SR 37.

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Chapter 5
Conversion of Land Assessment of Existing Conditions

This chapter describes existing land use in the SR 37 PEL Study Area.

5.1 Methodology

5.1.1 Data Gathering and Analysis Approach

This chapter summarizes information about existing land use and zoning from county and municipal land use planning documents and geographic information system (GIS) data to summarize the existing conditions of land use within the SR 37 PEL Study Area.

5.2 Existing Conditions

The land within the SR 37 PEL Study Area falls within the jurisdiction of Marin, Sonoma, Napa, and Solano counties, as well as the cities of Petaluma, Novato, American Canyon, Napa, and Vallejo. Figure CoL-1 illustrates zoning within unincorporated Marin County, the City of Novato, unincorporated Sonoma County, and the City of Petaluma. Figure CoL-2 shows the zoning designations within unincorporated Sonoma County, unincorporated Napa County, the City of Napa, and the city of American Canyon. Figure CoL-3 illustrates zoning within unincorporated Napa County, the City of Napa, the City of American Canyon, unincorporated Solano County, and the City of Vallejo. The existing land uses within each of these counties and cities are described in further detail below and organized by jurisdictional entity.

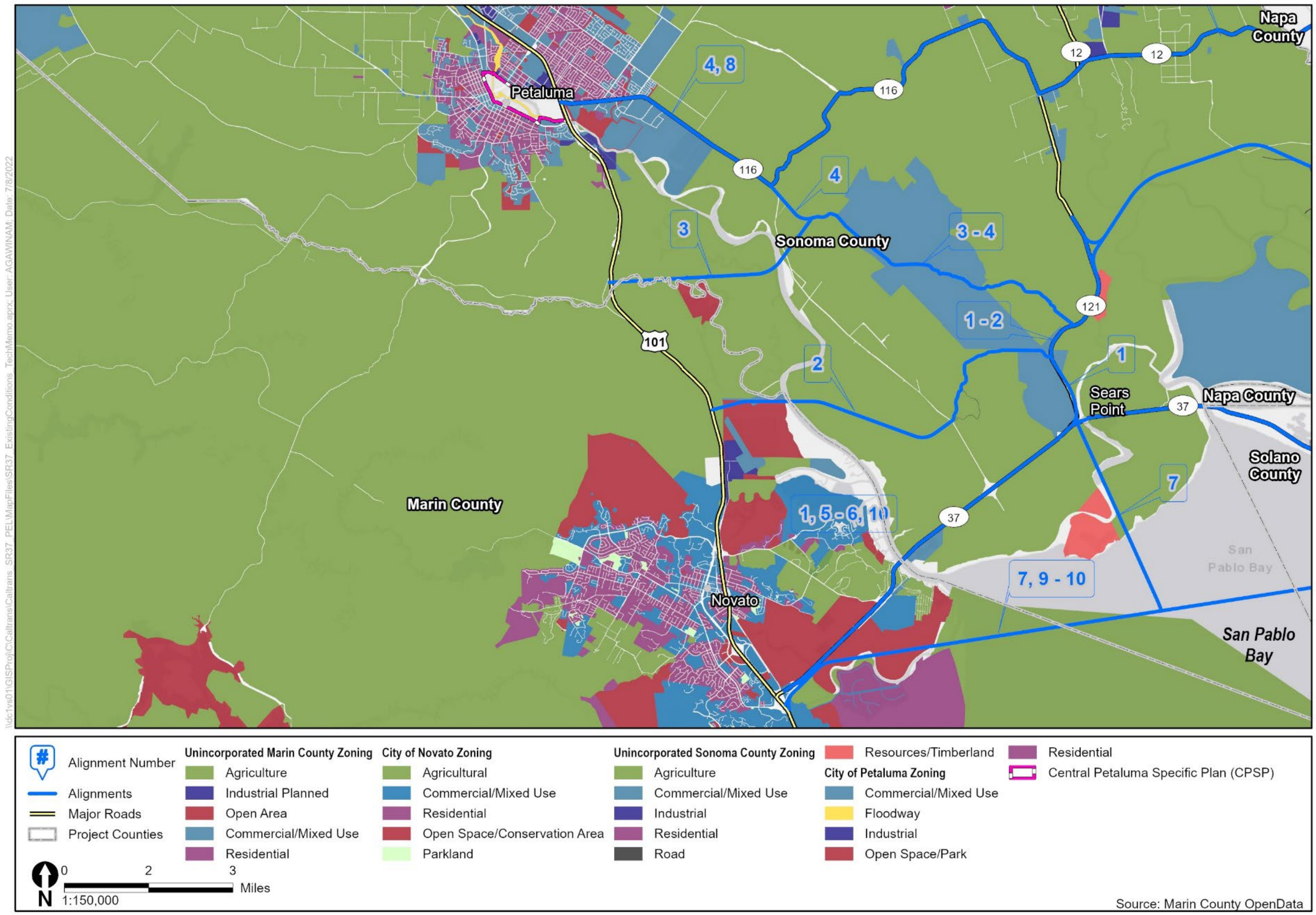

Figure CoL-1. Marin and Sonoma County Zoning Map

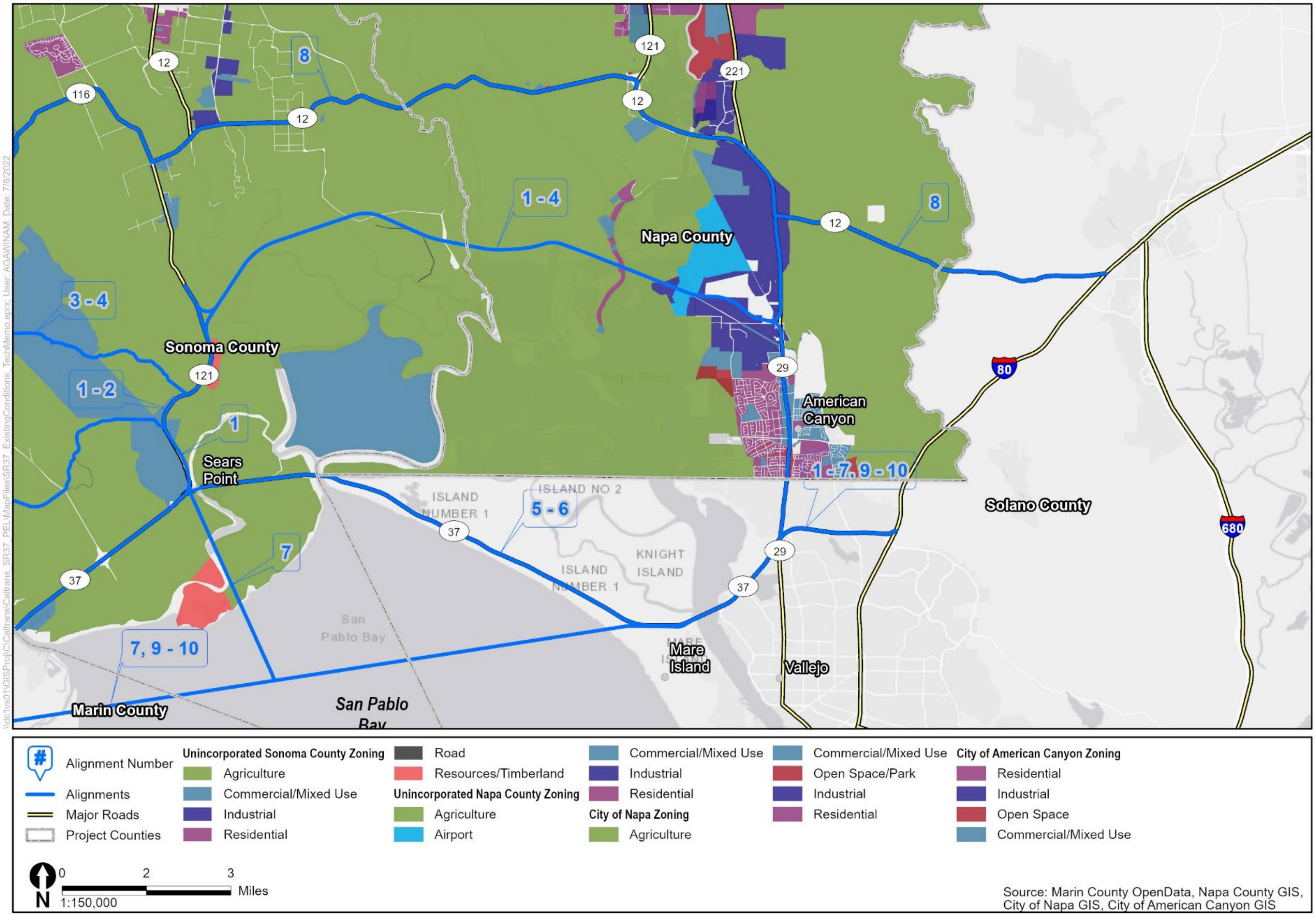

Figure CoL-2. Sonoma County and Napa County Zoning Map

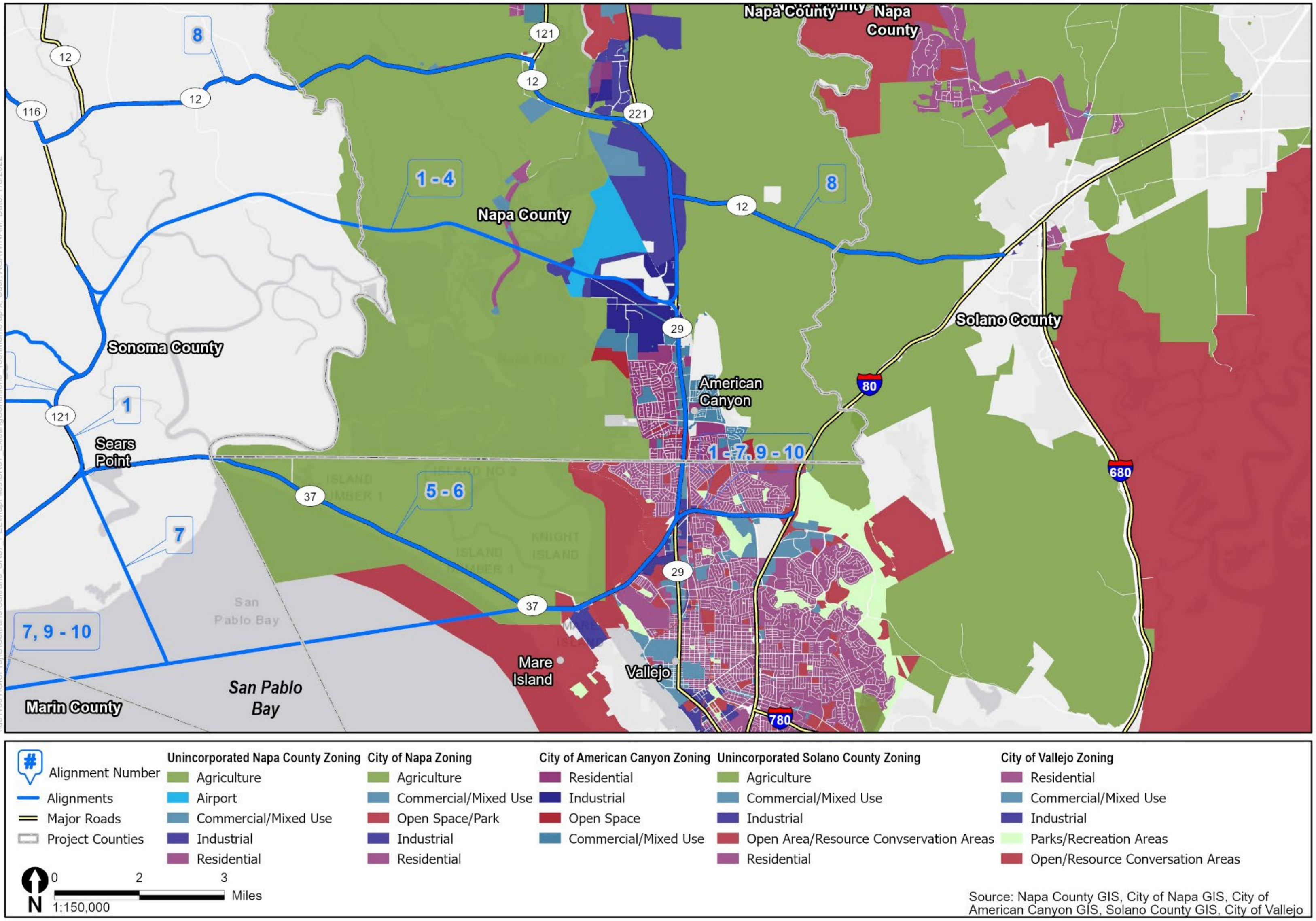

Figure CoL-3. Napa County and Solano County Zoning Map

5.3 County Land Use and Zoning

5.3.1 Marin County

The SR 37 PEL Study Area is located within the Novato planning area of the *Marin Countywide Plan* which guides land use within unincorporated portions of Marin County (Marin County 2014). The alignments under consideration would cross lands primarily zoned for agriculture and open areas for environmental preservation (Marin County 2014; Marin County 2022). The considered alignments also span lands zoned for resort and commercial recreation purposes, which are intended for resort facilities that provide access to public recreational areas and adjacent developed areas (Marin County 2014; Marin County 2022).

5.3.2 Sonoma County

Sonoma County's General Plan directs the patterns of land use throughout unincorporated Sonoma County (Sonoma County 2022a). The alignments would mainly require new ROW across land zoned for recreation and visitor-serving commercial purposes (Sonoma County 2022b). In addition, Alignment 3 would span land zoned for public facilities (Sonoma County 2022b).

5.3.3 Napa County

The *Napa County General Plan* serves as a framework for land use planning and development within unincorporated Napa County (Napa County 2008). The alignments would mainly require new ROW on land zoned for agricultural watershed purposes where new development is restricted because development could adversely impact existing agriculture and watershed preservation (Napa County 2015; Napa County 2022). Alignments 1 through 4 would also cross land zoned for low-density residential development (Napa County 2022).

Additionally, Alignments 1 through 4 and 8 would require new ROW on land zoned for industrial purposes near the Napa County Airport (Napa County 2022). Alignments 1 through 4 also cross land zoned for airport purposes where development is restricted to ensure land use would not conflict with airport operations (Napa County 2015; Napa County 2022).

Alignment 8 would span land zoned for commercial limited purposes, which is intended to establish areas for tourist services (Napa County 2015; Napa County 2022). Alignment 8 would also require new ROW on land zoned for planned developments, such as townhomes or condominiums with close access to common use space, commercial properties, and recreational areas (Napa County 2015; Napa County 2022).

5.3.4 Solano County

The *Solano County General Plan* guides current and future land development and establishes conservation policies in unincorporated Solano County (Solano County 2008). Alignment 7 would require new ROW on land currently zoned for agricultural purposes before it ties into existing Caltrans ROW on SR 37 (Solano County 2022). Alignments 5 and 6 also would enter Solano County.

Although the alignment would follow existing Caltrans ROW on SR 37, new ROW within Solano County may be necessary.

5.4 City Land Use and Zoning

5.4.1 City of Petaluma

The *City of Petaluma: General Plan 2025* identifies Petaluma's vision for long-range land use planning, economic development, and resource conservation (City of Petaluma 2021). Alignments 4 and 8 would enter the city limits of Petaluma. Although the alignment would follow the existing California Department of Transportation (Caltrans) ROW on SR 116, new ROW within the City of Petaluma may be necessary. Alignments 4 and 8 would terminate at the boundary of the Central Petaluma Specific Plan, which guides land use planning within the central downtown area of Petaluma.

5.4.2 City of Novato

The *City of Novato General Plan 2035* establishes goals and policies for land use planning within the city limits of Novato in Marin County (City of Novato 2020). Alignments 7, 9, and 10 would require new right-of-way (ROW) within Novato on land that is zoned for open space and community facilities (City of Novato 2019).

5.4.3 City of American Canyon

The *General Plan for the City of American Canyon* guides current and future land use within its city limits (City of American Canyon 1994). Alignments 1 through 4 would cross lands within American Canyon that are zoned for light and general industrial use south of the Napa County Airport and west of where the alignments would tie into existing Caltrans ROW on SR 29 (City of American Canyon 2015).

5.4.4 City of Napa

The *City of Napa General Plan* is a comprehensive and long-term land use planning document for development within Napa's city limits (City of Napa 2015). Alignment 8 would enter the city limits of Napa. Although the alignment would follow existing Caltrans ROW on SR 12, new ROW within the City of Napa may be necessary.

5.4.5 City of Vallejo

The *Propel Vallejo General Plan* is the land use planning document that directs economic development and resource conservation within the city limits of Vallejo (City of Vallejo 2017). Alignments 7, 9, and 10 would require new ROW on land currently zoned for resource conservation and public and semi-public uses within Vallejo before it ties into existing Caltrans ROW on SR 37 (City of Vallejo 2022). Alignments 5 and 6 also would enter the city limits of Vallejo. Although the alignments would follow existing Caltrans ROW on SR 37, new ROW within Vallejo may be necessary.

5.5 Next Steps

The SR 37 PEL Study should evaluate the conformance of the proposed alignments with applicable goals and objectives of land use planning documents. For any alignments that would require acquisition of property for new ROW, Caltrans must adhere to the requirements in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

As future projects are programmed from the SR 37 PEL Study, potential land use impacts should be evaluated as applicable in a National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) analysis. The NEPA/CEQA analysis would evaluate new ROW needs, property acquisitions or displacements, conformance with applicable land use planning documents, and impacts to the surrounding existing land use and development within the vicinity of the project. The NEPA/CEQA evaluation process would provide a more detailed determination regarding potential impacts to existing land use and identify any appropriate mitigation measures.

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Chapter 6
Cultural Resources

This chapter provides a ranking for each of the proposed alignments based on their potential to effect cultural resources within the SR 37 PEL Study Area. The alignments are ranked from most preferred to least preferred.

6.1 Methodology

Caltrans Office of Cultural Resource Studies (OCRS) Professionally Qualified Staff (PQS) Kathryn Rose, Principal Investigator – Prehistoric Archaeology and Helen Blackmore, Principal Architectural Historian reviewed the Caltrans Cultural Resource Database, records from the Northwest Information Center, along with geoarchaeological sensitivity mapping for surface, buried and submerged resources. The alignments were ranked based on the potential to encounter cultural resources, the number of resources potentially effected and the degree to which the resources would be affected.

6.2 Existing Conditions

The proposed alignments were ranked from most preferred to least preferred based on the potential to encounter cultural resources, the number of resources potentially effected and the degree to which the resources would be affected. As noted below, all alignments have the potential to adversely affect cultural resources.

6.2.1 Potential to Affect Cultural Resources

- Alignments 9/10 have the potential to effect unrecorded built environment resources on the western end of the SR 37 Study Area and Mare Island Naval Historic District on the east, which is listed on the National Register. This alignment would require evaluation of linear features (levees) and has the potential to adversely affect cultural resources if they were determined historic properties. Additionally, the alignment has the potential to effect unrecorded submerged archaeological resources.
- Alignment 8, by utilizing existing roads the project reduces the potential to effect built environment resources. There are known archaeological sites along this alignment and effects will depend on construction impacts, therefore there is a potential to adversely affect cultural resources.
- Alignment 7, similar to Alignment 9/10, has the the potential to effect unrecorded built environment resources on the western end of the SR 37 Study Area and Mare Island Naval Historic District on the east, which is listed on the National Register. . However, this alignment also has the potential to adversely affect additional cultural resources, including a known archeological site where the alignment goes north to meet SR 121.

- Alignments 5/6 have the potential to adversely affect unevaluated built resources (levees), as well as known archaeological sites. Additionally, there is moderate sensitivity for unrecorded archaeological resources between US-101 and SR-121.

6.2.2 High Potential to Affect Cultural Resources

- Alignment 1 could adversely affect a potential historic resource (railroad), as well as requiring other large-scale evaluations of linear features such as levees and sloughs, which may cause additional adverse effects to built environment resources. There are known archaeological sites throughout this alignment that would require evaluation. There is moderate sensitivity for unrecorded archaeological resources between US-101 and SR-121. Additionally, there is the potential to encounter submerged archaeological resources. The alignment has a high potential to adversely affect cultural resources.
- Alignment 4 could adversely affect a potential historic resource (railroad), as well as requiring other large-scale evaluations of linear features such as levees and sloughs, which may cause additional adverse effects to built environment resources. There are known archaeological sites throughout this alignment that would require evaluation. Additionally, the alignment passes through a recorded archaeological district, and would require extensive tribal consultation. The alignment has a high potential to adversely affect cultural resources.
- Alignment 3 has the same potential effects as Alignment 4; however, this alignment would require additional evaluation of cultural resources increasing the potential for adverse effects. The alignment has a high potential to adversely affect cultural resources.
- Alignment 2 could adversely affect a potential historic resource (railroad), as well as requiring other large-scale evaluations of linear features such as levees and sloughs, which may cause additional adverse effects to built environment resources. There are known archaeological sites throughout this alignment that would require evaluation. Additionally, the alignment passes through recorded archaeological sites, and would require extensive tribal consultation. The alignment has a high potential to adversely affect cultural resources.

6.3 Next Steps

The evaluation conducted by Caltrans indicates that there is the potential to encounter a wide range of cultural resources including built environment resources such as historic districts, railroads, levees and other features, and historic and prehistoric archaeological sites. All alignments have the potential to adversely affect cultural resources and would require extensive consultation with stakeholders including Native American Tribes. Until the evaluation and identification of cultural resources is complete effects cannot be fully determined.

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Chapter 7
Extreme Events

This chapter describes extreme natural events within the SR 37 PEL Study Area such as heat waves, droughts, wildfire or any other climatic event that may pose a higher risk to the corridor under the changes anticipated from climate change. Risks related to earthquakes and other geologic and seismic activity are covered under geology and soils. Unlike study areas for other existing conditions chapters, which focus on the area of impact that the route and proposed alignments may have on the resource topic (e.g., air quality is affected throughout the basin; archaeological resources are affected by the construction footprint), the SR 37 PEL Study Area for extreme events and climate must consider the impact of such events *on* the route and proposed alignments. Therefore, the SR 37 PEL Study Area for this chapter captures the current route and all proposed alignments, with enough area to consider nearby hazards that may affect the corridor (e.g., floodplains; wildfire hazard zones). Extreme events in the Study Area are described in more detail below.

7.1 Methodology

The existing conditions report was drafted based on review of data sets from Cal-Adapt, the Fourth California Climate Assessment, and other publicly available information. Refer to Section 4, *References*, for a complete list of information cited herein.

7.2 Existing Conditions

The information presented in this report describes how climate-related extreme events have historically occurred in the Study Area and estimates of future conditions due to climate change. Climate change is influenced by levels of greenhouse gas emissions, and future emission scenarios are captured with *representative concentration pathways* (RCPs). RCPs show a possible time series of concentrations of greenhouse gases, aerosols, and chemically active gases in the atmosphere, as well as land use/land cover (all of which influence the rate of climate change) to estimate the degree of climate change expected over time (IPCC n.d.). RCP 4.5 is a medium emissions scenario, and RCP 8.5 is a high emissions scenario. Both scenarios are used frequently in the climate resilience field to capture a range of possible future outcomes. This report provides estimates of future conditions under both scenarios.

7.2.1 Extreme Heat

Extreme heat events can include extended heat waves, very hot days, and other high temperature conditions that have various health, infrastructure, environmental, and other effects. Transportation infrastructure can experience a more rapid rate of wear and tear from regular exposure to extreme heat, thus requiring more frequent maintenance and replacement. For example, asphalt expands and softens under high heat conditions, which can lead to increased rutting and migration of liquid asphalt (AASHTO 2015). Bridge infrastructure can become stressed through increased expansion of bridge joints and paved surfaces (AASHTO 2015). Additionally, extreme heat poses a health risk to outdoor workers, so construction and maintenance teams may have to work earlier or later in the day, in shorter shifts, and with more frequent breaks to avoid heat illness (AASHTO 2015; OSHA 2022).

There are multiple ways to measure extreme heat events. For the purpose of this existing conditions assessment, we use Cal-Adapt's definition of extreme heat days: the number of days with maximum temperature above the 98th percentile value of historical (1961–1990) daily maximum temperatures observed in each county between April and October. Therefore, the threshold temperature to define "extreme heat days" varies by location. These are not calculated as consecutive days.

Table EE-1 presents observed historical and modeled future conditions for extreme heat for each county in the Study Area (UC Berkeley 2018). The values represent number of days per year with temperatures above the 98th percentile daily temperature for that county, averaged across a 30-year period. The future values show the range of results from the medium emissions (RCP 4.5) to the high emissions (RCP 8.5) scenarios.

Table EE-1. Historical and Future Annual Extreme Heat Days, by County

County (98th percentile threshold)	Historical (1961–1990)	Mid-Century (2035–2064)	Late Century (2070–2099)
Marin County (94.4°F)	4 days	8–10	11–20
Sonoma County (93.9°F)	4	10–12	13–23
Napa County (98.6°F)	4	15–18	20–35
Solano County (100.2°F)	4	17–21	22–39

Source: UC Berkeley 2018. The range of values under mid-century and late-century projections correspond to average projected values under the medium emissions (RCP 4.5) and high emissions (RCP 8.5) scenarios.

By definition, the region experiences four days per year with temperatures above the 98th percentile threshold (between April and October). Climate change is expected to increase the number of extreme heat days. By mid-century (2035–2064), the Study Area can expect to experience about 1 to 3 weeks per year with temperatures that are currently considered at the 98th percentile (~94–100 degrees Fahrenheit [°F]); by late century (2070–2099), the Study Area can expect to experience about 1.5 to 5.5 weeks of such temperatures.

Extreme heat can take many forms that vary in duration and severity, from extreme heat days to extended heat waves. The data presented here show one way to measure extreme heat and how that is expected to change in the future. Climate change is resulting in extreme heat events and average temperature increases. However, temperature, particularly throughout individual years and from year to year, will continue to vary.

The increased frequency of extreme heat days will have implications for the region, including health risks for outdoor workers, pedestrians,cyclists, and transit users, and increased risk for infrastructural impacts such as pavement softening and bridge span widening. Table 4 in the 'Next Steps' section at the end of this report provides considerations for decision making.

Further, the heat index is an important factor in understanding how high temperatures lead to impacts on people. The heat index is the "feels like" temperature and combines relative humidity with air temperature. Humidity is important to consider in addition to the air temperatures shown in Table EE-1, as increased humidity reduces the human body's ability to sweat in order to thermoregulate; therefore, increased humidity (and an increased heat index) is more dangerous (NWS n.d.). Climate scientists have modeled how the heat index could change in the future due to climate change and found that both the frequency and duration of days with a high heat index will increase due to climate change (Dahl et al. 2019). With this in mind, it is important that decision makers consider how to mitigate heat illness risks both to transportation construction and maintenance workers and to outdoor transportation network users (e.g., cyclists, pedestrians, and transit users).

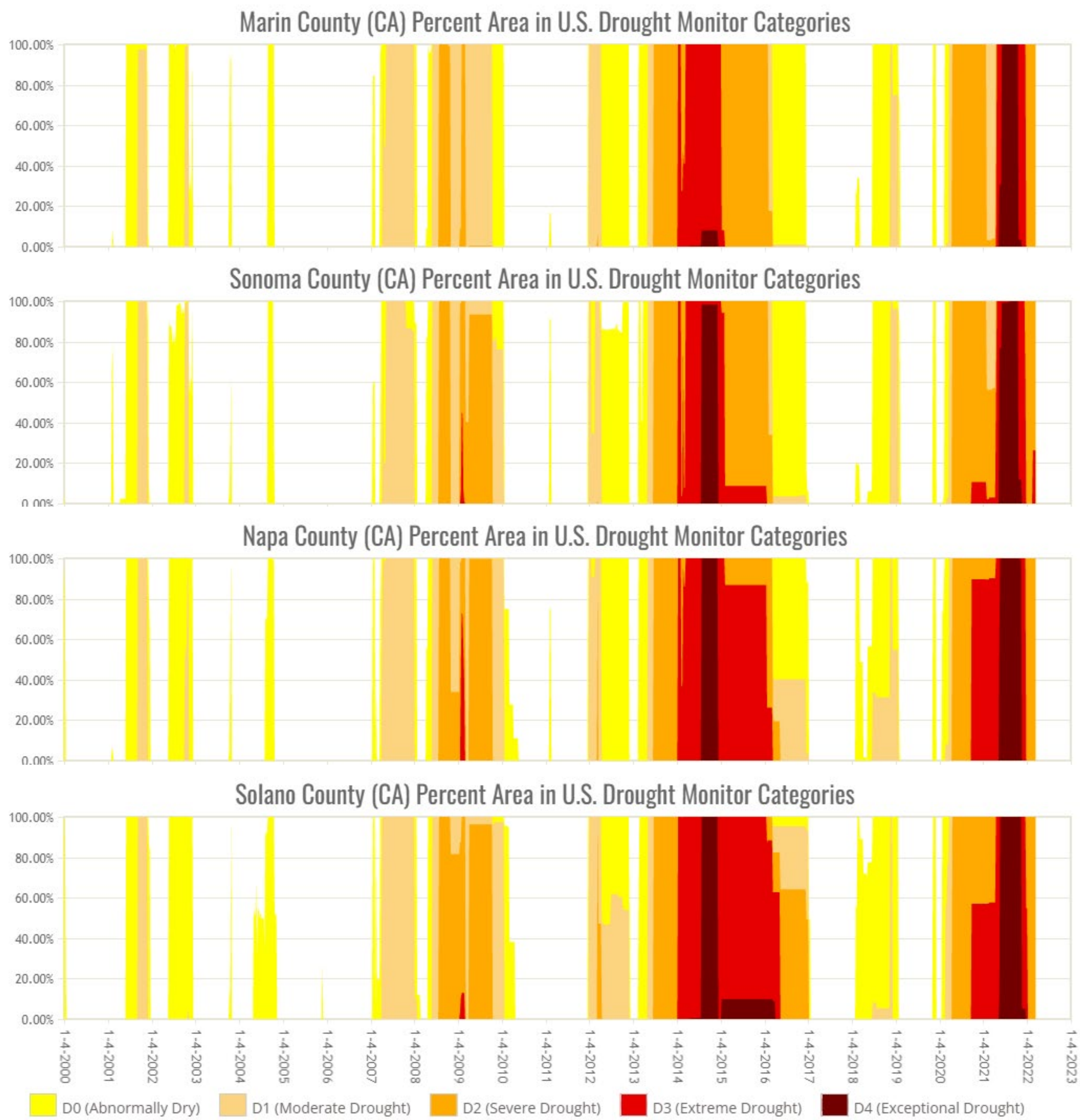
7.2.2 Drought

The Study Area has experienced multiple periods of drought over the past two decades, including 2014–2016 and 2020–2022 (Figure EE-1) (National Drought Mitigation Center 2022). Drought is a relatively geographically uniform phenomenon compared to other hazards (e.g., precipitation and wildfire), with consistent patterns throughout the Study Area. Climate change is expected to increase the likelihood of drought over time (OPR et al. 2018).

There are multiple ways to define and measure drought. For the purpose of projections in this report, analysts used Cal-Adapt's data on the Standardized Precipitation-Evapotranspiration Index (SPEI) as an indicator for drought. SPEI captures the combined impacts of precipitation deficits and potential evapotranspiration on soil moisture and reflects long-term hydrological and ecological drought conditions. A value less than -1 indicates a drought with at least moderate intensity.

Historically, all four counties experienced 0.2 month per year with SPEI of less than -1, or about 6 days per year with moderate drought conditions. The Study Area is projected to experience increasing frequency of such conditions in the future under climate change—between 0.5 and 2.1 months by mid-century (2035–2064) and 0.5 to 3.8 months by late century (2070–2099) (UC Berkeley 2018).

Drought is not expected to directly affect transportation infrastructure (Jacobs et al. 2018). However, drought may indirectly affect the Study Area by influencing streamflow and marsh/wetland habitats around the project, as well as influencing the likelihood of wildfire. Any differential impacts on the various alignments for SR 37 would likely be influenced by other conditions, such as the existing streamflow and marsh/wetland habitats or other wildfire risk factors such as nearby vegetation.



Source: National Drought Mitigation Center 2022

Figure EE-1. Percent Area in Drought over Time, by County

7.2.3 Wildfire

Marin, Sonoma, Napa, and Solano Counties have been affected by large wildfires in the recent past (Mandeno 2021), with the Nuns Fire in 2017 overlapping with the proposed Alignment #8 along SR 12 (SF Chronicle 2017) and another wildfire in October 2017 growing to 2,000 acres and burning near the current SR 37 at Sears Point (SF Gate 2017).

According to California Department of Forestry and Fire Protection's (CAL FIRE) fire hazard severity zone maps (CAL FIRE 2007), the Study Area and alignments are currently exposed to fire hazard zones. The current route and all alignments except Alignment 9 currently face some level of fire risk (Table EE-2), with Alignment 8 facing the greatest risk at 16.2 miles total.

Table EE-2. Miles of Each Alignment Exposed to Moderate and High Fire Hazard Severity Zones in the Study Area

	Proposed Alignments								
Fire Hazard Severity Zone	**1**	**2**	**3**	**4**	**5/6**	**7**	**8**	**9**	**10**
Moderate (miles)	2.4	3.8	7.6	7.1	1.2	0.6	8.5	0.0	1.1
High (miles)	0.9	0.0	0.0	0.2	0.9	0.0	7.7	0.0	0.9
Total	3.3	3.8	7.6	7.3	2.1	0.6	16.2	0.0	2.0

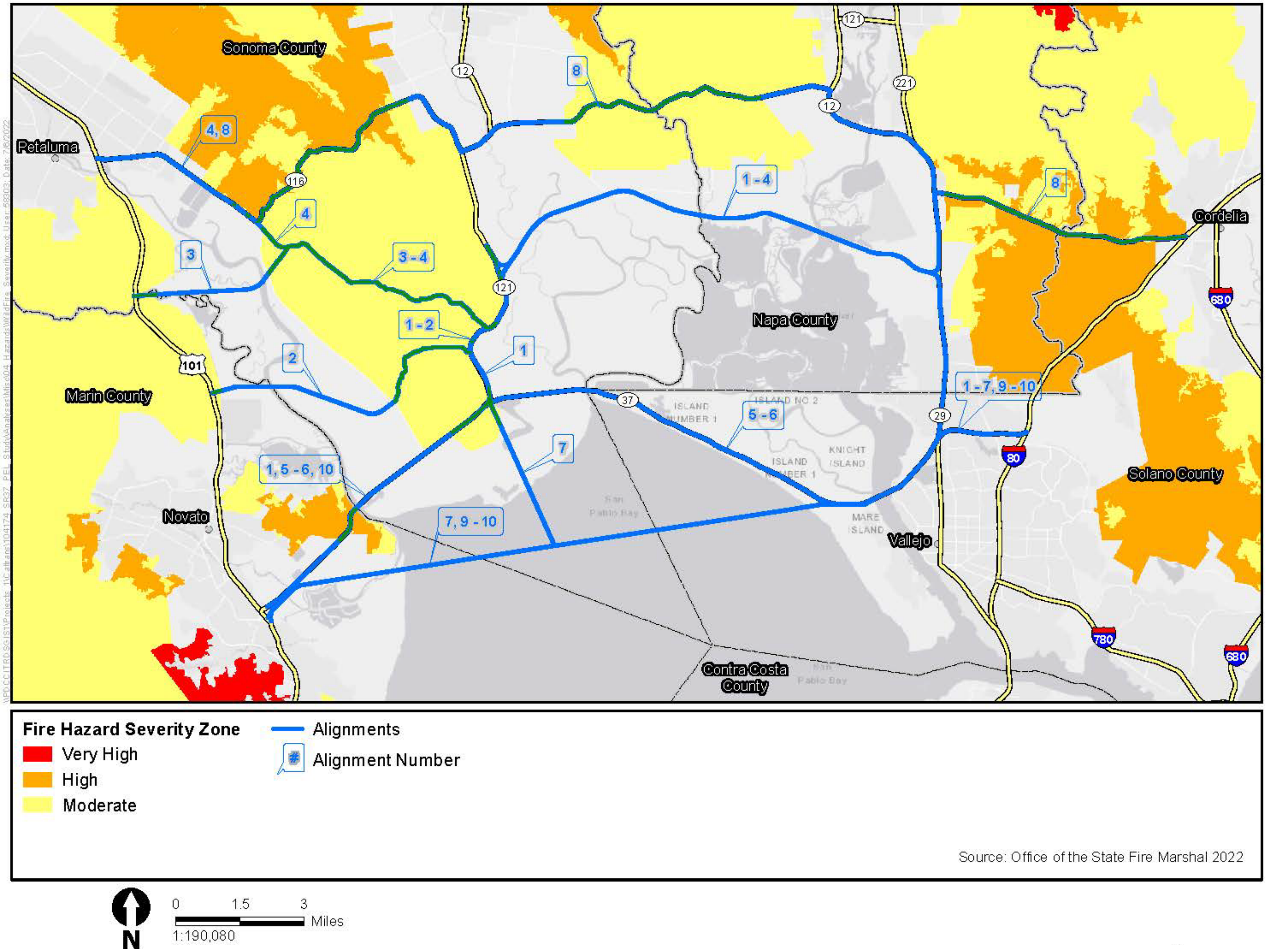


Figure EE-2. Wildfire Hazard Severity Zones

Wildfire risk is present in the Study Area and is projected to increase with climate change, with areas that are currently at risk likely to face continued and potentially more intense risk in the future. Climate change is projected to increase the frequency and intensity of wildfires in the area (OPR et al. 2018). Cal-Adapt has estimated future area burned[1] as a metric for estimating future wildfire and comparing to current conditions (Westerling 2018). Cal-Adapt's findings indicate that the risk of wildfire will be present in the Study Area and is projected to increase relative to current conditions due to climate change under both a medium (RCP 4.5) and high (RCP 8.5) emissions scenario. The same study also found that the largest impact of climate change on wildfires is on the frequency and size of extreme wildfire events (Westerling 2018). For example, fires greater than 10,000 hectares could occur nearly 50% more often statewide by end of century under a high emissions scenario (RCP 8.5) compared to current conditions (Westerling 2018).

Wildfires pose a threat to the Study Area by physically damaging infrastructure, altering the landscape, and preventing users from being able to access or use the route, which could have negative consequences for human health and safety in the event of an evacuation. In particular, the existing SR 37 route plays an important role in wildfire evacuation, so ensuring the chosen alignment is resilient to wildfire is important for overall resilience of the area's population.

7.2.4 Other Extreme Events

Other extreme events relevant to the Study Area include seismic events and flooding. Seismic events are discussed further in the existing conditions report on geology and soils.

Flooding has previously occurred in the Study Area due to storms and high tides. For example, king tides up to eight feet overtopped levees and resulted in SR 37 flooding and experiencing closures for 13 days total in January 2017 (McElhinney 2017).

Creek crossings in particular have faced flooding risk in the past; Novato Creek has flooded multiple times, closing SR 37 for 20 days in February 1996, 21 days in January 2005, 1 day in December 2014, and for nearly a month in January–February 2017. In February 2019, heavy rains flooded the highway twice near Novato Creek. Other flood-prone sites exist along Tubbs Island and Mare Island (Quackenbush 2019). Caltrans has implemented interim repairs following flood events in order to quickly restore highway service. For example, following the 2019 flood, County staff installed a temporary dam where the levee was breached, and Caltrans built a waterproof barrier along the highway to allow closed lanes to reopen.

Climate change is expected to make flooding events more frequent and more intense due to sea-level rise and changing precipitation patterns. The floodplains existing conditions report provides further detail on sea-level rise and expected future changes in flooding.

However, sea-level rise is a continual, gradual risk that is building over time, while flooding as an extreme event can happen at any time, including the immediate future. Sea-level rise does not create the threat of flooding, but rather exacerbates it.

[1] This variable presents the area that is expected to be at risk of burning in a given year due to a variety of factors, including future climate scenarios, population and development footprints, and fuel treatment scenarios.

7.3 Next Steps

The SR 37 PEL Study should consider how the extreme conditions described above could affect the infrastructure and users of SR 37 and assess alignments that integrate resilience to these conditions. For example, extreme heat will be an important consideration in the design of bicycle, pedestrian, and transit options in the corridor to ensure adequate shading and green space that will enable these modes to be viable long-term options, even in warm months. Flooding and wildfire are well-known threats to the Study Area and will increase in intensity and likelihood in the future, and so alignments and design will need to take this into account.

Table EE-3. Considerations for Decision Making Based on Impacts of Extreme Natural Events on Proposed Alignments

Extreme Natural Event	Impact on Alignments

Extreme heat	• All counties (and therefore all alignments) are subject to increases in intensity and duration of extreme heat.
	• The integration of heat resilience measures could include but are not limited to:
	  ○ More heat-resistant pavement types
	  ○ Green infrastructure along routes to provide cooling benefits
	  ○ Shaded bike/pedestrian/transit routes to protect users from heat illness
	  ○ Modified construction schedules to protect workers from heat illness
	• All alignments should plan for increased costs of future maintenance due to increased rate of wear and tear.

Drought	• Drought is not expected to directly affect transportation infrastructure. • All alignments face similar exposure to drought.
Wildfire	• The current route and all alignments except Alignment 9 currently face some level of fire risk. • Alignment 8 overlaps with area along SR 12 burned by the Nuns Fire in 2017 and is the alignment with the greatest exposure to current fire hazard severity zones. • All alignments should plan for resilience measures to wildfire (e.g., setbacks, vegetative maintenance). • Selection of an alternative should take into account the ability to serve as an evacuation route.
Other extreme events	• Inland flooding is a risk, particularly near bodies of water (e.g., near Novato Creek, Tubbs Island, and Mare Island). • Alignments with fewer water crossings will face lower risk of flooding. • All alignments should consider measures for bolstering resilience to inland flooding (e.g., raising the road, ensuring adequate drainage, planting bioswales and other green infrastructure to help slow and absorb stormwater).

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Chapter 8
Floodplains

This chapter describes the existing floodplains, areas that experience periodic flooding, watersheds, surface water, and groundwater in the SR 37 PEL Study Area.

8.1 Methodology

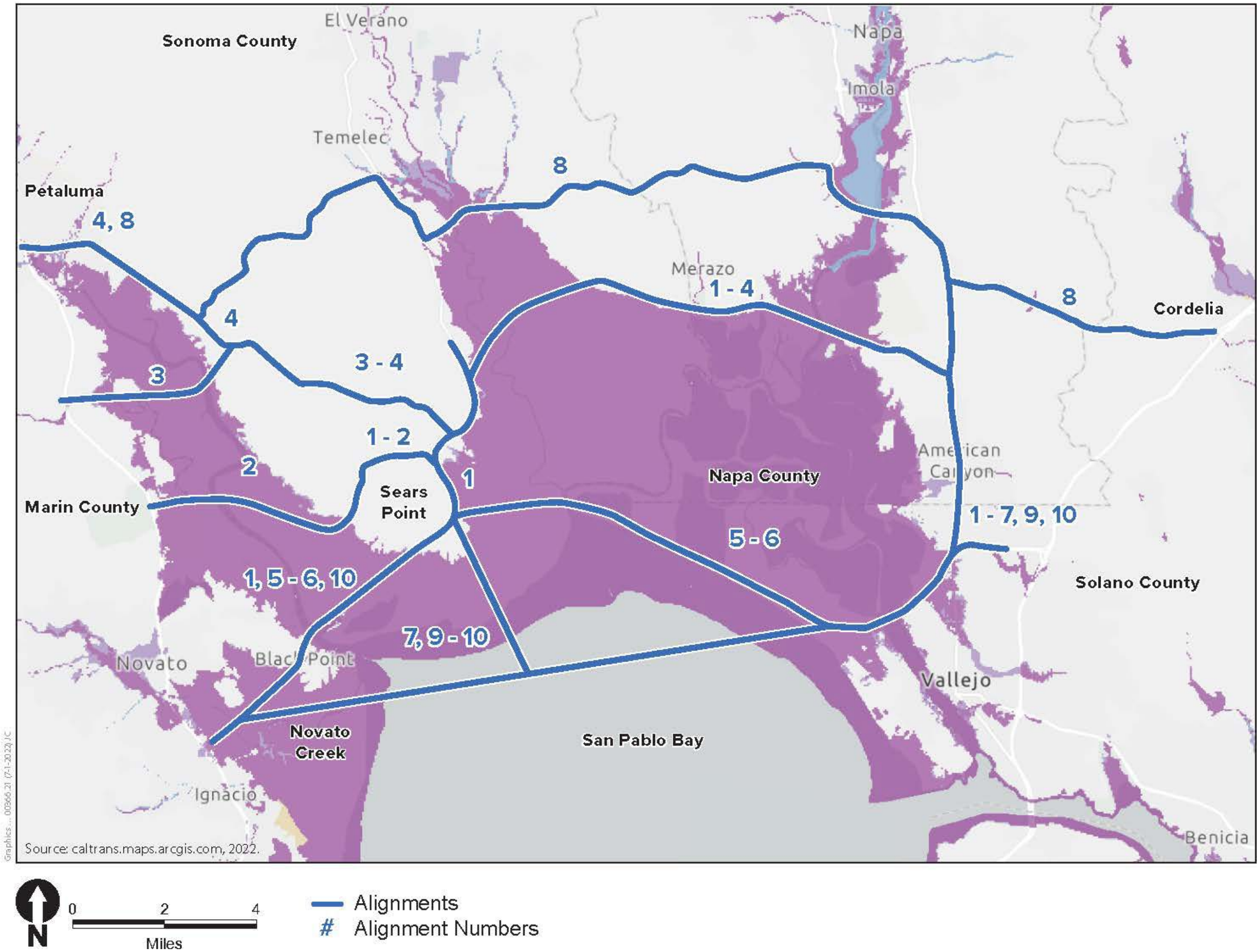
The existing conditions report was drafted based on review of state and federal spatial datasets and publicly available information pertinent to floodplains and water resources. Refer to Section 4, *References*, for a complete list of information cited herein.

8.2 Existing Conditions

8.2.1 Floodplains

The Federal Emergency Management Agency (FEMA) identifies flood hazard areas for the purpose of their Flood Insurance Rate Maps. Their Special Flood Hazard Area defines the area that is expected to be inundated by a 1% annual chance (i.e., 100-year, or base flood) flood event. Moderate flood areas define spaces that are beyond the limits of the base flood and would be flooded by the 0.2% annual chance (i.e., 500-year) flood (FEMA n.d.). Figure FP-1 shows the FEMA 100-year (1% annual chance, or special floodway) and 500-year (0.2% annual chance) floodplains in the Study Area (Caltrans 2021).[1] The floodplains surround San Pablo Bay and follow the Novato Creek, Petaluma River, Sonoma Creek and connected sloughs, and Napa River inland. Much of the existing route and potential alternative alignments overlap with the floodplain.

[1] The map also shows the Regulatory Floodway, which according to FEMA denotes “the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height” (FEMA n.d.)



Source: Caltrans 2021

Figure FP-1. FEMA 100- and 500-year Floodplains in the Study Area

FEMA floodplains are based on historical flood likelihoods and do not account for future sea-level rise or changes in precipitation patterns due to climate change, so floodplains over the lifetime of the SR 37 corridor will likely cover a greater area than those currently published by FEMA.

Table FP-1 summarizes projected sea-level rise in the corridor area over time, and the maps below show how future sea-level rise in 2050, 2085, and 2130 could inundate the Study Area, both with and without storm surge. The future increases in sea level were based on California Ocean Protection Council's (OPC) 2018 medium-high risk aversion scenario for the San Francisco tide gauge and are provided for a range of potential future greenhouse gas (GHG) emission scenarios[2] (OPC 2018). OPC defines its medium-high risk aversion scenario as the 1-in-200 chance that sea-level rise will meet or exceed the value for a given timeframe and recommends using this scenario for "less adaptive, more vulnerable projects… that will experience medium to high consequences as a result of underestimating sea-level rise," such as reconstructing a major corridor (OPC 2018). This report presents values for medium-high risk aversion under two climate emissions scenarios: representative concentration pathways (RCP) 2.6, which represents a future with low emissions and stringent mitigation measures, and RCP 8.5, which represents high GHG emissions and little mitigation (OPC 2018). Using these two scenarios provides a useful bracket for possible amounts of future sea-level rise.

Mapping tools available for viewing future sea-level rise flood extents do not exactly match the projections, so the furthest column on the right in Table FP-1 shows the amount of sea-level rise used in the maps to demonstrate flooding associated with the various projections. This discrepancy is due to the fact that OPC 2018 guidance does not provide maps of all of its various sea-level rise projections, and the sea-level rise mapping tools that are available tend to only show discrete increments of sea-level rise (e.g., 12-inch increments from 0 inches to 108 inches) due to the complexity of mapping sea-level rise. The mapping tools used for this report include the Resilient SR-37 Corridor Improvement Project, which provides foot-by-foot inundation levels (12-inch sea-level rise inundation, 24-inch, 36-inch, etc.) (Caltrans 2021) and the Adapting to Rising Tides Bay Shoreline Flood Explorer by the San Francisco Bay Conservation and Development Commission (BCDC), which provides flood mapping of sea-level rise with and without storm surge (BCDC 2018).

Table FP-1. Sea-Level Rise Projections According to the OPC Guidance, and Associated Increments Used for Mapping

Year	OPC Medium-High Risk Aversion Projection		Mapped
2050	N/A[3]	22.8 inches	24 inches
2085	46.8 inches	67.2 inches	48, 66 inches
2130	102 inches	120 inches	108 inches

Source: OPC 2018.

Note: Sea-level rise values are with respect to a baseline of the average relative sea level from 1991 to 2009.

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[2] Climate change is influenced by levels of GHG emissions, and future emission scenarios are captured with representative concentration pathways (RCPs). RCPs show a possible time series of concentrations of GHGs, aerosols, and chemically active gases in the atmosphere, as well as land use/land cover (all of which influence the rate of climate change) to estimate the degree of climate change expected over time (IPCC n.d.). RCP 2.6 is a low emissions scenario, and RCP 8.5 is a high emissions scenario.

[3] For 2030–2050, OPC only reports sea-level rise projections for the high emissions RCP 8.5 scenario, as this scenario matches current conditions more closely than the low emissions RCP 2.6 scenario.

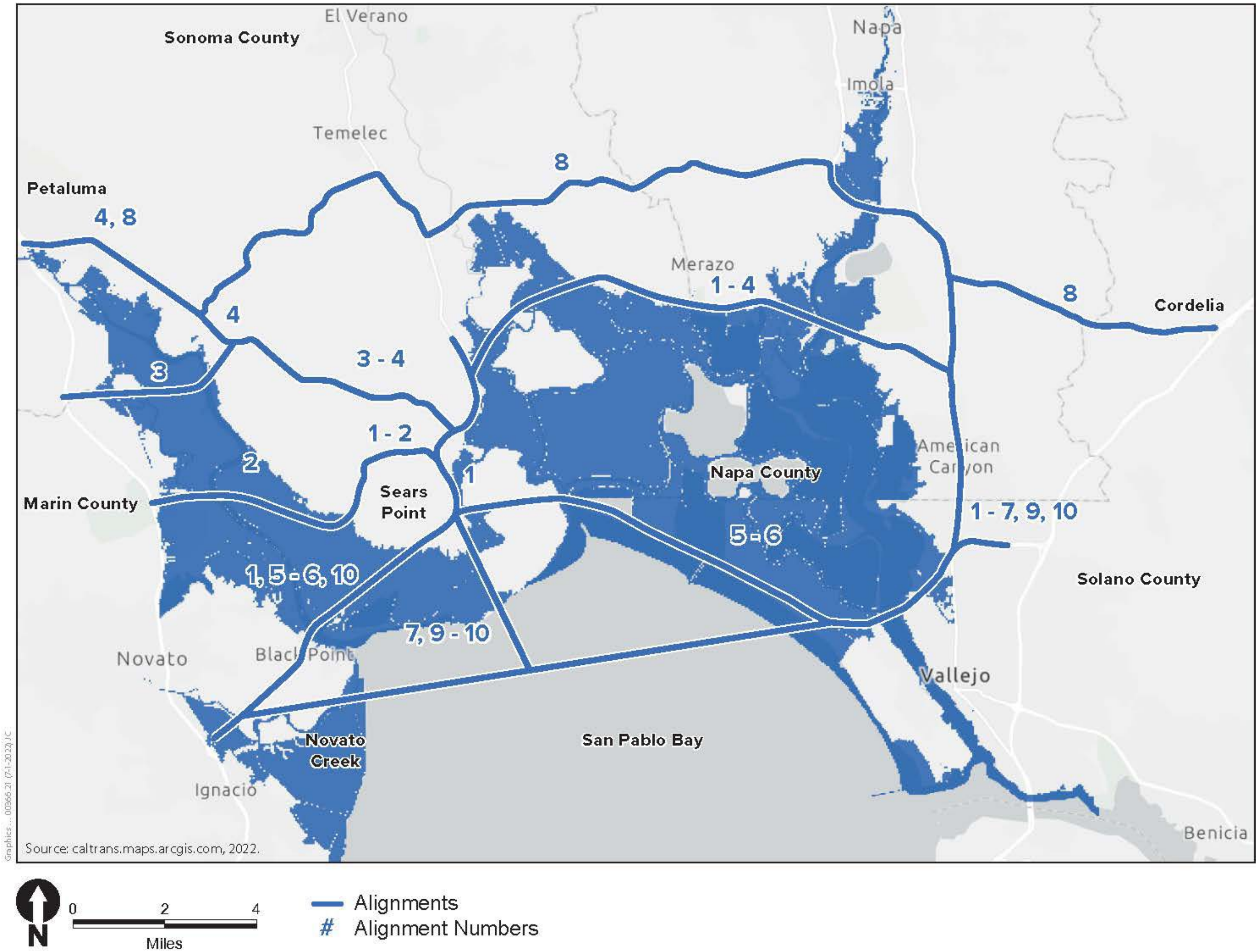
While the increases in sea level shown in Table FP-1 are the recommended values for planning and analysis purposes such as this existing conditions report, the actual sea level may be higher or lower over time, and there is uncertainty inherent in future projections. This uncertainty results from the possibility for different emissions scenarios, assumptions baked into the modeling process, and natural variability in Earth's systems (OPC 2017).

In 2050, 24 inches of sea-level rise are expected to inundate areas of SR 37 along Novato Creek, between Black Point and Sears Point, and along the northeastern shoreline of San Pablo Bay (Figure FP-2). With storm surge from the 100-year storm on top of 24 inches of sea-level rise, nearly all of the existing SR 37 would be flooded (Figure FP-3). Figure FP-3 considers the current 100-year storm. In the future, the 100-year storm (i.e., 1% annual chance storm) is expected to become more intense due to climate change. Therefore, flooding with a future 100-year storm is expected to be greater than what is shown in Figure FP-3.

By 2085, 48–66 inches of sea-level rise would have about the same flood extent as 24 inches + 100-year storm surge, with most of SR 37 experiencing flooding except for portions along Black Point and Sears Point, which have higher elevations. With the 100-year storm surge on top of 48–66 inches of sea-level rise, slightly more area would be flooded, but overall, flooded areas would experience a greater depth of flooding than without storm surge (Figures FP-4, FP-5, and FP-6).

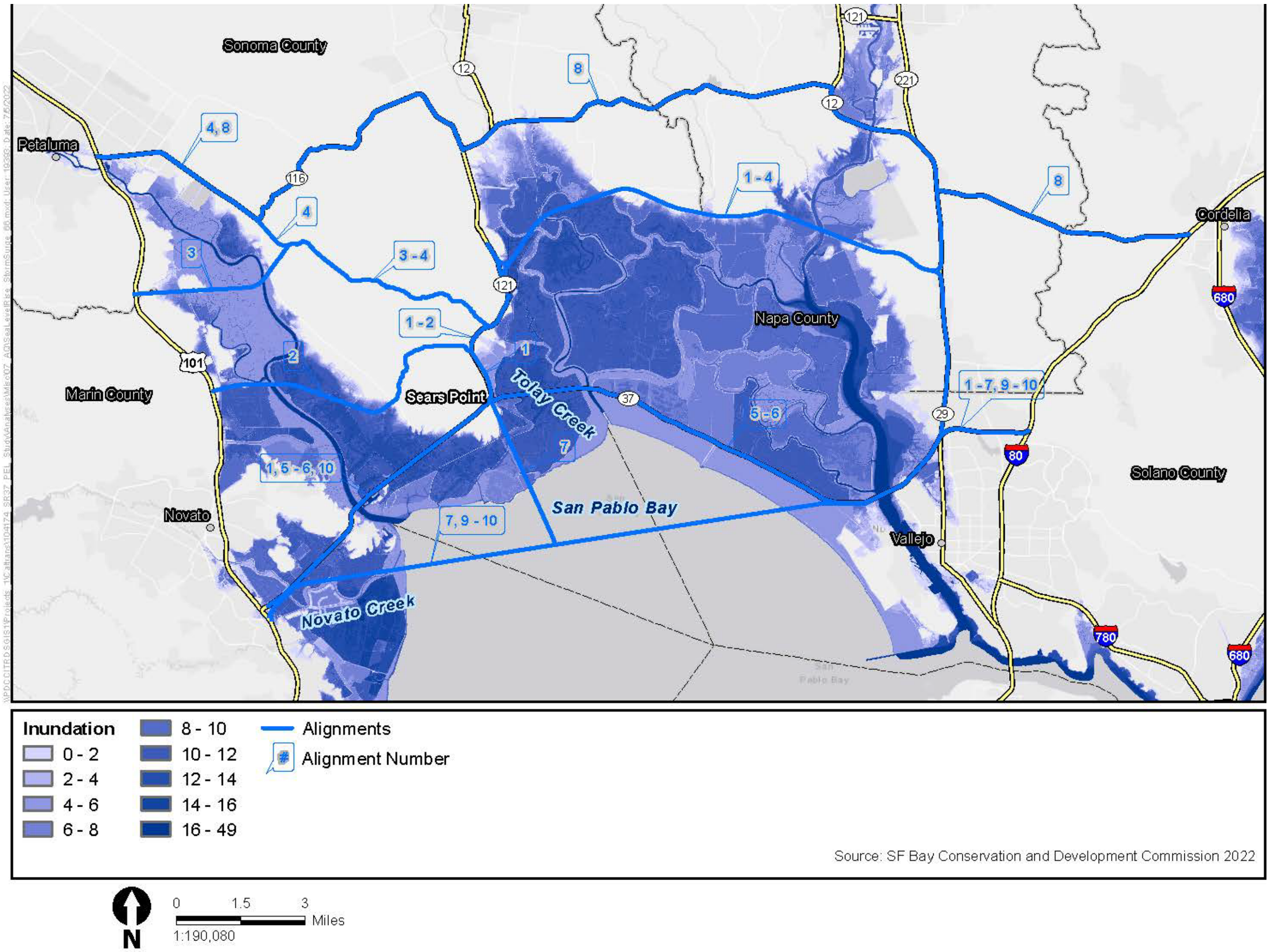
By 2130, the OPC projects 102–120 inches of sea-level rise for the San Francisco area under medium-high risk aversion and the low emissions RCP 2.6 scenario and high emissions RCP 8.5 scenario, respectively. Overall, the extent and depth of flooding under 108 inches of sea-level rise is expected to look similar to conditions with 66 inches (2085 high projection) plus 100-year storm surge, although inundation due to sea-level rise is permanent, while storm surge–induced flooding is temporary (Figure FP-7). We could not capture the full range of potential flooding under 2130 conditions since the recommended mapping tool for sea-level rise in the Bay Area, Adapting to Rising Tides, only shows up to 108 inches of sea-level rise and has not yet mapped storm surge with 108 inches of sea-level rise.

The *State Route 37 Integrated Traffic, Infrastructure and Sea Level Rise Analysis* study determined that currently (i.e., 0 inches of sea-level rise beyond 2018 levels), a 25-year coastal storm event could flood the route; a 5- to 10-year coastal storm event could flood the route with 6 to 12 inches of sea-level rise which, according to the OPC Guidance, could occur by 2030–2040. In addition, San Francisco could see 36 inches of sea-level rise as soon as 2070, which would expose most of the route to permanent inundation without storm events (Kimley Horn and AECOM 2018: 11; OPC 2018: 57).



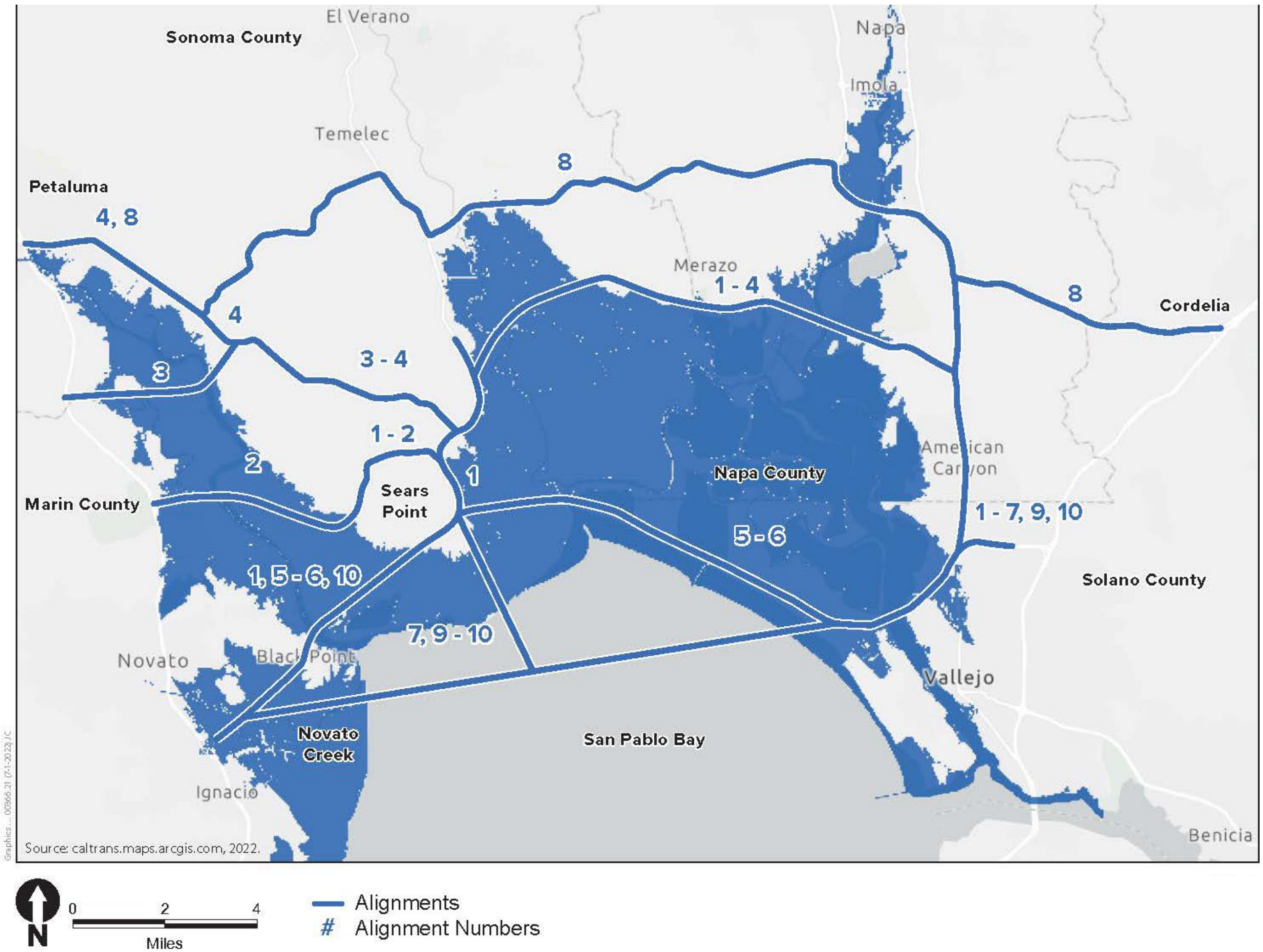
Source: Caltrans 2021

Figure FP-2. Study Area with Inundation based on 24 Inches of Sea-Level Rise (2050 Projection)



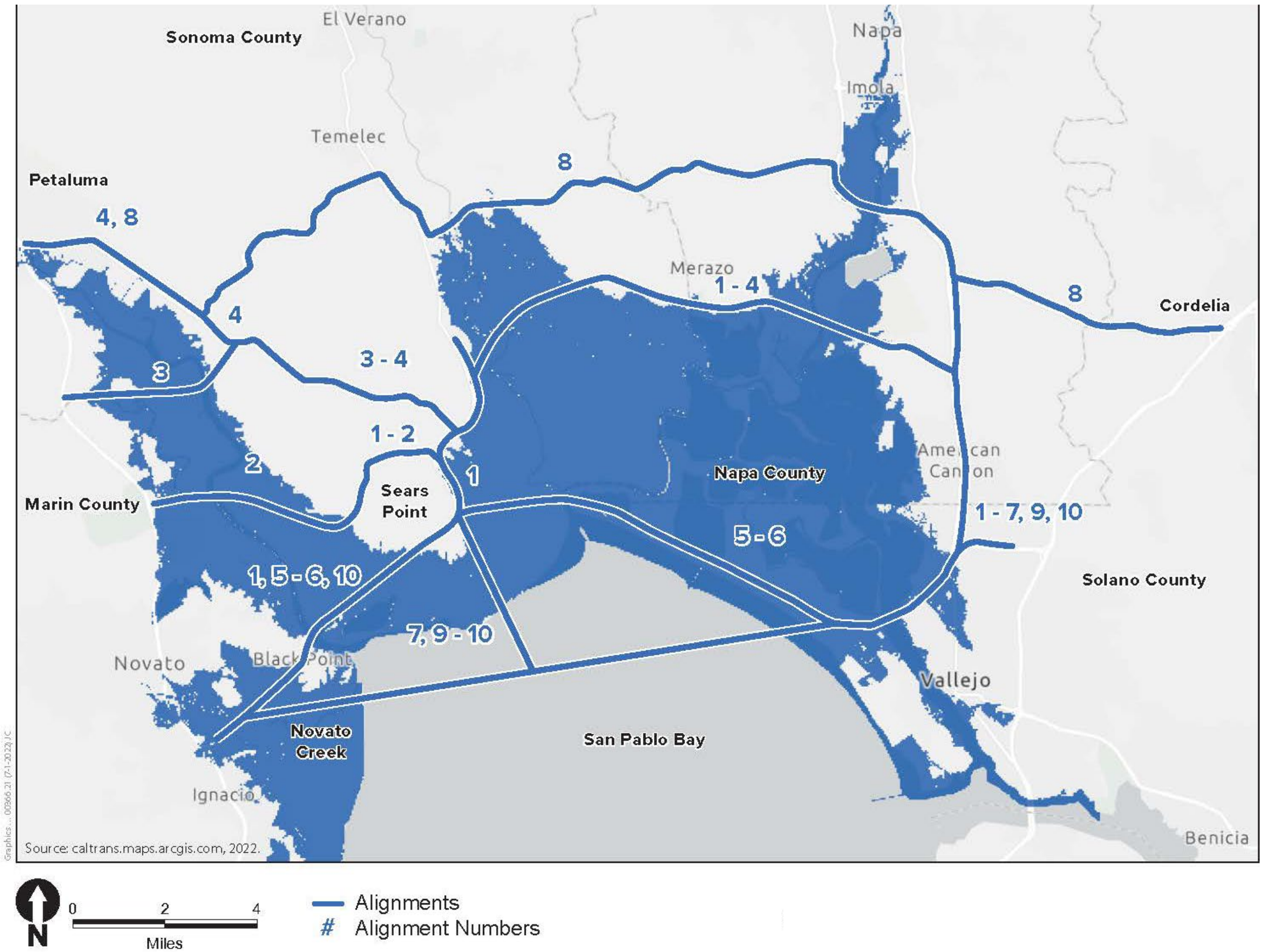
Source: BCDC 2018

Figure FP-3. Projected Flood Depths across Study Area with 24 Inches of Sea-Level Rise (2050 Projection) and Storm Surge from a 100-Year Storm Event



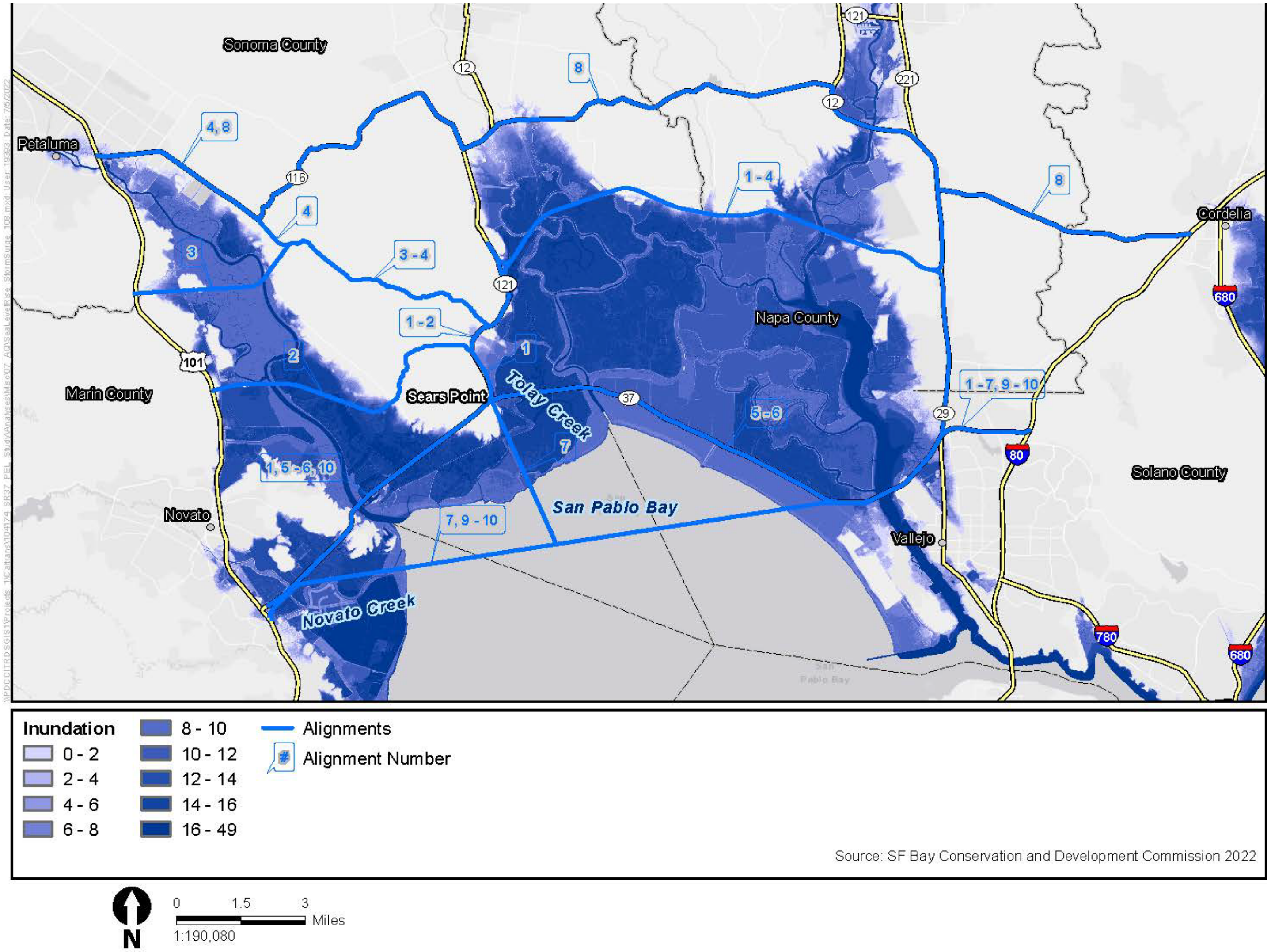
Source: Caltrans 2021

Figure FP-4. Study Area with Inundation based on 48 Inches of Sea-Level Rise (2085 Low Projection)



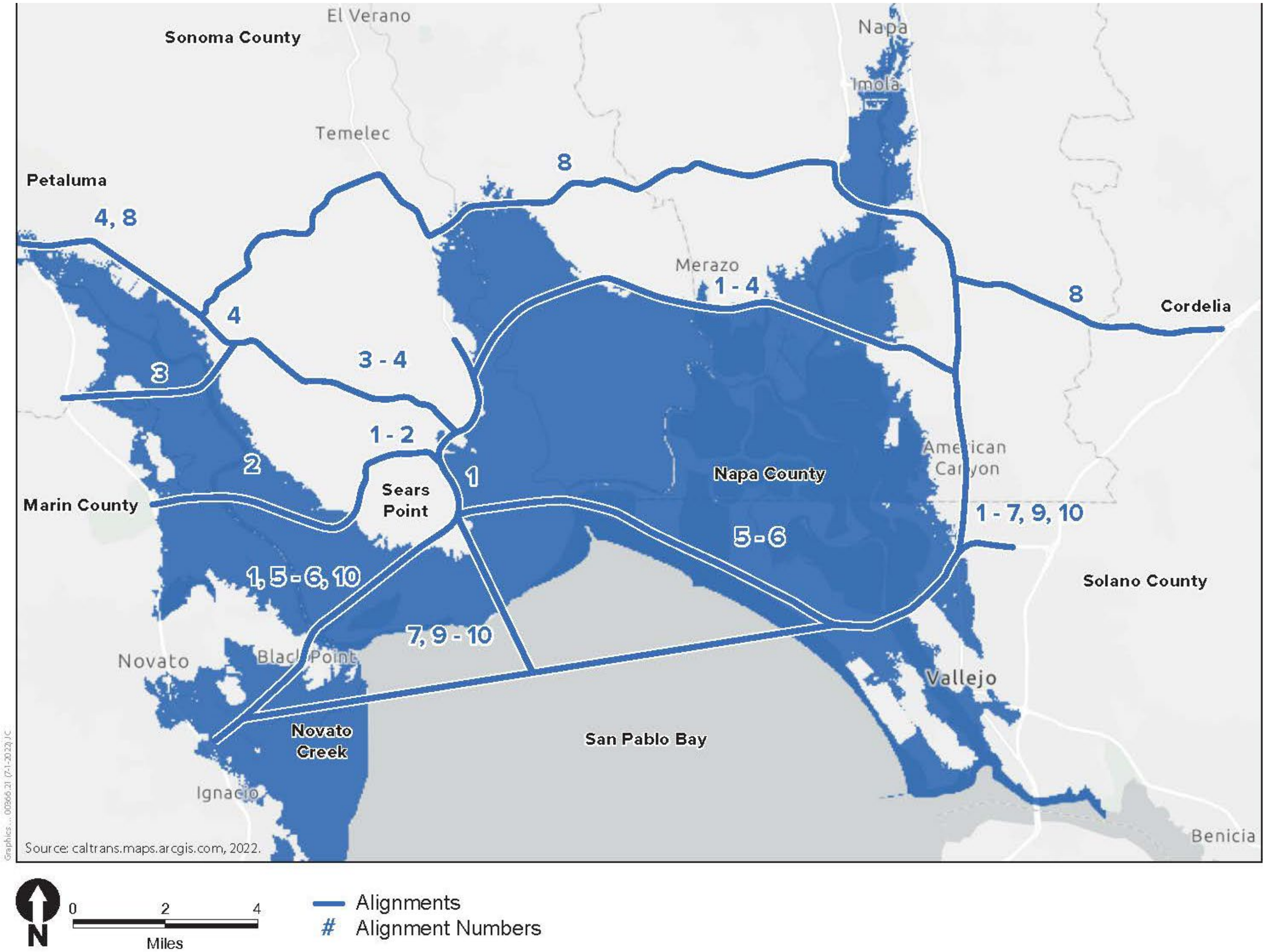
Source: Caltrans 2021

Figure FP-5. Study Area with Inundation based on 66 Inches of Sea-Level Rise (2085 High Projection)



Source: BCDC 2018

Figure FP-6. Projected Flood Depths across Study Area with 66 Inches of Sea-Level Rise (2085 High Projection) and Storm Surge from a 100-Year Storm Event

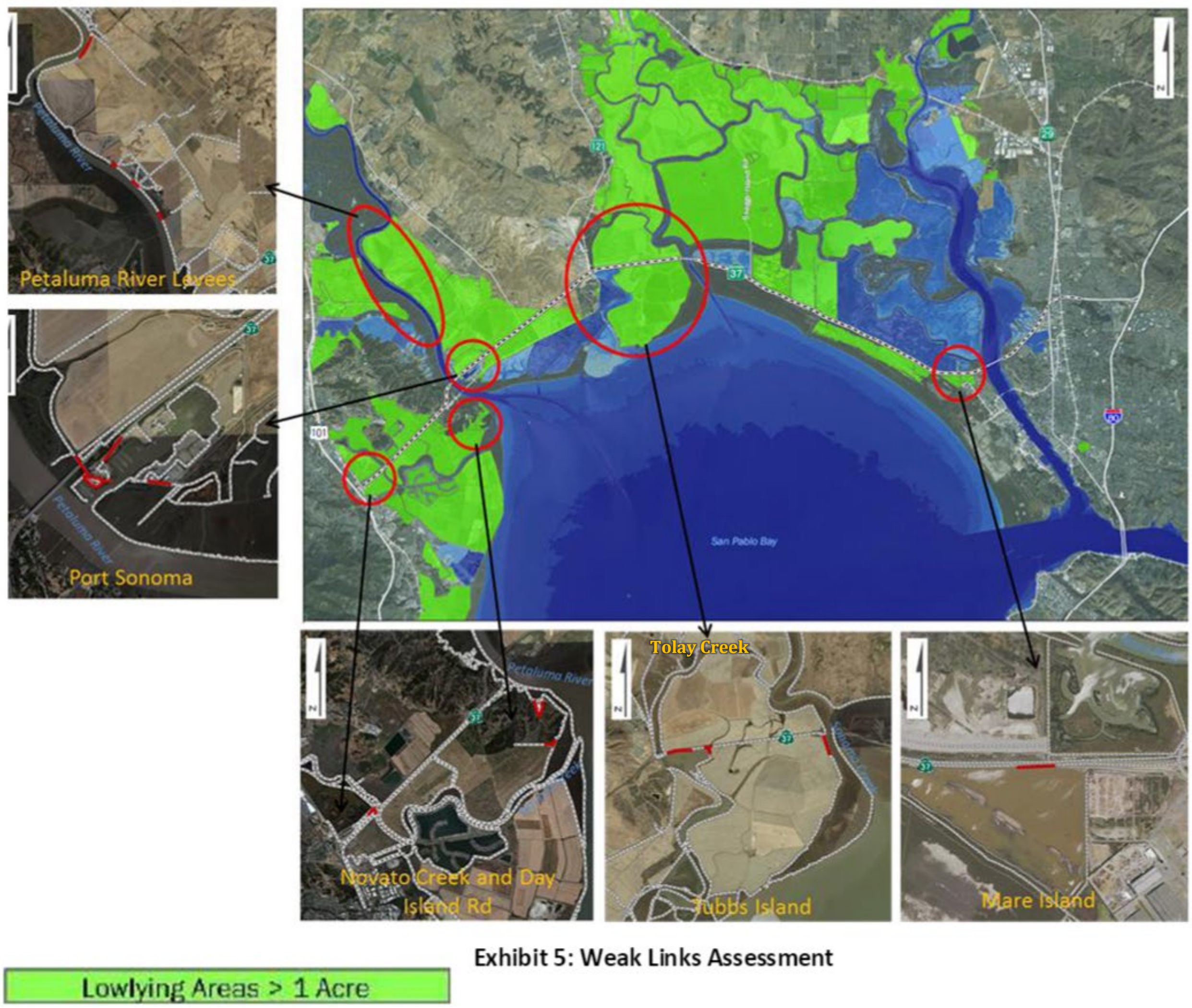


Source: Caltrans 2021

Figure FP-7. Study Area with Inundation Based on 108 Inches of Sea-Level Rise (2130 projection)

8.2.2 Areas that Experience Periodic Flooding

Creek crossings along SR 37 are areas prone to flooding. For example, Novato Creek has experienced flooding multiple times, closing SR 37 for 20 days in February 1996, 21 days in January 2005, 1 day in December 2014, and for nearly a month in January–February 2017. After the 2017 flood event, Caltrans dedicated $8 million to elevate the roadway by two feet and replace three culverts at Novato Creek (Kimley Horn and AECOM 2018: 10). However, other locations are still prone to flooding. These locations include Mare Island, Tolay Creek, and six low spots in the existing levee system (Figure FP-8) (Kimley Horn and AECOM 2018: 10).



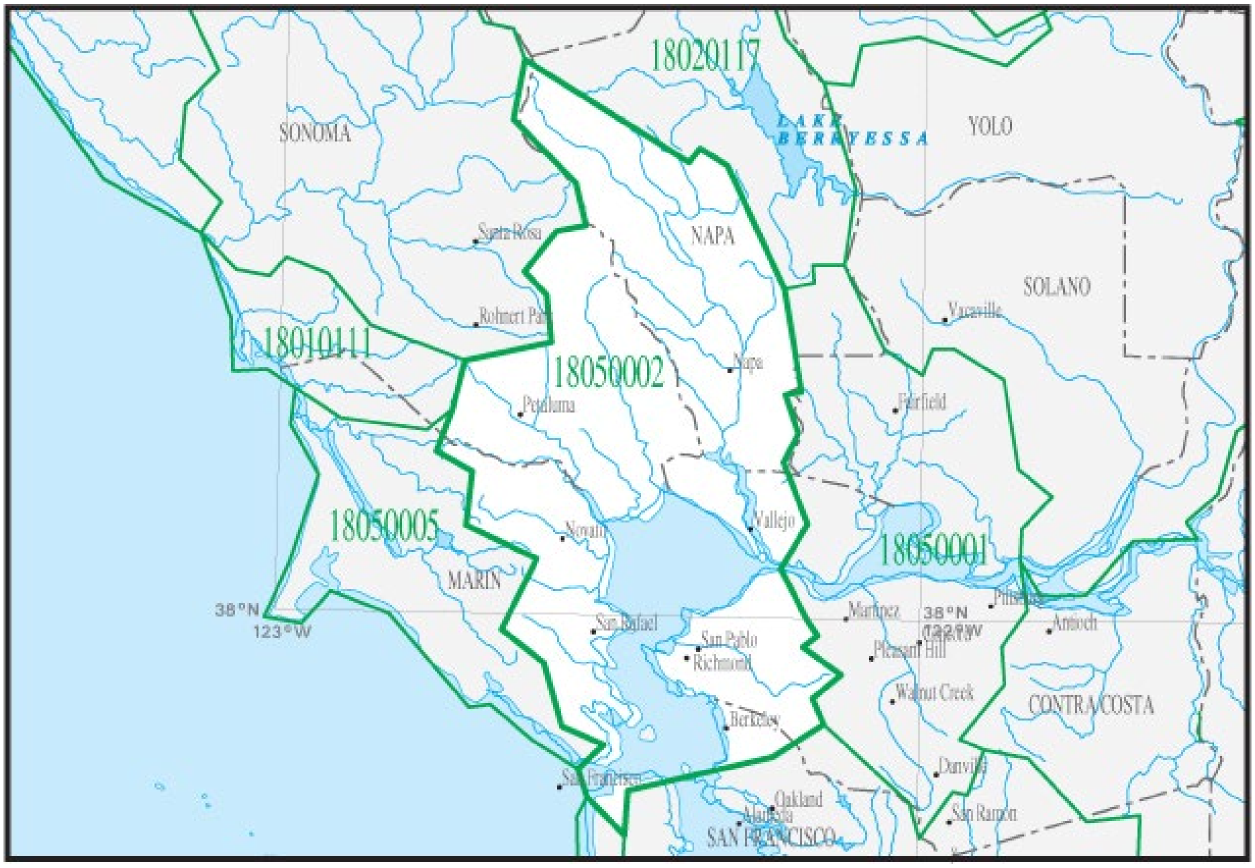
Source: Kimley Horn and AECOM 2018

Note: Low-lying areas that are greater than one acre are shaded in green; specific low spots in the existing levee system are circled in red in the larger map and lined in red in the close-up maps.

Figure FP-8. Low Spots in Existing Levee System

8.2.3 Watersheds

The U.S. Geological Survey (USGS) watersheds for the Study Area are shown in Figure FP-9. Specifically, watershed #18050002 overlaps with the Study Area (USGS 2020). Refer to the Water Quality Existing Conditions Report for more information regarding watersheds in the Study Area.



Source: USGS 2020

Figure FP-9. U.S. Geological Survey Map of North San Francisco Bay (Hydrological Unit Code 18050002)

8.2.4 Surface Water

The Study Area includes many smaller rivers and streams, such as the Petaluma River, Sonoma Creek, and Napa Slough, as well as the larger Napa River (Figure WQ-2 in the Water Quality Existing Conditions Report) (SWRCB 2021). Freshwater flows are highly seasonal, with streams experiencing more than 90% of their annual runoff between October and April and going dry during mid- to late summer (San Francisco Bay RWQCB 2017: 1-1). Flows are also regulated by upstream infrastructure that is part of California's water diversion projects (San Francisco Bay RWQCB 2017: 1-1).

Climate change may alter channel width in the future. Currently, the Study Area includes diked Baylands that will fill and empty with the tides if the levees are breached. The historical Baylands were largely eliminated over the past 150 years due to diking and filling for flood control and land reclamation, with un-engineered levees and berms along Novato Creek, the Petaluma River, and Sonoma Baylands originally designed to reclaim land for agricultural use rather than to protect the road (TAM 2018: 4, 8). As a result of the levee construction and related activities, fluvial and tidal flows were confined such that sediment has accumulated in Novato Creek rather than flowing through the historical tidal channel network that connected lower Novato Creek to the Baylands, thus cutting off the sediment supply that helped maintain the elevation of the Baylands (TAM 2018: 8). Now, the former marshes are several feet below mean higher-high water, and the whole area depends on levees and pumping to avoid flooding. If the levees were to fail, then large portions of land along the Novato Creek and Petaluma River (including the current SR 37 route) would be inundated on each tide (TAM 2018: 8–10).

The amount of water that enters the marsh and subsided land on high tide and leaves on the ebb is called the *tidal prism*. The levees currently protect most areas, and so there is relatively little water that flows to and from the marsh in tidal channels—that is, the tidal prism is relatively small. However, climate change is expected to change streamflow patterns by increasing the severity of flood events, and tidal action may be restored to diked areas due to erosion and breaching of levees, or via restoration projects. If tidal action is restored, then the tidal channels will erode to accommodate the influx of water as the tidal prism increases in volume. Eroded channels could lead to erosion of levees and scouring around bridge piles (TAM 2018: 11). It is important to keep the potential for wider channels and increased erosion in mind as Caltrans assesses alternatives.

8.2.5 Groundwater

There are four groundwater basins in the Study Area, as described in this section and shown in Figure WQ-1 in the Water Quality Existing Conditions Report (SWRCB 2020).

- **2-030 Novato Valley:** Lies in Marin County and covers 20,500 acres in total surface area. The basin is mostly recharged naturally by infiltration from streambeds and direct percolation of precipitation. The relevant water agencies are North Marin Water District, Marin Municipal Water District, and Marin County Flood Control and Water Conservation District (SWRCB 2004).
- **2-001 Petaluma Valley:** Lies in Sonoma County and covers 46,043 acres in total surface area. The basin is mostly recharged by percolation of rainfall and has a generally slow rate of recharge. The basin experienced seawater intrusion in the past as a result of groundwater pumping. The relevant water agencies are Sonoma County Water Agency, North Marin Water District, and City of Petaluma (SWRCB 2014a).
- **2-002.02 Sonoma Valley** (subbasin of the Napa-Sonoma Valley Basin): Lies in Sonoma County and covers 44,626 acres in total surface area. The subbasin is mostly recharged by precipitation via seepage from creeks, lakes, reservoirs, and direct infiltration. Two areas (city of Sonoma and southwest of El Verano) have experienced declines in groundwater levels since the late 1990s, likely due to increased groundwater pumping. The relevant water agencies are Sonoma County Water Agency, City of Sonoma, and Valley of the Moon Water District (SWRCB 2014b).
- **2-002.03 Napa-Sonoma Lowlands** (subbasin of the Napa-Sonoma Valley Basin): Lies within both Napa and Solano Counties and covers 40,455 acres in total surface area. The relevant water agency is the City of Vallejo Public Works, though Napa County established a Groundwater Resources Advisory Committee and published a County-wide Groundwater Monitoring Plan in January 2013 (SWRCB 2014c).

Groundwater levels could rise due to climate change. Sea-level rise could force groundwater levels in shallow unconfined coastal aquifers to rise as well, which could result in surface flooding (both from rising groundwater and reduced infiltration rates for stormwater), saltwater intrusion, and contamination (LAO 2020: 3-4; Plane et al. 2019).

8.3 Next Steps

The SR 37 PEL Study should consider both the risks to and from floodplains and water resources in the Study Area. The project could present risks to water quality in the watersheds—this is discussed further in the water quality existing conditions report. Risks to the project include the location of floodplains in relation to SR 37 and proposed alignments, especially as climate change and sea-level rise are projected to increase the extent and depth of floodplains. In addition, the tidal prism is projected to increase in volume and channels are projected to widen, and so the SR 37 PEL Study should consider the changing geography of tidal channels and the increased risk for flooding and erosion.

Coordination with governing agencies, including BCDC and other floodplain management agencies, may be required. California requires that local, state, and federal water resources and floodplain management agencies be consulted if a proposed action encroaches on a 100-year base floodplain (Caltrans 2015).

Further, this information should be included in the Preliminary Environmental Analysis Report prepared as part of the Project Initiation Document. Specifically, these studies should include potential flood issues and identify 100-year base floodplain(s) within the project area using National Flood Insurance Program maps and any potential floodplain encroachments by the proposed project and construction activities (Caltrans 2015).

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Chapter 9
Water Quality

This chapter describes the existing water quality conditions and impairments located within the SR 37 PEL Study Area. Watersheds and receiving waterbodies in the Study Area are also considered to be part of the SR 37 PEL Study Area for water quality. The following subsections describe these resources in more detail.

9.1 Methodology

This section was drafted based on a review of State Water Resources Control Board (SWRCB) resources and publicly available information pertinent to water quality resources. Refer to Section 4, *References*, for a complete list of information cited herein. Resources include:

- San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan)
- California 2020/2022 Integrated Report: 303(d) list of impaired waterbodies
- Sustainable Groundwater Management Act Basin Prioritization Dashboard

9.2 Existing Conditions

9.2.1 Surface Water Hydrology

The SR 37 PEL Study Area includes the Petaluma River-Frontal San Pablo Bay Estuaries (Hydrologic Unit Code [HUC] 1805000206), San Pablo Bay (HUC 1805000208), Sonoma Creek-Frontal San Pablo Bay Estuaries (HUC 1805000203), Carneros Creek-Frontal San Pablo Bay Estuaries (HUC 1805000205), and Tulucay Creek-Frontal San Pablo Bay Estuaries (HUC 1805000204) sub-basins, all within the larger San Pablo Bay watershed. The San Pablo Bay watershed encompasses over 784,984 acres and drains into the northern reaches of San Francisco Bay (CWIP 2022). The watershed is the northern reach of the San Francisco Estuary and is a major drainage basin for Marin, Sonoma, Napa, Solano, and Contra Costa Counties. Streams draining to San Pablo Bay are tidally influenced in the lower reaches. A unique feature in the San Pablo Bay watershed is the large tracts of historical baylands, both diked and tidal, particularly along the perimeter of San Pablo Bay and adjacent to Sonoma Creek, and the Petaluma and Napa Rivers. Some of these diked baylands include important seasonal wetlands.

In Marin County, Las Gallinas Creek, Miller Creek, and Novato Creek drain into San Pablo Bay. In Sonoma County, major water features include the Petaluma River, Sonoma Creek, and Tolay Creek, which all drain into the tidal flats of San Pablo Bay. In Napa County, the Napa River also flows into San Pablo Bay with several sloughs crossing the landscape. Tributaries to the Napa River include Carneros Creek, Suscol Creek, and Huichica Creek. The western portion of Solano County is characterized by large expanses of diked baylands, bordering San Pablo Bay and Mare Island at its eastern edge (USACE and Coastal Conservancy 1999). In the southern portion of the San Pablo Bay watershed in Napa and Solano Counties, tidal marshlands lie at or below sea level. These marshlands are incised with numerous winding tidal channels containing brackish water.

9.2.2 Surface Water Quality

The San Pablo Bay watershed has experienced increased soil erosion and stream channel degradation. Due to waterway modification, development of rural lands, and increased pollution, water quality in the watershed is declining. Northern Marin County, and Napa and Sonoma Counties converted wetland uses to predominantly grazing and cultivated croplands. Urbanized areas continue to grow in each county, adversely affecting water quality (USACE and Coastal Conservancy 1999).

The Porter-Cologne Water Quality Control Act requires the SWRCB or a Regional Water Quality Control Board to adopt basin plans for the protection of water quality. The San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) specifies regionwide and waterbody-specific beneficial uses and sets numeric and narrative water quality objectives in surface waters. The Basin Plan specifies beneficial uses that apply to waterbodies with potential to be affected by the project, as shown in Table WQ-1 (San Francisco Bay RWQCB 2017).

Table WQ-1. Beneficial Uses for Surface Waters of Waterbodies with Potential to Be Affected by the Project

	Designated Beneficial Uses													
Water Body	**Freshwater Replenishment**	**Commercial, and Sport Fishing**	**Estuarine Habitat**	**Municipal And Domestic Supply**	**Commercial and Sport Fishing**	**Cold Freshwater Habitat**	**Fish Migration**	**Reservation of Rare and Endangered Species**	**Fish Spawning**	**Warm Freshwater Habitat**	**Wildlife Habitat**	**Water Contact Recreation**	**Noncontact Water Recreation**	**Navigation**
Novato Creek				E	E	E	E	E	E	E	E	E	E	
San Antonio Creek						*E*	*P*		*P*	*E*	*E*	*E*	*E*	
Napa River, tidal		*E*	*E*				*E*	*E*			*E*	*E*	*E*	*E*
Mare Island Strait		*E*	*E*				*E*	*E*			*E*	*E*	*E*	*E*
Rindler Creek	*E*									*E*	*E*	*E*	*E*	

Source: San Francisco Bay RWQCB 2017.
Key: E = Existing beneficial use P = Potential beneficial use

Section 303(d) of the federal Clean Water Act (CWA) requires states make a list of waters that are not attaining water quality standards. The 303(d)-listed impairments for the Study Area shown in **Table WQ-2** are based on the 2020/2022 California Integrated Report (SWRCB 2022). These waterbody features are summarized below and shown on Figure WQ-1.

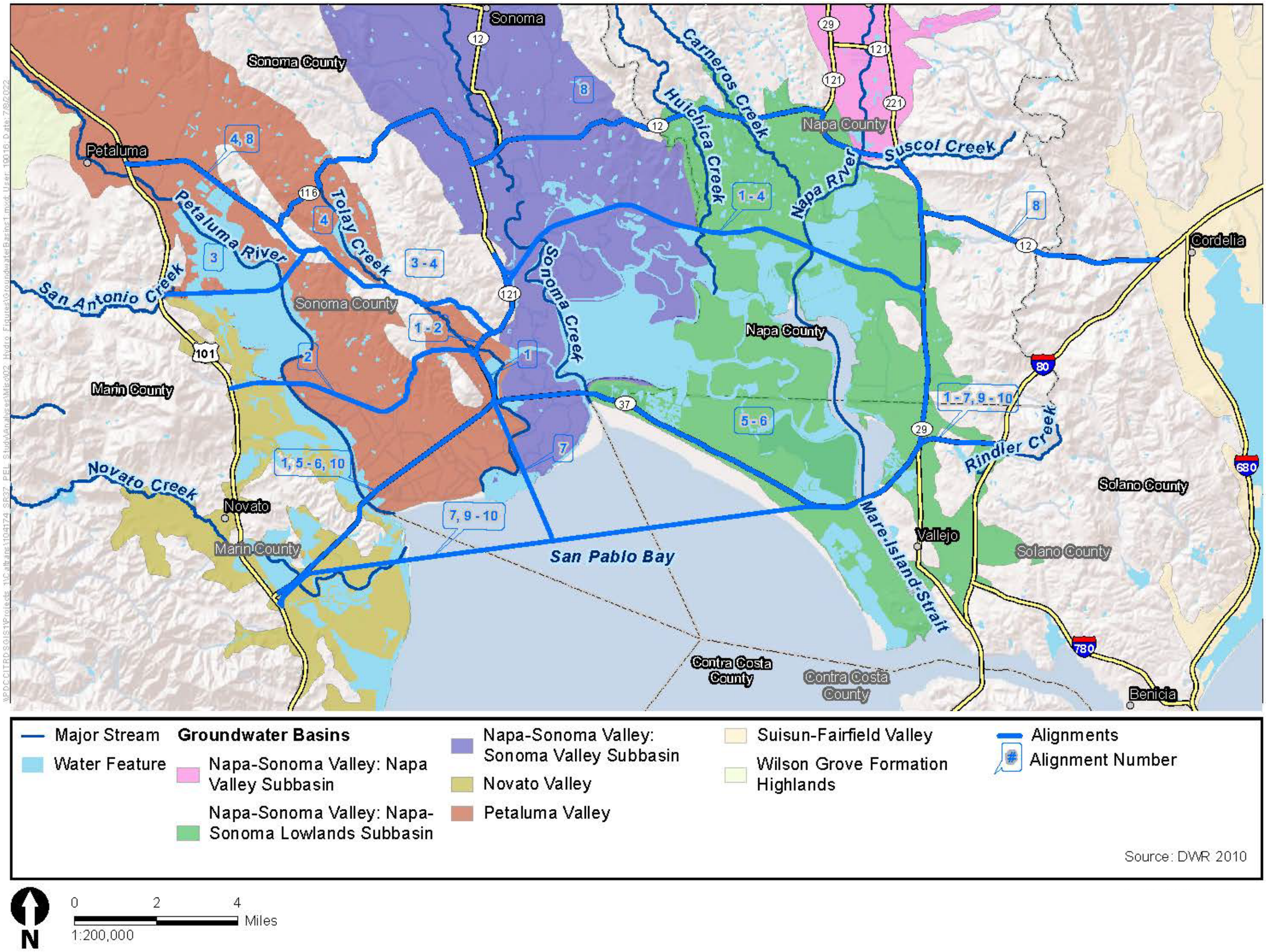

Figure WQ-1. Groundwater Basins in the Study Area

Table WQ-2. Water Quality Impairments within the Project Area

Waterbody	Listed Impairments per 2020/2022 303(d) List	Potential Sources	EPA TMDL Report Completion
San Pablo Bay	Dieldrin	Unknown	Est. 2013
	PCBs including dioxin-like PCBs	Unknown	03/29/2010
	Dioxin compounds including 2,3,7,8-TCDD	Unknown	Est. 2019
	Chlordane	Unknown	Est. 2013
	Furan Compounds	Unknown	Est. 2019
	Invasive Species	Unknown	Est. 2019
	Selenium	Unknown	01/01/2016
	DDT	Unknown	Est. 2013
	Mercury	Unknown	02/12/2008
Novato Creek	Diazinon	Unknown	05/16/2007
San Antonio Creek (Marin/ Sonoma County)	Diazinon	Urban runoff/storm sewers	05/16/2007
Petaluma River	Sedimentation/Siltation	Unknown	Est. 2019
	Diazinon	Unknown	Est. 2019
	Pathogens	Unknown	Est. 2019
	Nutrients	Unknown	Est. 2020
	Trash	Unknown	Est. 2029[1]
Petaluma River (tidal portion)	Diazinon	Unknown	Est. 2019
	Pathogens	Unknown	Est. 2019
	Nutrients	Unknown	Est. 2020
	Nickel	Unknown	Est. 2019
Sonoma Creek, tidal	Nutrients	Agriculture, onsite wastewater systems (septic tanks)	Est. 2018
	Pathogens	Onsite wastewater systems (septic tanks)	02/29/2008
Napa River, tidal	Nutrients	Agriculture, onsite wastewater systems (septic tanks)	Est. 2018
	Pathogens	Agriculture, onsite wastewater systems (septic tanks)	11/01/2001
Napa River, Mare Island Strait	PCBs	Unknown	03/29/2010
	Chlordane	Unknown	Est. 2029
	Dieldrin	Unknown	Est. 2029
	Total DDT[2]	Unknown	Est. 2029
	Mercury	Unknown	02/12/2008

Waterbody	Listed Impairments per 2020/2022 303(d) List	Potential Sources	EPA TMDL Report Completion
Lake Chabot	Mercury	Unknown	Est. 2029
Rindler Creek	Trash	Unknown	Est. 2029

DDT = dichlorodiphenyltrichloroethane
EPA = U.S. Environmental Protection Agency
Est. = estimated completion date
PCBs = polychlorinated biphenyls
TCDD = Tetrachlorodibenzodioxin
TMDL = total maximum daily load
[1] The trash listing will be addressed by implementing the trash control provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California through the NPDES phase II small MS4 permit applicable to this waterbody.
[2] sum of 4,4'- and 2,4'- isomers of DDT, Dichlorodiphenyldichloroethylene (DDE), and Dichlorodiphenyldichloroethane (DDD)
Source: SWRCB 2022.

9.2.3 Groundwater Quality

The SR 37 PEL Study Area is in the Novato Valley Groundwater Basin; Petaluma Valley Groundwater Basin; Napa-Sonoma Valley Groundwater Basin, Sonoma Valley Subbasin; and the Napa-Sonoma Valley Groundwater Basin, Napa-Sonoma Lowlands Subbasin. Due to the underlying geology, some areas are not located within a recognized California Department of Water Resources (DWR) groundwater basin. These groundwater basins are described in more detail below and shown on Figure WQ-2.

Groundwater quality was investigated from August to November 2004, as part of the California Groundwater Ambient Monitoring and Assessment program. Samples were collected from 89 public-supply wells, seven hydrothermal wells, and one hydrothermal spring in Napa, Sonoma and Marin Counties. Wells were selected to provide a spatially distributed, randomized monitoring network for statistical calculations and constituent detection frequency (Kulongoski, et. al. 2006). Groundwater samples were collected from 71 wells in the North San Francisco Bay Shallow Aquifer study unit, which includes Marin, Mendocino, Napa, Solano, and Sonoma Counties (Bennett and Fram 2014).

Many inorganic constituents occur naturally in groundwater. The concentrations of the inorganic constituents can be affected by natural processes as well as by human activities. In the North San Francisco Bay Study Area, one or more inorganic constituents were present at high and moderate concentrations in approximately 14% and 36% of the primary aquifers, respectively. Major and minor ions and dissolved solids samples were collected at 33 public-supply wells; three samples had dissolved solid concentrations above the secondary maximum contaminant level (SMCL). Trace and minor elements are naturally present in the minerals in rocks and soils, and in the water that comes into contact with those materials. Trace elements were present at high and moderate concentrations in approximately 14% and 33% of the primary aquifers, respectively. Arsenic, boron, and lead were the trace elements that most frequently occurred at high concentrations. Aluminum, antimony, and nickel also were detected at high concentrations, but in less than 1% of the primary aquifers. Groundwater samples from 32 public-supply wells were analyzed for trace elements. Arsenic concentrations above the MCL were measured at four public-supply wells, boron concentrations above the detection level for the purpose of reporting (DLR) were measured at 19 wells. Iron and manganese are naturally occurring elements, and either were present at high and moderate

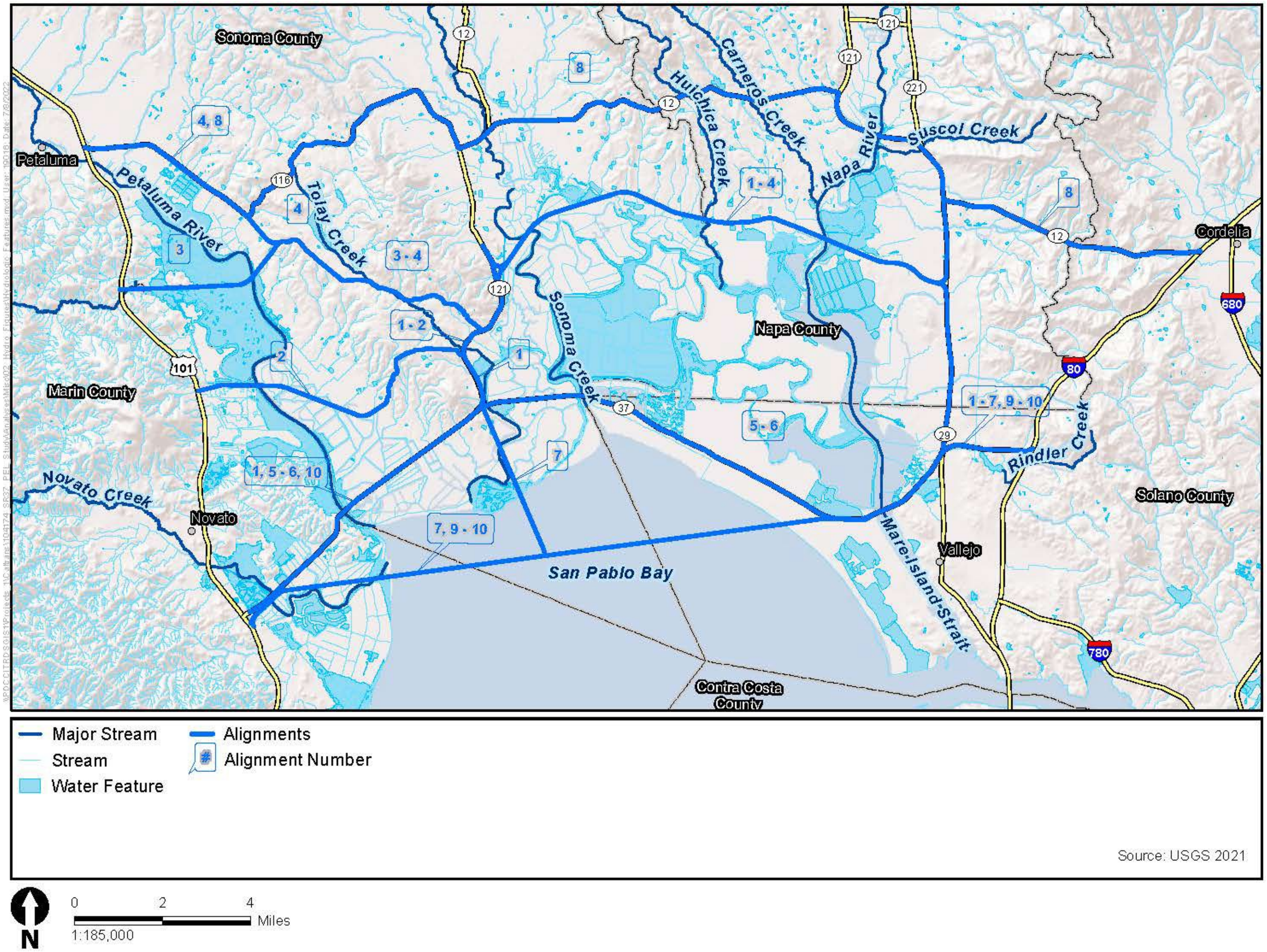

Figure WQ-2. Hydrologic Features in the Study Area

concentrations in approximately 42% and 18% of the primary aquifers, respectively. Iron concentrations above the SMCL were measured at 7 wells, and manganese concentrations above the SMCL were measured at 17 wells. Vanadium and chromium(VI) concentrations above their DLR were measured at nine and 48 public-supply wells, respectively (Kulongoski et. al. 2006; Kulongoski and Belitz 2010).

Volatile organic compounds (VOCs) and gasoline additives and/or oxygenates were detected in groundwater samples but were well below the maximum contaminant levels (MCL). Thirty-two percent of the randomized wells sampled had at least a single detection of a VOC or gasoline additive or oxygenate. The most frequently detected compounds were chloroform, found in 12 of the 84 randomized wells; carbon disulfide, found in eight of the 84 randomized wells; and toluene, found in four of the 84 randomized wells. Trihalomethanes were the most frequently detected class of VOCs. Similarly, pesticides were detected, but concentrations were below the MCLs. Fourteen of the wells sampled had at least a single detection of pesticide. The most frequently detected compound was simazine, found in eight of the 84 of the wells (Kulongoski et. al. 2006).

In the North San Francisco Bay Shallow Aquifer Study Area, trace elements of the shallow aquifer system were present at high and moderate concentrations in approximately 25 percent and 21percent, respectively. Arsenic, boron, fluoride, and manganese were the trace elements detected at high concentrations. Total dissolved solids (or the major ions chloride and sulfate) were present at high concentrations (greater than the upper limit) in approximately 6 percent of the shallow aquifer system and at moderate concentrations (between the recommended and upper limit) in approximately 16 percent. Iron was present at high and moderate concentrations in approximately 20 percent and 5percent, respectively, of the shallow aquifer system (George et. al. 2018).

9.2.3.1 Novato Valley Groundwater Basin

The Novato Valley Groundwater Basin covers an area of approximately 20,500 acres. It is bound to the north by San Antonio Creek, to the west and south by the Mendocino Range, and to the east by San Pablo Bay. Natural recharge occurs primarily as infiltration from streambeds and from direct percolation of precipitation that falls on the basin floor (DWR 2004). The basin is considered a low-priority basin.

Groundwater in the Novato Valley Groundwater Basin is of the calcium bicarbonate type. Groundwater in the tidal areas of the alluvium is of the sodium chloride type and the total mineral content is greater than in areas more distal to the bay. Tidal fluctuations in the vicinity of San Pablo Bay can cause intrusion of brackish water into the groundwater reservoir, resulting in degraded water quality.

9.2.3.2 Petaluma Valley Groundwater Basin

The Petaluma Valley Groundwater Basin covers an area of approximately 46,043 acres. It is bound to the west by the Mendocino Range, to the east by the Sonoma Mountains, to the north by a series of low hills (and the Santa Rosa Valley-Santa Rosa Plain groundwater basin), and to the south by San Pablo Bay. Groundwater is predominantly recharged by percolation of rainfall. Suitable recharge areas are concentrated northwest of the city of Petaluma and are also scattered on the western flank of the Sonoma Mountains to the east. The rate of recharge is generally slow and is dependent on annual precipitation (DWR 2014a). The basin is considered a medium-priority basin.

Groundwater quality varies considerably within the Petaluma Valley Groundwater Basin because of the discontinuous nature of the water-bearing formations. Groundwater from the hills west of Petaluma is of calcium bicarbonate chloride type, while east of Petaluma groundwater is of sodium bicarbonate type. Generally, groundwater quality is poor in the Petaluma Valley south of Petaluma. The potential for seawater intrusion exists in the tidal reaches near the Petaluma River if groundwater extraction increases to historically high levels. There is also an increasing problem with methyl tertiary-butyl ether contamination. Due to large amounts of animal waste disposed on permeable soils in the upland area northwest of Petaluma, there is widespread nitrate contamination affecting shallow wells.

9.2.3.3 Napa-Sonoma Valley Groundwater Basin, Sonoma Valley Subbasin

The Napa-Sonoma Valley Groundwater Basin, Sonoma Valley Subbasin covers an area of approximately 44,626 acres. The subbasin extends from San Pablo Bay northward approximately two miles south of the town of Kenwood where the alluvial plain terminates. It is bound to the west by the Sonoma Mountains, to the east by the Mayacamas Mountains, and to the south by San Pablo Bay. Generally, groundwater recharge is from precipitation and occurs as seepage from creeks, lakes, reservoirs, and direct infiltration of precipitation on soils (DWR 2014b). The basin is considered a high-priority basin.

Groundwater in the subbasin is generally good for most purposes. Sodium bicarbonate and sodium chloride are the most frequently occurring water types. The RWQCB reports that 43 underground fuel tank leaks have occurred in the Sonoma Valley. Saline groundwater has historically been found south of SR 12/121, although data collected in 2003 by the U.S. Geological Survey indicates that the saline groundwater may have moved northward (DWR 2014b).

9.2.3.4 Napa-Sonoma Valley Groundwater Basin, Napa-Sonoma Lowlands Subbasin

The Napa-Sonoma Valley Groundwater Basin, Napa-Sonoma Lowlands Subbasin covers an area of approximately 40,455 acres. It is bound to the north by the Mayacamas Mountains, to the northwest and northeast by the Sonoma Valley and Napa Valley Subbasins, respectively, and to the south by San Pablo Bay (DWR 2004). Natural recharge occurs primarily as infiltration from streambeds and from direct percolation of precipitation. The basin is considered a very-low-priority basin (DWR 2014c).

Groundwater within the unconfined alluvium is generally salty (having a chloride concentration greater than 250 parts per million) and increase with depth. Groundwater is mostly soft and relatively high in bicarbonate. Generally, groundwater is usable for most domestic and irrigation needs but may be locally unsatisfactory. Increased summer pumping results in an inflow of brackish water to the wells from the tidal sloughs, resulting in chloride concentrations above the acceptable limits for irrigation in some wells (DWR 2014c).

9.3 Next Steps

The SR 37 PEL Study should consider the proximity of hydrologic resources along the proposed alignments. Future coordination with governing agencies/bodies including the San Francisco Bay

Regional Water Board and State Water Resources Control Board may be required. CWA Section 402 mandates permits for municipal stormwater discharges, which are regulated under the National Pollutant Discharge Elimination System General Permit for Municipal Separate Storm Sewer Systems. Section 402 also requires compliance with the National Pollutant Discharge Elimination System Construction General Permit during construction activities. In the event in water work is required, compliance with CWA Section 401 will require obtaining a Regional Water Quality Certification.

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Chapter 10
Geology, Soils, Seismicity, Minerals, and Paleontological Resources

This chapter describes the existing setting for geology, soils, seismicity, minerals, and paleontological resources in the SR 37 PEL Study Area.

10.1 Methodology

10.1.1 Geology, Soils, and Seismicity

Analysts prepared the geology, soils, and seismicity existing conditions sections based on a review of regional and local geology and fault-earthquake hazard information from the California Geological Survey (CGS) and U.S. Geological Survey (USGS), including mapping and technical investigations; soils data from the Natural Resources Conservation Service; and city and county planning documents. Refer to Section 4, *References*, for a complete list of information cited. The SR 37 PEL Study Area for geology, soils, and seismicity is located within four northern counties of the San Francisco Bay Area (Bay Area), but also includes other major regional faults, including the San Andreas fault, located to the west, and the Hayward fault, located to the south, which could affect the Study Area in a seismic event.

10.1.2 Mineral Resources

For a typical environmental project, the study area for mineral resources would be the footprint of potential ground disturbance. For the purposes of the SR 37 PEL Study, which takes a landscape-level view of resources, the Study Area for minerals is the overall SR 37 PEL Study Area.

Assessing the potential for mineral resources, including federally defined critical minerals (USGS 2022), to exist in the mineral resources Study Area was based on review of California Department of Conservation (DOC) map data in geographic information system (GIS) data format showing location of mines, oil and gas wells, and quarries (DOC 2022). In addition, mineral resource zones in the Study Area were identified through consultation with CGS mapping (2013). The mineral resources Study Area was overlaid on the maps to identify where the projects 37 PEL Study could disrupt access to these mineral resources.

10.1.3 Paleontological Resources

For a typical environmental project, the study area for paleontological resources would be the full extent of geologic formations found within the footprint of potential ground disturbance extending below ground surface to the maximum depth of excavation. The full extent of these geologic formations constitutes the study area because paleontological resources could occur at any location within a specific geologic formation. For the purposes of the SR 37 PEL Study, which takes a landscape-level view of resources, the Study Area for paleontological resources is the overall SR 37 PEL Study Area.

Assessing the potential for paleontological resources to exist in the paleontological resources Study Area followed the standard procedures of the Society of Vertebrate Paleontology (SVP) (2010).[1] Assessment involved identifying the potential for geologic units underlying a project site or area to contain significant nonrenewable paleontological resources that could be damaged or destroyed by excavation or construction.

Geologic units in the paleontological resources Study Area were identified through review of CGS regional mapping (Wagner and Burtugno 1982). This map was georeferenced in GIS and the Study Area was overlaid on the map to identify geologic units that could be disturbed.

Literature (Hilton 2003) and the University of California Museum of Paleontology (UCMP) localities database (2022a, 2022b, 2022c, 2022d, 2022e, 2022f, 2022g, 2022h, 2022i, 2022j) were reviewed to identify both depositional environment and past records of each geologic unit having yielded paleontological resources. Based on this information, the potential for that geologic unit to yield paleontological resources in future ground disturbance was assessed. Paleontological potential concerns the potential for yielding abundant fossils, a few significant fossils, or recovered evidence for new and significant data pertaining to scientific categorization or characterization. SVP defines the level of potential for a geologic unit to contain such paleontological resources as one of four sensitivity categories: High, Undetermined, Low, or No Potential (SVP 2010):

- High Potential—Assigned to geologic units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered and sedimentary rock units that are suitable for the preservation of fossils (e.g., middle Holocene and older, fine-grained fluvial sandstones; fine-grained marine sandstones).
- Undetermined Potential—Assigned to geologic units for which little information is available concerning their paleontological content, geologic age, and depositional environment. In cases where no subsurface data already exist, paleontological potential can sometimes be assessed by subsurface site investigations.
- Low Potential—Field surveys or paleontological research may determine that a geologic unit has low potential with respect to yielding significant fossils (e.g., basalt flows).
- No Potential—Some geologic units have no potential with respect to containing significant paleontological resources, such as high-grade metamorphic rocks (e.g., gneisses and schists) and plutonic igneous rocks (e.g., granites and diorites).

[1] SVP's standard procedures are widely accepted among paleontologists and followed by most investigators. The procedures identify the two key phases of paleontological resource protection: (1) assessment and (2) implementation. This Existing Conditions Report focuses on assessment, whereas implementation would be the subject of environmental impact analysis and mitigation.

10.2 Definitions

10.2.1 Geology, Soils, and Seismicity

Seismic-related surface rupture occurs when the ground surface is broken due to fault movement during an earthquake. The location of surface rupture generally can be assumed to be along an active fault trace.

Seismic-related ground shaking is the most widespread hazardous phenomenon associated with seismic activity. The Study Area is located in the northern part of the Bay Area, a seismically active region where there is a 72% chance of a major earthquake (magnitude 6.7 or greater) occurring in the 30 years between 2014 and 2044 (Working Group for California Earthquake Probabilities 2015).

Liquefaction is a phenomenon in which the strength and stiffness of unconsolidated sediments are reduced by earthquake shaking or other rapid cyclic loading. The susceptibility of an area to liquefaction is determined largely by the depth to groundwater and the properties (e.g., texture, density) of the soil and sediment within and above the groundwater. The sediments most susceptible to liquefaction are saturated, unconsolidated sandy and silty soils with low plasticity within 50 feet of the ground surface (CGS 2008).

Lateral spreading is a type of seismically induced ground failure related to liquefaction. Lateral spreading occurs when soils lose their strength due to liquefaction and flow toward a free face (such as a canal or streambank). Lateral spreading can occur in area with gentle slopes, even as gentle as one-half degree, and a relatively thin seam of liquefiable sediment can lead to continuous lateral spread over large areas (CGS 2008).

Landslides occur when the stability of a slope changes from a stable to an unstable condition. The stability of a slope is affected by the following primary factors: inclination, material type, moisture content, orientation of layering, vegetative cover, and potential to experience seismic-related ground shaking. In general, steeper slopes are less stable than more gentle slopes.

Soil is generally defined as a natural body comprised of solids (minerals and organic matter), liquid, and gases which occupy space on the surface of the land (USDA 2022).

Expansive soils are characterized by their ability to undergo significant volume changes (i.e., shrink and swell) due to variation in moisture content. Expansive soils expand when wet and shrink when dry. They typically have a high to very high percentage of clay. The process of seasonal, cyclical expansion and contraction can damage structures, foundations, and pavements and can increase maintenance requirements. Projects located on such soils often require special building foundations or the removal of problematic soils and their replacement with engineered soils or require chemical stabilization.

Soil erosion is a natural process by which soil particles are removed by wind, water, or gravity. Different soils have different susceptibility to erosion depending on particle size, organic matter content, and permeability. Additionally, topography (including length and steepness of slope) and presence of vegetative cover influence a soil's susceptibility to erosion. Soils containing a high percentage of silt or fine sand are generally the most erodible.

10.2.2 Minerals

All lands within the North San Francisco Bay production-consumption region are assigned mineral resource zone classifications, based on geologic appraisal (CGS 2013). Four major categories are identified. Of these, MRZ-2 is the zone most likely to contain mineral resources:

- MRZ-1—Areas where available geologic information indicates that little likelihood exists for the presence of significant mineral resources.
- MRZ-2—Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists. This zone is applied to known mineral deposits or where well-developed lines of reasoning, based upon economic-geologic principles and adequate data, demonstrate that the likelihood for occurrence of significant mineral deposits is high.
- MRZ-3—Areas containing mineral occurrences of undetermined mineral resource significance.
- MRZ-4—Areas where available information is inadequate for assignment to any other MRZ category.

10.2.3 Paleontological Resources

Fossils are the remains of living organisms that have been replaced by minerals. They preserve a record of life on earth. However, they also can provide important clues to other scientific fields.

Significant fossils are fossils that provide information for taphonomy (processes of fossilization), taxonomy (classification of living beings), phylogeny (processes of evolution), paleoecology (ecology of ancient biota, populations, communities, landscapes, and environments), stratigraphy (the order and relative position of geologic strata), and/or biochronology (correlation in time of biological events).

Fossils occur within geologic units. A *geologic unit* is an identifiable and mappable volume of rock that is defined by its dominant characteristics, including age range, depositional environment, and lithologic features.

When geologic units with high potential to contain paleontological resources are disturbed, such as through excavation or pile driving or drilling, it is possible that a unique paleontological resource could be encountered and damaged or destroyed. Excavation can be anticipated to shallow depths for new roadbeds and potentially up to 200 or 300 feet for bridge pier foundations. When excavation into a geologic unit with high paleontological potential is involved, a monitor can identify any such resources and recover the data so that the find remains valuable to scientific study. When pile driving or drilling is involved, recovering any paleontological resources that the procedure might encounter is not possible. However, because the area and volume of disturbance are relatively small, the likelihood of encountering a unique paleontological resource is also small.

10.3 Existing Conditions

10.3.1 Geology, Soils, and Seismicity

The primary factors that determine potential hazards related to geology and soils are proximity to active faults, composition and type of soils, proximity to open faces (e.g., cliffs, stream beds), and the general topography of the area, including height and steepness of slopes. As shown on Figure GEO-1, the Study Area includes active faults as well as open faces and waterways, such as the Napa River and San Pablo Bay.

The elevations within the Study Area range from highs of around 550 feet above sea level in parts of Sonoma County north of SR 116, to below sea level in some areas south of the existing SR 37 alignment. Diking and drainage at the bayland sites occurred in the 19th century, and subsequent oxidation and consolidation of sediments in this area close to the existing SR 37 alignment has caused subsidence of between four and six feet, resulting in below sea level elevations (BCDC 1997).

10.3.1.1 Geology

The Study Area is located in the California Coast Ranges Geomorphic Province, a geologically young and seismically active region (CGS 2002). This province extends along the western edge of California, bounded to the north by the Klamath Mountains, to the east by the Great Valley, and to the south by the Transverse Ranges (Marin County Community Development Agency 2005).

10.3.1.2 Seismic Conditions and Hazards

Seismicity

The Study Area is in four northern counties of the Bay Area, a seismically active region traversed by active faults. Faults found by CGS to be "active" are those that have evidence of displacement in the past 11,000 years. The San Andreas fault, an active fault formed at the boundary of the North American and Pacific lithospheric plates, is west of US 101. The Hayward fault, an active fault that is an offset of the San Andreas fault system, is south of the existing SR 37 alignment. The Rodgers Creek fault, the main strand of the North American-Pacific Plate boundary north of the San Francisco Bay, extends from San Pablo Bay at the southern tip of Sonoma County to Healdsburg. The West Napa fault extends from north of the Napa County Airport to the town of Rutherford. The Green Valley fault, part of the San Andreas fault system, extends from Wooden Valley south to Suisun Bay. The Cordelia fault lies north of the town of Cordelia on the east side of Green Valley. Other local faults traverse the Study Area, including the Tolay fault, the Lakeview fault, and the Franklin fault. As shown on Figure GEO-1, the Rodgers Creek fault, the West Napa fault, the Green Valley fault, and the Cordelia fault have been found by CGS to be active under the Alquist-Priolo Earthquake Fault Zoning Act.[2]

[2] The Alquist-Priolo Earthquake Fault Zoning Act was enacted in 1971 after the San Fernando earthquake and was designed to prevent structures intended for human occupancy from being placed on faults that have the potential for surface rupture.

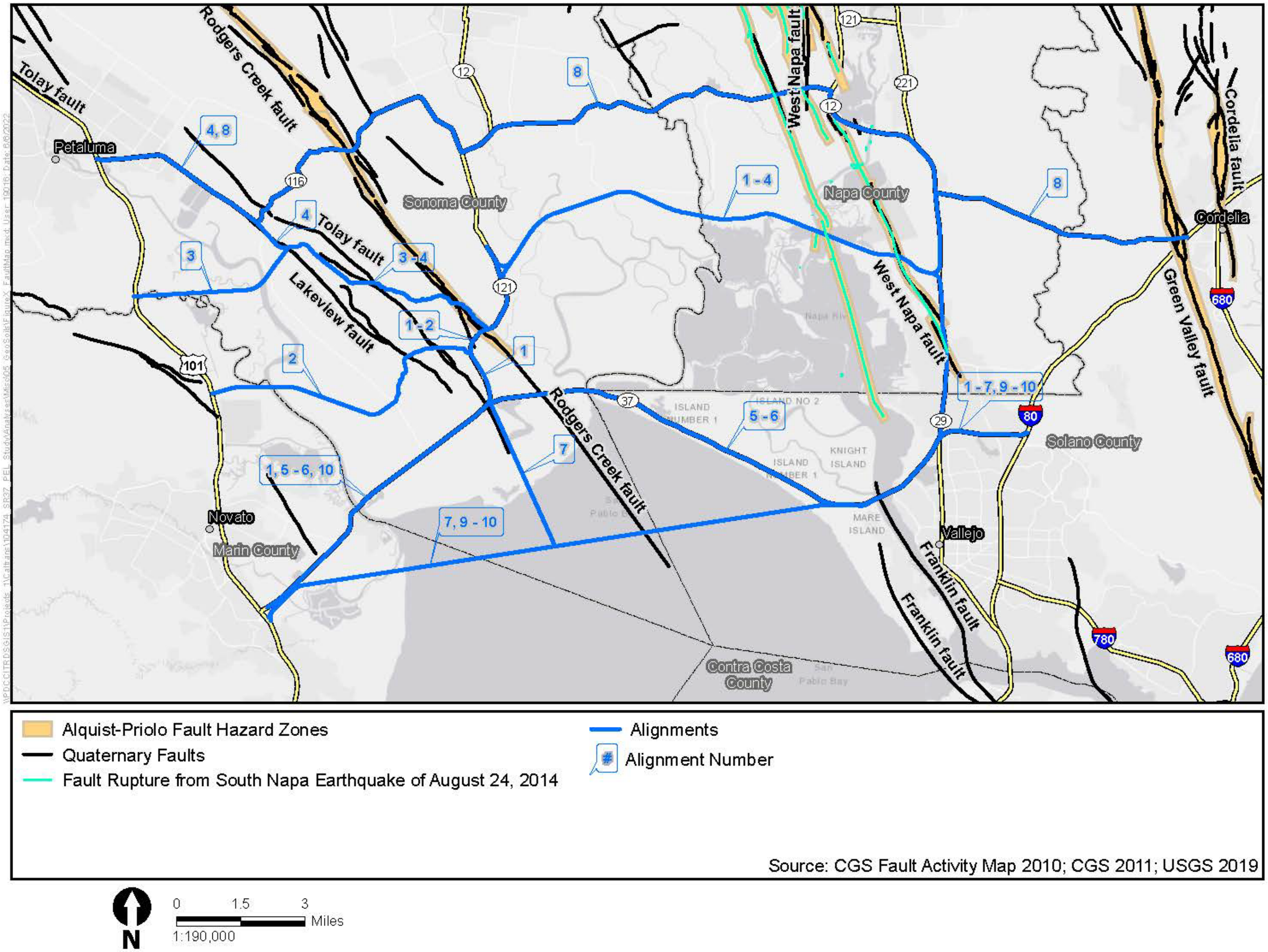

Figure GEO-1. Regional Fault Map

The record of historical earthquakes includes the August 24, 2014 South Napa earthquake with Moment Magnitude (MW) Scale[3] 6.0, which occurred on the Alquist-Priolo zoned West Napa fault. The earthquake caused injuries and property damage, buckled and cracked roadways, and broke water mains.

Due to the proximity to regional and local fault systems, the Study Area is subject to seismic hazards, including surface rupture, ground shaking, liquefaction, and seismically induced landslides. Each of these hazards is discussed in the following subsections.

Surface Rupture

As shown on Figure GEO-1, the Study Area is traversed by several active faults, which present a risk of fault rupture. Additionally, in a seismically active region, there exists the potential for surface fault rupture to occur on undiscovered fault strands that are activated during a seismic event. For example, the 2014 South Napa earthquake resulted in approximately eight miles of surface rupture along the West Napa fault zone and exposed fault strands in residential areas that had not been previously mapped (USGS 2015).

Ground Shaking

The entire Study Area could experience strong seismic shaking, ranging between severe shaking Modified Mercalli Intensity scale[4] (MMI 8) and violent shaking (MMI 9) (ABAG 2022). While the entire area could experience strong seismic shaking, the area in Sonoma County around SR-121 could experience the most intense shaking (ABAG 2022) because of the proximity of the Rodgers Creek fault, as shown on Figure GEO-1.

Liquefaction

As shown in Figure GEO-2, the majority of the Study Area is characterized by Very Low to Moderate susceptibility to liquefaction, with a few exceptions. Areas of High liquefaction susceptibility include areas near Vallejo and on Mare Island in Solano County. Areas of High to Very High liquefaction susceptibility in the Study Area include areas SR 37 and US 101 in Marin County, around SR 12 and SR 116 in Sonoma County, and around SR 221 in Napa County.

Locations within the Study Area susceptible to lateral spread include areas near river channels and where artificial fill is placed on slopes.

[3] The Moment Magnitude scale (Mw) measures the amount of energy released by an earthquake at its source. It is an objective measure of earthquake size.

[4] The Modified Mercalli Intensity scale (MMI) is used to describe the intensity of ground shaking associated with an earthquake. It is a subjective measure of earthquake size.

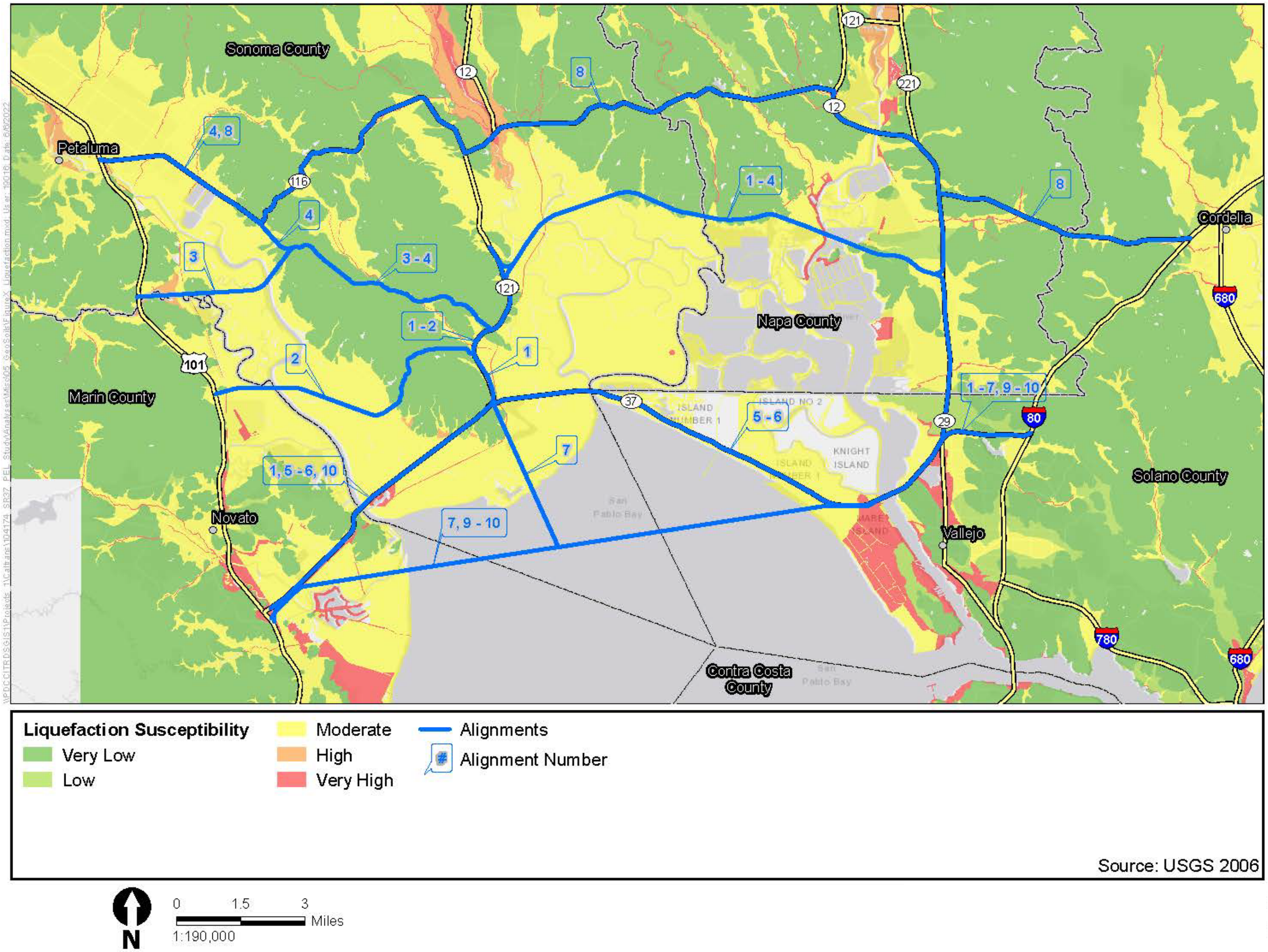

Figure GEO-2. Liquefaction Susceptibility Map

Landslide Risk

As shown on Figure GEO-3, the Study Area includes all classes of susceptibility to landslide, from zero (0) to high (X) susceptibility (CGS 2011). *Landslide susceptibility classes* are generalizations that consider slope gradations and the strength of underlying sediments to express the potential of landslide occurrence. The most landslide-susceptible areas are located in Sonoma County, in the area bounded by SR 121 on the east, SR 116 on the north, and SR 37 on the south, and the Petaluma River on the west and in Napa County, in an area north of SR 12 and west of SR 121. Landslide-susceptible areas are also located in Marin County west of US 101, and in Solano County east of SR 116.

While areas susceptible to landslide occur within the Study Area, CGS Landslide Inventory (2022) mapping shows very little historic landslide activity in the vast majority of the Study Area, with historic landslides occurring primarily in the northern portion. Specifically, in the portion of the Study Area in Marin County, historic landslide activity has occurred west of US 101 and south of San Antonio Road. Sonoma County shows no historic landside activity for the Study Area. The portion of the Study Area in Napa County shows historic landslides occurring just south of SR 12 near Huichica and Carneros Creeks. The portion of the Study Area in Solano County has experienced landslides southeast of the junction of the SR 12 and SR 221 (CGS 2022).

Landside risk modeling on the Metropolitan Transportation Commission (MTC)/Association of Bay Area Governments (ABAG) Hazard View Map shows the southern portion of the Study Area to be gently sloping to nearly level; landslide risk is low in these areas. In contrast, northern portions of the Study Area north of SR 116 and SR 12 show more landslide risk (MTC and ABAG 2022).

10.3.1.3 Soils

Soil composition varies depending on the material from which it is derived, age, and other factors, and soils in the Study Area have different physical, chemical, biological, and morphological properties and chemical characteristics that define their suitability for roadway and facility construction.

Expansive Soils

As shown on Figure GEO-4, the majority of the Study Area is underlain with soils with a Low to Moderate shrink/swell potential, as measured by linear extensibility percentage. However, soils with a High to Very High shrink/swell potential are located along several alignment alternatives, including in Sonoma County southeast of SR 116, in Napa County south of the existing SR 37 and SR 12 alignments, and along the northeastern portion of SR 116 in Solano County.

Erodible Soils

As shown on Figure GEO-5, the majority of the Study Area is underlain with soils with a Slight to Moderate susceptibility to erosion by water. However, soils with a Severe to Very Severe susceptibility to erosion by water are located west of US 101 in Marin County, in portions of Sonoma County south of SR 116, and in Solano County east of SR 116.

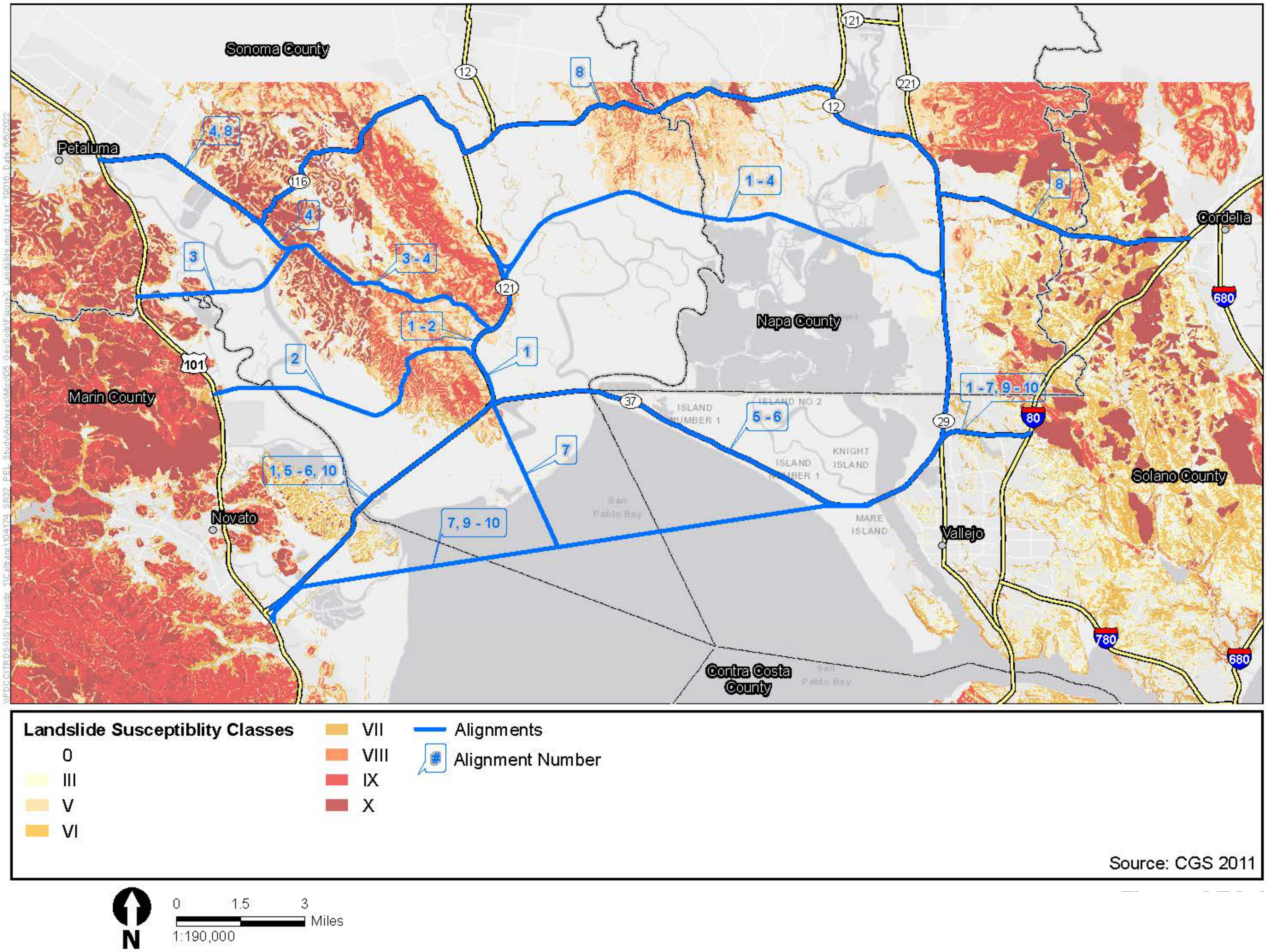

Figure GEO-3. Landslide Susceptibility

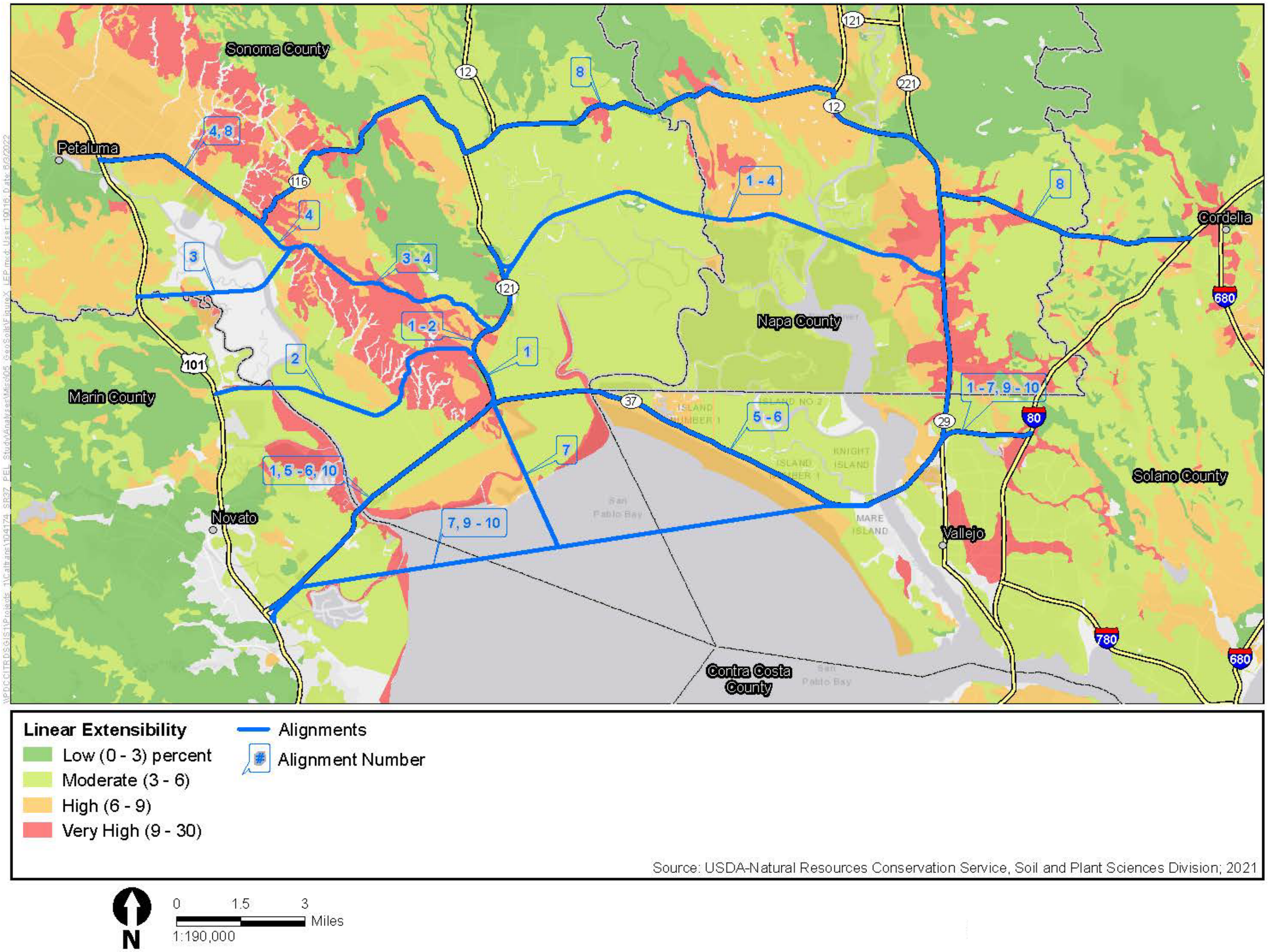

Figure GEO-4. Shrink/Swell Potential Map

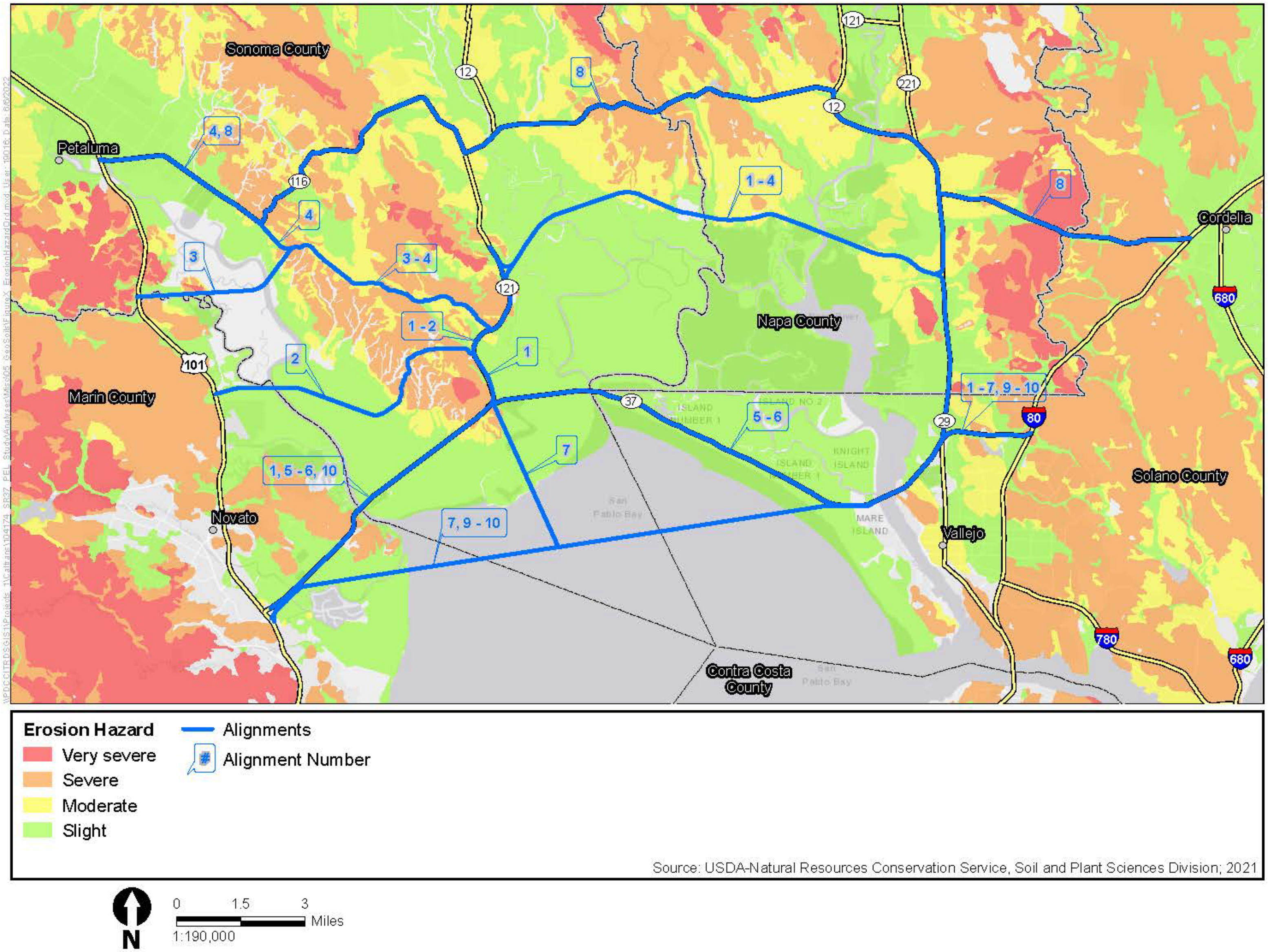

Figure GEO-5. Water Erosion Hazard Map

10.3.2 Minerals

General plans for the four-county region and mapping report that all four counties contain mineral resources, including rock, sand, and earth products (Marin County and Sonoma County); geothermal resources and rock (Napa County); and mercury, sand and gravel, clay, stone products, calcium, and sulfur (Solano County) (County of Marin 2007; County of Sonoma 2008; County of Napa 2013; County of Solano 2008; Geologic Energy Management Division 2019) (Figure GEO-6). Quarries in the four-county region include clay, fill dirt, rock, sand and gravel, shale, and stone. Well types in the four-county region include oil and gas. Among these resources, depending on precise alignment, the project could affect access to stone, sand, gravel, and fill dirt resources.

In addition, the Study Area contains several locations classified as MRZ-2,[5] where geologic units known to contain significant mineral deposits exist for potential future exploitation: crossing the existing SR 37 alignment in its western extent in Marin County, north of SR 12 in Sonoma County, and northeast of SR 12 in Napa County (CGS 2013). In addition, much of the Study Area is classified as MRZ-3, where geologic units are known to contain mineral resources, but where the significance of the mineral resources is not known. Accordingly, it is likely that the project could affect land classified as MRZ-2 or MRZ-3 and could therefore future restrict access to mineral resources.

As shown in Figure GEO-6, no active gas or oil wells are adjacent to the proposed alignments. A search with CALGEM's well finder indicates that all gas and oil wells in the Study Area are plugged (Geologic Energy Management Division 2019). Accordingly, the project is unlikely to affect gas or oil wells.

10.3.3 Paleontological Resources

Geologic units in the Study Area that are known to have yielded significant or unique paleontological resources include the following geologic units (Wagner and Burtugno 1982). Their thickness is described below. The units are listed in chronological order of age.

- Older alluvium, with a maximum thickness of 500 feet (DWR 2014a)
- Glen Ellen Formation, of unknown thickness (DWR 2014a)
- Tehama Formation, with a thickness ranging from 1,500 to 2,500 feet (DWR 2004)
- Petaluma Formation, with a thickness of up to 4,000 feet (DWR 2014b)
- Sonoma Volcanics, a thick highly variable series of volcanic rock composed of three units; each unit several hundred feet thick (DWR 2014a)
- San Pablo Group, with a thickness of up to 1,500 feet (Willmarth 1931)
- Funks Formation, of unknown thickness (Graymer et al. 2002)
- Lower Cretaceous-Upper Jurassic Great Valley Sequence, up to 12,000 feet in thickness for the entire Great Valley Sequence (Bartow and Nilsen 1990)

[5] Mineral Resource Zones are defined above in the Definitions subsection. MRZ-2 is an area where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists.

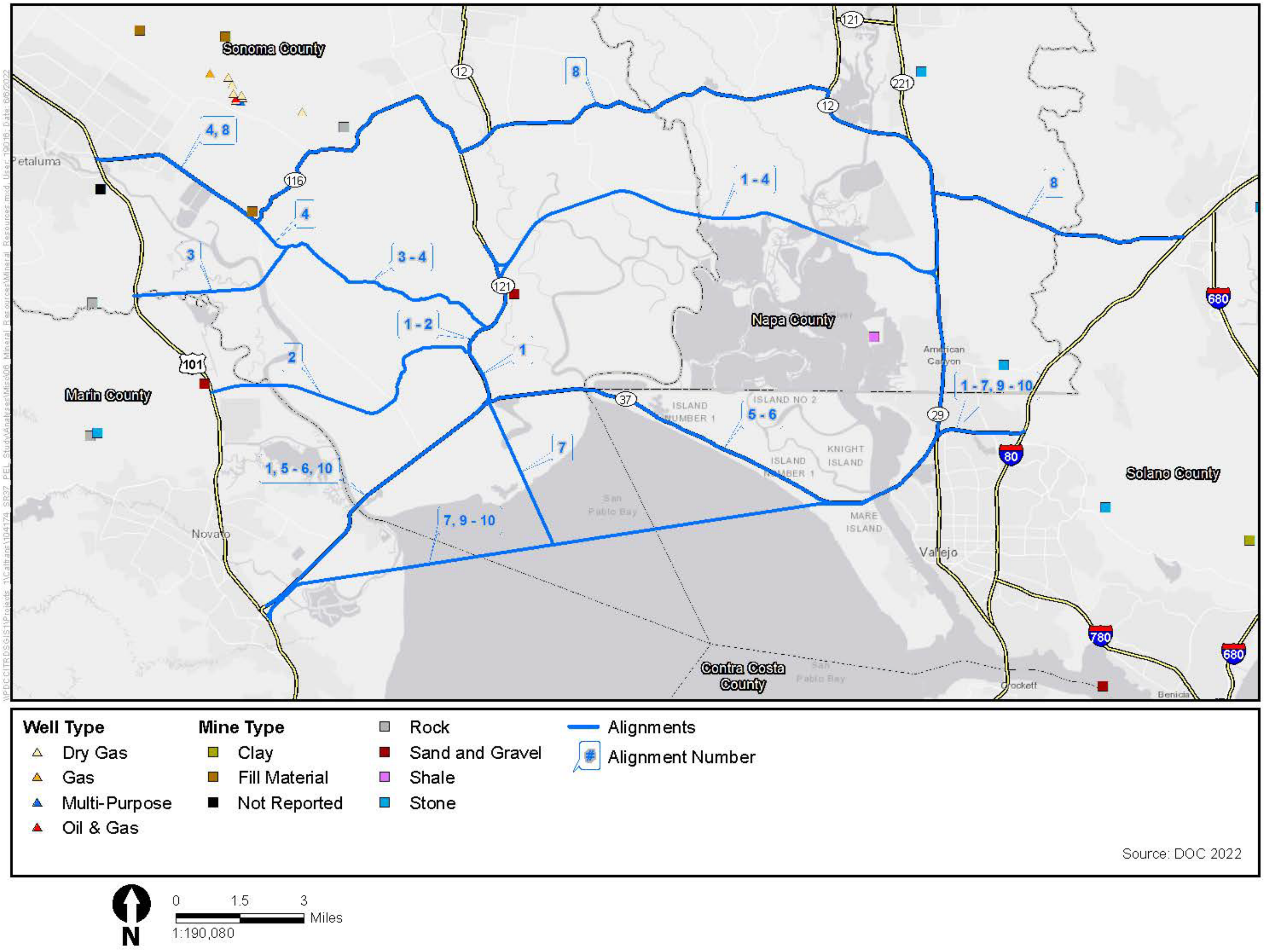

Figure GEO-6. Mineral Resources

These geologic units are considered to have high potential to contain unique paleontological resources (Wagner and Burtugno 1982; UCMP 2022a, 2022b, 2022c, 2022d, 2022e, 2022f, 2022g, 2022h, 2022i, 2022j; Hilton 2003). Surficial expressions of these geologic units are arranged in patchwork fashion across the landscape. In general, these geologic units are layered from youngest at the surface to oldest underlying the younger units.

Geologic units with high paleontological potential are exposed at ground surface throughout the Study Area except in the intertidal marsh area north of San Pablo Bay (Wagner and Burtugno 1982). They can also be inferred to exist at depth below other younger overlying geologic units such as Holocene alluvium and intertidal deposits because of their age and adjacency to these younger units. In addition, geologic units with high paleontological potential likely underlie the younger surficial sediment in San Pablo Bay.

Fossils that have been retrieved from these identified geologic units include vertebrate fossils, invertebrate fossils, plant fossils, and microfossils (i.e., small remains of bacteria, protists, fungi, animals, and plants [Lipps n.d.]) (UCMP 2022a, 2022b, 2022c, 2022d, 2022e, 2022f, 2022g, 2022h, 2022i, 2022j; Hilton 2003). Examples of vertebrate fossils that have been found in geologic units in the Study Area include extinct and still-living genera of mammals such as horse, bison, mammoth, ground sloth, seal, and whale; birds such as auk and fulmar; reptiles such as turtle; dinosaurs; bony fish such as salmon; and cartilaginous fish such as shark.

10.4 Next Steps

The SR 37 PEL Study should consider the full scope of geology, soils, and seismicity-related impacts, including evaluating potential risks related to landslides, surface fault rupture, liquefaction, and lateral spreading. Different alignment alternatives will have different geological and seismicity-related considerations due to the nature of underlying soils, such as their potential for expansion and erosion.

In addition, the SR 37 PEL Study should consider the proximity of mineral resources and paleontological resources along the proposed alignments. Encroachment on existing mines, wells, or mineral resource zones containing known or inferred significant mineral resources could cause the project to interfere with future access to these mineral resources. Construction on geologic units with high paleontological sensitivity could result in damage to or destruction of this nonrenewable resource. Future coordination with governing agencies/bodies may be required.

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Chapter 11
Hazardous Materials

This chapter describes existing known hazardous materials sites in the SR 37 PEL Study Area.

11.1 Methodology

The Study Area for hazardous materials is each alternative alignment and a 1-mile buffer on either side of the alignments.

To assess hazardous materials sites in the hazardous materials Study Area, datasets for the State Water Resources Control Board (SWRCB) Geotracker, Department of Toxic Substances Control (DTSC) EnviroStor, oil and gas wells recorded by the California's Geologic Energy Management Division, and city and county zoning in geographic information systems (GIS) were overlaid with the footprint for the SR 37 proposed alignments (SWRCB 2022; DTSC 2022a; California Department of Conservation 2022; City of American Canyon 2020; City of Napa n.d.; City of Novato 2001; City of Petaluma 2019; City of Vallejo 2012; County of Marin 2015a, 2015b; County of Napa 2022; County of Sonoma 2020). In addition, the Hazardous Waste and Substances Sites List (Cortese list) was consulted to determine the presence or absence of Cortese list parcels in the Study Area (DTSC 2022b).

11.2 Definitions

Hazardous materials include substances or materials determined by the U.S. Environmental Protection Agency to be capable of posing an unreasonable risk to health, safety, or property. Hazardous materials exist within the hazardous materials Study Area at facilities that generate, store, or dispose of these substances, or at locations of past releases of these substances. Examples of hazardous materials include asbestos, lead-based paint, heavy metals, dry-cleaning solvents, and petroleum hydrocarbons (e.g., gasoline, diesel fuels), all of which could be harmful to human health and the environment if released.

The Hazardous Waste and Substances Sites (Cortese) list is a planning document used by agencies and developers to comply with the California Environmental Quality Act requirements in providing information about the location of hazardous materials release sites.

11.3 Existing Conditions

11.3.1 Designated Land Uses in the Study Area

Designated land uses in the hazardous materials Study Area are predominantly agricultural and residential (Figure HAZ-1). However, the Study Area includes the following industrial land uses where hazardous materials could occur because of present or past land use:

- Sonoma County: Limited Rural Industrial (County of Sonoma n.d.)

- Napa County: Industrial Park, General Industrial (County of Napa 2015)
- City of American Canyon: general industrial, light industrial uses, and the Napa County Airport Industrial Area (City of American Canyon 2015)
- City of Vallejo: industrial light (City of Vallejo n.d.)

The Study Area in the following other jurisdictions does not overlap with areas zoned for industrial use: Marin County (County of Marin 2015a), City of Novato (City of Novato 2001; County of Marin 2015b), and City of Petaluma (City of Petaluma 2019). GIS data for Solano County were not available.

11.3.2 Hazardous Materials Sites

As documented by DTSC (2022a, 2022b) and SWRCB (2022), sites containing hazardous materials and underground storage tanks as well as sites with documented contamination occur in the Study Area (Figure HAZ-2). According to EnviroStor databases, there are 16 cleanup sites in the hazardous materials Study Area. According to GeoTracker databases, there are 42 permitted underground storage tanks, 12 active sites, and 93 closed cases in the hazardous materials Study Area. These sites in general are clustered around urban areas, although a small number of such sites occur along SR 37, SR 116, SR 121, and SR 12 in rural areas. No sites on the Cortese list occur in the Study Area (Figure HAZ-2) (DTSC 2022b).

As documented by DTSC (2022a), 20 dry oil or gas wells were mapped within the hazardous materials Study Area (Figure HAZ-2).

11.4 Next Steps

Encountering contaminated groundwater or soils during ground disturbance would have implications for project cost, schedule, mitigation requirements, worker safety, and other aspects of a proposed alternative. Alignment alternatives that could affect contaminated soils or groundwater must be evaluated for the constraints associated with encountering hazardous materials. Because of these risks, avoiding areas of known or suspected contamination is preferred. Project scope and design will need to be specifically reviewed within areas of potential concern to ensure that hazardous materials will not be encountered.

In addition, encountering an oil or gas well during ground disturbance would similarly have implications for project cost, schedule, mitigation requirements, worker safety, and other aspects of a proposed alternative. Such a well would have to be either closed and abandoned or its hole relocated. Avoidance of such wells is preferable. However, if avoidance is not feasible, then additional coordination would have to occur with the well owner over the project construction period.

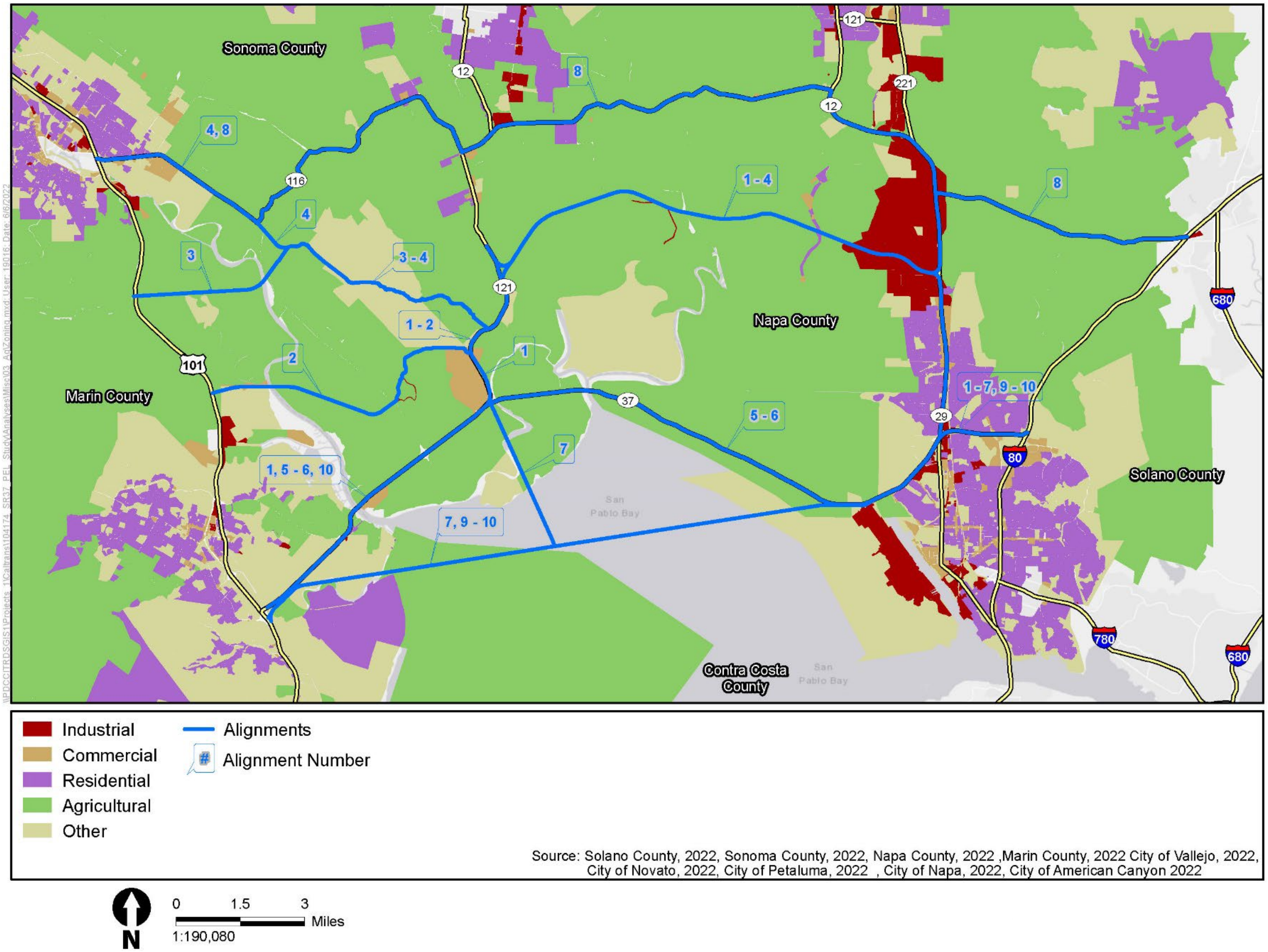

Figure HAZ-1. Designated Land Uses

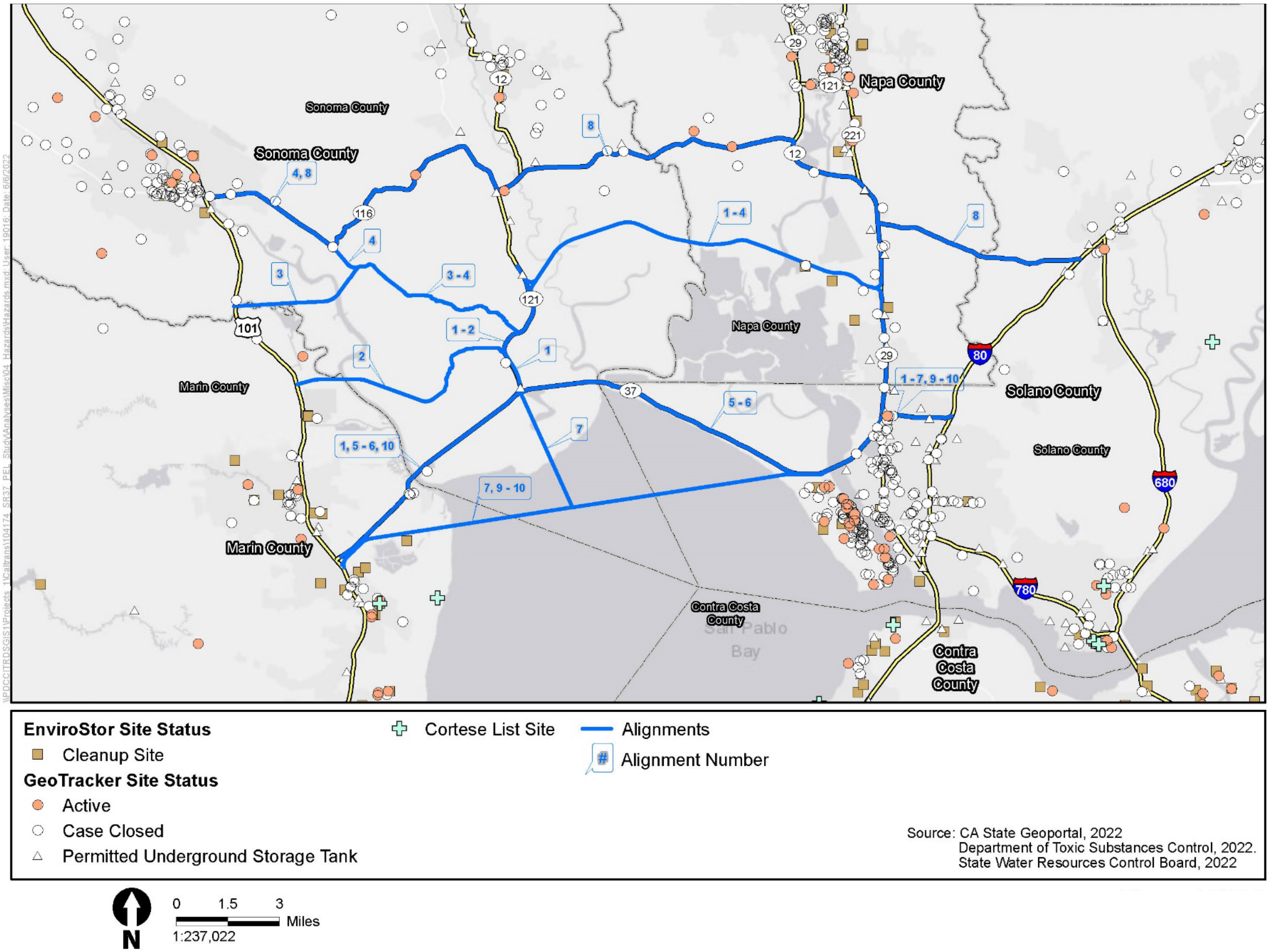

Figure HAZ-2. Hazardous Substances

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Chapter 12

Threatened and Endangered Species, Special Status Species, and Critical Habitat Assessment of Existing Conditions

This chapters summarizes information about the distribution and population of special status species and the presence of critical habitat from geographic information system (GIS) data from the California Natural Diversity Database (CNDDB) and the U.S. Fish and Wildlife Service (USFWS).

12.1 Methodology

GIS data from the CNDBB was used to identify the potential for federally and state-listed species to occur within the SR 37 PEL Study Area. USFWS and National Marine Fisheries Service (NMFS) GIS data was also used to identify federal critical habitat within the SR 37 PEL Study Area.

A desktop review based upon GIS data was used to identify the total number of federally listed threatened or endangered species and state-listed species with the potential to occur in the proposed right-of-way (ROW) of each alignment. USFWS and NMFS GIS data was also used to calculate the acreage of critical habitat that would be converted to a transportation use within the proposed right-of-way of each alignment.

12.2 Existing Conditions

This section summarizes the occurrence of special status species and their habitats in the vicinity of the SR 37 PEL Study Area. Special status species include federally and state-designated wildlife and plant species.

Species discussed in this chapter are protected by the following federal and state regulations and policies:

- The Endangered Species Act (ESA) protects federally listed plant and animal species to ensure their long-term survival.
- The California Endangered Species Act (CESA) protects rare, endangered, and threatened species and their essential habitats within California.

12.2.1 Special Status Species

Based on a review of the CNDBB, there are 47 special status species of mammals, birds, amphibians, insects, crustaceans, fish, and plants that have the potential to occur within the Study Area (Table SSS-1).

Table SSS-1. Special Status Species with the Potential to Occur in the PEL Study Area

Common Name	Scientific Name	Status	Critical Habitat	Habitat
Mammals				
Salt-marsh harvest mouse	*Reithrodontomys raviventris*	FE, SE	N/A	Pickleweed-dominated vegetation; primarily found in marsh habitats around the San Francisco Bay Estuary
Southern sea otter	*Enhydra lutris nereis*	ST	N/A	Marine coastal areas along central California coastline, including rocky and sandy areas on coast, bays, and estuaries
Birds				
Bald eagle	*Haliaeetus leucocephalus*	SE	N/A	Near rivers, lakes, marshes, and sometimes urban areas with perching areas and nesting sites
Bank swallow	*Riparia riparia*	ST	N/A	Near water; fields, marshes, streams, lakes
California black rail	*Laterallus jamaicensis coturniculus*	ST	N/A	Riparian marshes, salt marshes, and impounded wetlands
California clapper rail	*Rallus longirostris obsoletus*	FE	N/A	Salt marshes dominated by cordgrass, pickleweed, mangroves, and other vegetation
California least tern	*Sternula antillarum browni*	FE, SE	N/A	Sandy, shelly beaches; islands on coastlines or rivers; dry mudflats
California Ridgway's rail	*Rallus obsoletus obsoletus*	FE, SE	N/A	Saltmarsh swamps with extensive vegetation
Northern Spotted Owl	*Strix occidentalis caurina*	FT, ST	N/A	Evergreen tree forests in cool, northern latitudes
Swainson's hawk	*Buteo swainsoni*	ST	N/A	Plains, dry grassland, farmland, ranch country
Tricolored blackbird	*Agelaius tricolor*	ST	N/A	Cattail or tule marshes; forages in fields, farms
Western snowy plover	*Charadrius nivosus nivosus*	FT	Designated	Open, sandy areas adjacent to water, including ocean beaches and barrier islands
Yellow-billed cuckoo	*Coccyzus americanus*	FT	N/A	Canopies of deciduous trees
Reptiles				
Alameda whipsnake	*Masticophis lateralis euryxanthus*	FT	N/A	Chaparral and adjacent grasslands; rock outcrops
Giant garter snake	*Thamnophis gigas*	FT	N/A	Marshes, sloughs, ponds, and small lakes or streams; agricultural wetlands; irrigation and drainage canals
Green sea turtle	*Chelonia mydas*	FT	N/A	Near coastline in bays, particularly in areas with seagrass beds

Common Name	Scientific Name	Status	Critical Habitat	Habitat
Amphibians				
California red-legged frog	*Rana draytonii*	FT	Designated	Primarily found in coastal drainages of central California from Marin County, California to Baja California, Mexico
California tiger salamander	*Ambystoma californiense*	FE, ST	N/A	Annual grasslands and oak woodlands in California's Sacramento and San Joaquin River valleys, the surrounding foothills, and California's central coast
Foothill yellow-legged frog	*Rana boylii*	SE	N/A	Pacific drainages between Oregon to California
Insects				
Callippe silverspot butterfly	*Speyeria callippe callippe*	FE	N/A	Native grassland and adjacent habitat in the San Francisco Bay region
Monarch butterfly	*Danaus plexippus*	FC	N/A	Undeveloped, rural, or urban areas where milkweed is present; overwintering population in California along the Pacific Coast in eucalyptus, Monterey pines, and Monterey cypress trees
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT	N/A	Riparian areas and foothill oak woodlands in California's Central Valley
Crustaceans				
California freshwater shrimp	*Syncaris pacifica*	FE, SE	N/A	Streams with undercut banks, exposed roots, or overhanging woody debris or vegetation
Conservancy fairy shrimp	*Branchinecta conservatio*	FE	N/A	Ephemeral or temporary vernal pools
Vernal pool fairy shrimp	*Branchinecta lynchi*	FT	Designated	Rural areas, grassland, and wetlands with vernal pools or temporary waters within California's Central Valley, central coast, southern California, and southern Oregon
Fish				
Chinook salmon	*Oncorhynchus tshawytscha*	FE, ST	Designated	Colder upper reaches of the Pacific Ocean and breed in freshwater rivers and streams of the Pacific Northwest
Delta smelt	*Hypomesus transpacificus*	FT, SE	N/A	Brackish water below 25 degrees Celsius; upper reaches of the San Francisco Bay and Sacramento-San Joaquin Delta Estuary
Green sturgeon	*Acipenser medirostris*	FT	Designated	Inshore waters to 200 feet in seawater and mixing zones of bays and estuaries

Common Name	Scientific Name	Status	Critical Habitat	Habitat
Longfin smelt	*Spirinchus thaleichthys*	FC, ST	N/A	Open water of estuaries in seawater and freshwater areas
Steelhead	*Oncorhynchus mykiss irideus*	FT	Designated	Cold-water streams with adequate dissolved oxygen
Tidewater goby	*Eucyclogobius newberryi*	FE	N/A	Lagoons, backwater marshes, and freshwater tributary entries peripheral to bays and estuaries
Plants				
Burke’s goldfields	*Lasthenia burkei*	FE	N/A	Vernal pools and swales primarily in Sonoma County
Contra Costa goldfields	*Lasthenia conjugens*	FE	Designated	Endemic to a limited range within the San Francisco Bay Area at elevations below 330 feet
Marin Dwarf-flax	*Hesperolinon congestum*	FT, ST	N/A	San Mateo, San Francisco, and Marin counties, California in serpentine soils in dry native bunch grasses at elevations less than 650 feet
Mason's lilaeopsis	*Lilaeopsis masonii*	SR	N/A	Endemic to California near the San Francisco Bay in freshwater and brackish marshes and other estuary habitat
Pitkin Marsh lily	*Lilium pardalinum ssp. pitkinense*	FE, SE	N/A	Endemic to wetlands and freshwater marshes in Sonoma County, California
Santa Cruz tarplant	*Holocarpha macradenia*	FT	N/A	Coastal terrace prairie habitat along California’s central coast
Sebastopol meadowfoam	*Limnanthes vinculans*	FE	N/A	Sonoma and Napa Counties, primarily near the City of Santa Rosa
Showy Indian clover	*Trifolium amoenum*	FE	N/A	Low wet swales, grasslands, and grassy hillsides at elevations below 1,020 feet
Soft bird's-beak	*Chloropyron molle ssp. molle*	FE, SR	Designated	Coastal salt marshes in the marsh/upland transition zone
Sonoma alopecurus	*Alopecurus aequalis var. sonomensis*	FE	N/A	Riparian, freshwater marshes
Sonoma spineflower	*Chorizanthe valida*	FE, SE	N/A	Endemic to Marin County, California
Sonoma sunshine	*Blennosperma bakeri*	FE, SE	N/A	Endemic to Sonoma County, California in vernal pools
Suisun thistle	*Cirsium hydrophilum var. hydrophilum*	FE	N/A	Boggy, upper reaches of tidal marshes
Tiburon paintbrush	*Castilleja affinis var. neglecta*	FE, SE	N/A	Endemic to Marin, Napa, and Santa Clara counties in serpentine soils below 980 feet in elevation

Common Name	Scientific Name	Status	Critical Habitat	Habitat
Two-fork clover	*Trifolium amoenum*	FE	N/A	Grassland areas of the San Francisco Bay Area and northern California Coast Ranges at elevations below 330 feet
Yellow larkspur	*Delphinium luteum*	FE	N/A	Wet cliffs, coastal grassland, chaparral

Sources: CBD 2022, CDFW 2022, Cornell University 2022, The National Audubon Society 2022, NMFS 2022, USFWS 2022a, USFWS 2022b

Table Notes:

FC = federal candidate species
FE = federally listed as endangered
FT = federally listed as threatened
SE = state listed as endangered
SR = state listed as rare
ST = state listed as threatened

12.2.2 Critical Habitat

The SR 37 PEL Study Area also includes critical habitat for the western snowy plover, soft bird's beak, and vernal pool fairy shrimp within the Napa-Sonoma Marshes Wildlife Area (USFWS 2022a). Critical habitat for Contra Costa goldfields is also present along SR 221 (Napa Valley Highway) near its intersection with SR 12 (USFWS 2022a). SR 12 also crosses between separate designated areas of critical habitat for California red-legged frog between the Napa County Airport and Cordelia (USFWS 2022a). Aquatic critical habitat for the chinook salmon, green sturgeon, and steelhead is also present within the San Pablo Bay and its tributaries, including the Petaluma River, Tolay Creek, Sonoma River, and Napa River (NMFS 2022). Figure SSS-1 illustrates the location and extent of these areas of critical habitat.

12.2.3 Habitat of Particular Concern

In addition, San Pablo Bay is also a habitat area of particular concern (HAPC) for groundfish pursuant to the National Marine Fishery Service's Pacific Coast Groundfish Fishery Management Plan (FMP) (NMFS 2020). The Pacific Coast Groundfish FMP identifies goals and objectives to manage the groundfish populations in Washington, Oregon, and California, including identifying essential fish habitat and HAPCs (NMFS 2020). The Pacific Coast Groundfish FMP designates estuaries as a HAPC for groundfish, which includes the San Pablo Bay (NMFS 2020).

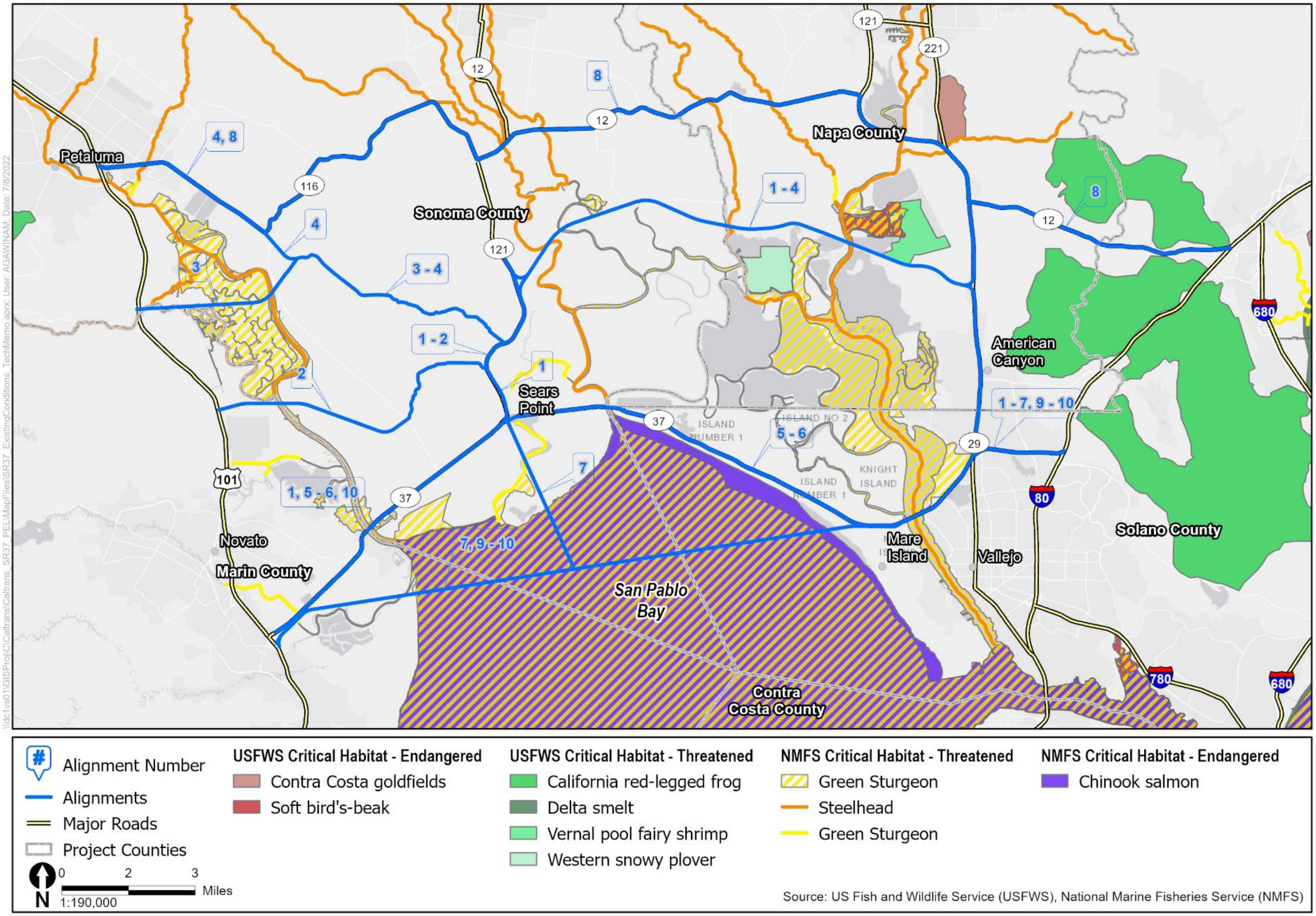

Figure SSS-1. Critical Habitat

12.3 Next Steps

A preliminary desktop review indicates the species listed in Table SSS-1 have the potential to occur within the SR 37 PEL Study Area. However, it is possible that suitable habitat for these species may not be present within the Study Area. Therefore, as planning efforts continue, additional desktop reviews and a field survey would be necessary to confirm the presence of any special status species that any alignment may affect.

As future projects are programmed from the PEL, consultation and coordination would be necessary with USFWS and the California Department of Fish and Wildlife (CDFW), including Section 7 consultation under the ESA. In addition, potential impacts to special status species should be evaluated as applicable in a National Environmental Policy Act (NEPA) analysis. The NEPA evaluation process would provide a more detailed determination regarding potential impacts to special status species and critical habitat and would identify any appropriate mitigation measures.

12.4 References

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California Native Plant Society. 2022. Calscape. Available at: https://calscape.org/. Accessed May 4, 2022.

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U.S. Fish and Wildlife Service (USFWS). 2022b. Species. Available at: https://www.fws.gov/species. Accessed May 4, 2022.

Chapter 13
Bird Habitat Assessment of Existing Conditions

This chapter describes existing bird habitat and migratory birds with the potential to occur in the SR 37 PEL Study Area.

13.1 Methodology

This chapter identifies the potential presence of migratory birds within the SR 37 PEL Study Area based on the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool, as well as the distribution of high-priority long-term tidal marsh bird habitat bird habitat using geographic information system (GIS) data from Point Blue Conservation Science.

13.2 Definitions

13.2.1 Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act

The Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) protect designated migratory birds and bald and golden eagles from any activity that results in a "take." A take includes the killing, capturing, selling, trading, and transport of protected migratory bird or eagle species (USFWS 2022a).

13.2.2 High Priority Bird Habitat

Point Blue Conservation Science developed scenarios of climate change impacts on bird species from 2010 to 2110 based on low or high rates of sea level rise (0.52 or 1.65 meters in 100 years) and low or high suspended sediment availability (Veloz et al. 2012). Based upon these assumptions, Point Blue Conservation Science identified high-priority bird habitat for five critical tidal marsh bird species: Clapper Rail (*Rallus crepitans*), Black Rail (*Laterallus jamaicensis*), Common Yellowthroat (*Geothlypis trichas*), Marsh Wren (*Cistothorus palustris*), and Song Sparrow (*Melospiza melodia*) (Veloz et al. 2012). High priority areas are those that are most important for conservation for current and future tidal marsh bird habitat because loss of these areas would result in irreversible adverse harm to tidal marsh bird species (Veloz et al. 2012).

13.3 Existing Conditions

The area surrounding San Pablo Bay within the SR 37 PEL Study Area provides critical and important marsh bird and waterfowl habitat. Freshwater wetlands, tidal saltmarsh, and tidally-exposed mudflats provide bird habitat within the Study Area. Within the SR 37 PEL Study Area, the San Pablo Bay National Wildlife Refuge, Petaluma Marsh Wildlife Area, and Napa-Sonoma Marsh

Wildlife Area have been established to preserve land as open space to support migratory bird and wetland habitat.

The San Pablo Bay wetlands support almost the entire range of the endemic San Pablo Song Sparrow (*Melospiza melodia ssp. Samuelis*) and about half the global population of the California Black Rail (*Laterallus jamaicensis coturniculus*) (National Audubon Society 2022). The San Pablo Bay wetlands are regionally significant for several bird species, such as the Bufflehead (*Bucephala albeol*), Western Snowy Plover (*Charadrius nivosus nivosus*), Song Sparrow (*Melospiza melodia*), Burrowing Owl (*Athene cunicularia*), Tricolored Blackbird (*Agelaius tricolor*), Canvasback (*Aythya valisineria*), and the Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*) (National Audubon Society 2022).

13.3.1 Migratory Birds

Based on a review of the IPaC, there are 36 migratory bird species with the potential to occur in the Study Area (Table BH-1).

Table BH-1. Migratory Birds with the Potential to Occur in the PEL Study Area

Common Name	Scientific Name	Breeding Season
Allen's Hummingbird	*Selasphorus sasin*	February 1 to July 15
Bald Eagle	*Haliaeetus leucocephalus*	January 1 to August 31
Black Oystercatcher	*Haematopus bachmani*	April 15 to October 31
Black Scoter	*Melanitta nigra*	Breeds elsewhere
Black Skimmer	*Rynchops niger*	May 20 to September 15
Black Swift	*Cypseloides niger*	June 15 to September 10
Black Tern	*Chlidonias niger*	May 15 to August 20
Black Turnstone	*Arenaria melanocephala*	Breeds elsewhere
Brown Pelican	*Pelecanus occidentalis*	January 15 to September 30
California Thrasher	*Toxostoma redivivum*	January 1 to July 31
Cassin's Finch	*Carpodacus cassinii*	May 15 to July 15
Clark's Grebe	*Aechmophorus clarkia*	June 1 to August 31
Common Loon	*Gavia immer*	April 15 to October 31
Common Murre	*Uria aalge*	April 15 to August 15
Common Yellowthroat	*Geothlypis trichas sinuosa*	May 20 to July 31
Double-crested Cormorant	*Phalacrocorax auritus*	April 20 to August 31
Golden Eagle	*Aquila chrysaetos*	January 1 to August 31
Lawrence's Goldfinch	*Carduelis lawrencei*	March 20 to September 20
Long-eared Owl	*Asio otus*	March 1 to July 15
Long-tailed Duck	*Clangula hyemalis*	Breeds elsewhere
Marbled Godwit	*Limosa fedoa*	Breeds elsewhere
Nuttall's Woodpecker	*Picoides nuttallii*	April 1 to July 20
Oak Titmouse	*Baeolophus inornatus*	March 15 to July 15
Olive-sided Flycatcher	*Contopus cooperi*	May 20 to August 31
Red Phalarope	*Phalaropus fulicarius*	Breeds elsewhere
Red-breasted Merganser	*Mergus serrator*	Breeds elsewhere
Red-necked Phalarope	*Phalaropus lobatus*	Breeds elsewhere
Red-throated Loon	*Gavia stellata*	Breeds elsewhere
Ring-billed Gull	*Larus delawarensis*	Breeds elsewhere
Short-billed Dowitcher	*Limnodromus griseus*	Breeds elsewhere
Surf Scoter	*Melanitta perpicillata*	Breeds elsewhere
Tricolored Blackbird	*Agelaius tricolor*	March 15 to August 10
White-winged Scoter	*Melanitta fusca*	Breeds elsewhere
Willet	*Tringa semipalmata*	Breeds elsewhere
Wrentit	*Chamaea fasciata*	March 15 to August 10
Yellow-billed Magpie	*Pica nuttalli*	April 1 to July 31

Source: USFWS 2022b

13.3.2 High Priority Long-Term Bird Habitat

Higher priority long-term bird habitat within the Study Area is primarily concentrated along the coastline of San Pablo Bay and its tributaries, including the Petaluma River, Tolay Creek, Sonoma Creek, and the Napa River (Point Blue Conservation Science 2022). High priority bird habitat is concentrated along the Petaluma River to its confluence with San Pablo Bay. Outside of these areas, most of the remaining portions of the Study Area is considered low priority bird habitat, primarily in agricultural areas.

13.4 Next Steps

The SR 37 PEL Study should consider the presence of high-priority bird habitat and migratory birds along the proposed alignments and evaluate the potential adverse impacts to bird habitat from project construction.

A preliminary desktop review indicates the migratory birds listed in Table BH-1 have the potential to occur within the SR 37 PEL Study Area. As planning efforts continue, a field survey to identify and map migratory bird and nest locations should be conducted. As future projects are programmed from the PEL, potential impacts to bird habitat and migratory birds should be evaluated as applicable in a National Environmental Policy Act (NEPA) analysis. The NEPA analysis would provide a more detailed evaluation regarding potential impacts to bird habitat and migratory birds and would identify any appropriate mitigation measures. Any future project construction must adhere to the requirements of both the MBTA and the BGEPA. In addition, migratory bird surveys may be required for active bird nests prior to construction if any vegetation removal is required during the breeding season.

13.5 References

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Chapter 14
Vegetation Assessment of Existing Conditions

This chapter describes existing vegetation cover in the SR 37 PEL Study Area.

14.1 Methodology

14.1.1 Data Gathering and Analysis Approach

This chapter summarizes information about the existing vegetation cover within the SR 37 PEL Study Area based on Global Information Systems (GIS) data from the U.S. Forest Service's Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) dataset. A desktop review based upon CALVEG GIS data was used to identify the total acreage of each type of vegetative cover within the SR 37 PEL Study Area.

14.2 Definitions

This section identifies the native vegetation and common vegetation species present within the study area, as well as explains the CALVEG dataset's classification system.

14.2.1 CALVEG Dataset Categories

The CALVEG dataset identifies existing vegetative type and land use cover. The CALVEG dataset classifies vegetation into eight broad formation classes based upon climate pattern, phenology, and dominant species based upon the National Vegetation Classification Standards (USFS 1981).

14.2.2 Native Plant Communities

Much of the natural vegetation within the SR 37 PEL Study Area has been converted to agricultural use; suburban, commercial, and residential areas; urban development; and non-native ornamental vegetation. However, the SR 37 PEL Study Area is interspersed with open space areas with native vegetation. The primary native plant communities are grasslands, coastal scrub, woodlands, riparian, and wetlands (Bay Area Open Space Council 2019).

14.2.3 Grasslands

Two categories of grasslands occur within the San Francisco Bay Area (Bay Area): nonnative annual grasslands and perennial grasslands (e.g., serpentine bunchgrass and valley needlegrass grasslands) (CNPS 2022). Grasslands are the most heavily modified vegetation within the Bay Area due to non-native invasive grasses and forbs (Bay Area Open Space Council 2019). Most of the grassland within the Bay Area are non-native species, such as brome grasses (*Bromus)*, yellow-star thistle (*Centaurea solstitialis*), Indian paintbrush (*Castilleja* spp.), and California poppy (*Eschscholzia californica*) (CNPS 2022).

14.2.4 Coastal Scrub

Coastal scrub plant communities are characterized by dense, low shrubs with sparse understory. Dominant species in coastal scrub plant communities in the Bay Area include California buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemesia californica*), coyote brush (*Baccharis pilularis*), and black sage (*Salvia mellifera*) (CNPS 2022).

14.2.5 Woodlands

Bay Area woodlands are typically dominated by oak species, such as coast live oak (*Quercus agrifolia*), blue oak (*Quercus douglasii*), California black oak (*Quercus kelloggii*), or valley oak (*Quercus lobata*) (CNPS 2022). Other notable woodland tree species include big-leaf maple (*Acer macrophyllum*), tan oak (*Notholithocarpus densiflorus*), California bay (*Umbellaria californica*), madrone (*Arbutus menziesii*), and California buckeye (*Aesculus californica*) (CNPS 2022). The understory of Bay Area woodlands generally includes shrubs such as toyon (*Heteromeles arbutifolia*), snowberry (*Symphoricarpos albus*), poison oak (*Toxicodendron diversilobum*), gooseberry (*Ribes spp.*), ocean spray (*Holodiscus discolor*), and California blackberry (*Rubus ursinus*) (CNPS 2022). The understory also usually features non-native brome grasses, blue wildrye (*Elymus glaucus*), mission bells (*Fritillaria affinis*), chickweed (*Stellaria media*), bedstraw (*Galium aparine*), mugwort (*Artemesia douglasiana*), fiesta flower (*Pholistoma auritum*), and miner's lettuce (*Claytonia perfoliata*) (CNPS 2022).

14.2.6 Riparian

Riparian plant communities occur along aquatic features, such as streams or rivers, and are dominated by trees or shrubs. Typical dominant species in riparian habitats along Bay Area aquatic features include Fremont cottonwood (*Populus fremontii*), California sycamore (*Platanus racemosa*), various species of willow (*Salix* spp.), coast live oak, valley oak, and white alder (*Alnus rhombifolia*) (CNPS 2022).

14.2.7 Wetlands

Coastal salt marshes around the San Francisco Bay, including historically diked marshes, are generally dominated by perennial pickleweed (*Salicornia pacifica*), alkali heath (*Frankenia salina*), spearscale (*Atriplex triangularis*), marsh gumplant (*Grindelia stricta var. angustifolia*), and saltgrass (*Distichlis spicata*) (CNPS 2022). Freshwater wetlands usually feature perennial grasses. Vernal pools also seasonally support many endemic and rare plant species.

14.3 Existing Conditions

The CALVEG data identifies four vegetation classifications present within the SR 37 PEL Study Area: hardwood forest/woodland, herbaceous, mixed conifer and hardwood forest/woodland, and shrub. Figure V-1 illustrates the locations of each type of vegetation and land coverage throughout the Study Area.

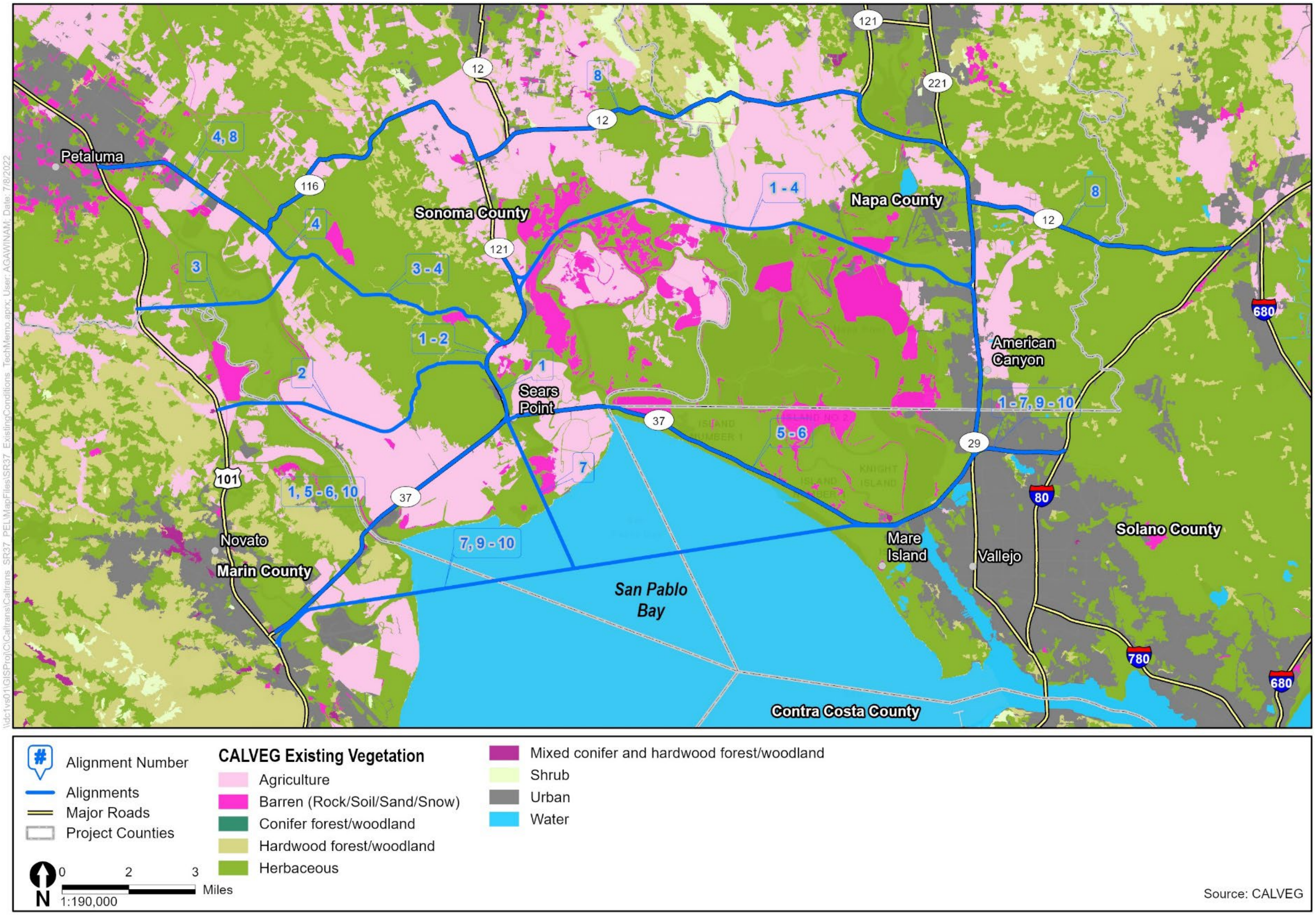

Figure V-1. CALVEG Existing Vegetation

Table V-1 below summarizes the area and types of vegetation and land coverage found within the SR 37 PEL Study Area based upon a review of GIS data from CALVEG. Herbaceous vegetation is the most prevalent vegetation type and is present in a little more than half of the Study Area (56 percent). Approximately 27 percent of the native vegetation in the SR 37 PEL Study Area has been converted to agriculture.

Table V-1. Vegetation and Land Cover Present in the PEL Study Area

Vegetation/Land Coverage Type	Area (sq mi)
Agriculture	42.5
Barren (Rock/Soil/Sand)	13.2
Hardwood Forest/Woodland	5.8
Herbaceous	89.4
Mixed Conifer and Hardwood Forest/Woodland	0.1
Shrub	0.8
Urban	6.9
Inland Water	0.2

Source: USFS 2018

14.4 Next Steps

The SR 37 PEL Study should consider the presence of undisturbed, native vegetation along the proposed alignments and evaluate the potential adverse impacts of removal of such vegetation. As future projects are programmed from the PEL, potential impacts to vegetation should be evaluated as applicable in a National Environmental Policy Act (NEPA) analysis. The NEPA evaluation process would provide a more detailed determination regarding potential impacts to native vegetation and would identify any appropriate mitigation measures.

14.5 References

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Chapter 15

Wetlands and Waters of the U.S. and State Assessment of Existing Conditions

This chapter describes wetlands and Waters of the US (WOTUS) in the SR 37 PEL Study Area.

15.1 Methodology

15.1.1 Data Gathering and Analysis Approach

This chapter includes information about the distribution of streams and potential WOTUS within the SR 37 PEL Study Area based on geographic information system (GIS) data from the U.S. Geological Survey (USGS) National Hydrography Dataset (NHD), as well as the presence of wetlands based on data from the California Aquatic Resource Inventory (CARI) and the National Wetlands Inventory (NWI). The wetlands present have been classified with the Cowardin classification system. A desktop review based upon CARI and NWI GIS data was conducted to identify the total acreage of wetlands by Cowardin classification within the SR 37 PEL Study Area. In addition, this chapter identifies U.S. Coast Guard (USCG) regulated coastal channels.

15.2 Definitions

15.2.1 Waters of the U.S.

Section 404 of the Clean Water Act (CWA) regulates the dredge and fill of materials into WOTUS. The CWA does not define WOTUS; rather, it directs the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (Corps) to define WOTUS in regulations. The limits of WOTUS are formally identified through jurisdictional determinations issued by the Corps. Section 401 of the CWA also requires any applicant requesting a federal Section 404 CWA permit to obtain a Section 401 certification from the state where the discharge originates to verify the prospective permittee complies with the state's applicable effluent limitations and water quality standards.

In addition, Section 10 of the Rivers and Harbors Act of 1899 regulates the dredge and fill of materials into navigable WOTUS. The USCG evaluates the navigability of waterways to determine its jurisdiction on those waterways. Navigable waters, regulated by the USCG, are defined as territorial seas of the U.S. and all internal waters of the U.S. that are subject to tidal influence (33 Code of Federal Regulations [CFR] 2.36).

15.2.2 Wetland Systems and Subsystems

Wetlands are transitional lands, "between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water" (Federal Geographic Data Committee 2013). Wetlands are classified into systems and subsystems based upon hydrologic, geomorphologic, chemical, and biological factors, such as plant and animal communities present within the wetland and the substrate type.

The Cowardin system identifies five major systems of wetlands and deepwater habitats: Marine, Estuarine, Lacustrine, Palustrine, and Riverine within the Study Area. The Study Area does not include any Marine deep-water habitat; therefore, this system is not discussed in this chapter. The definitions of each wetland system and subsystem present within the Study Area are discussed below.

15.2.3 Estuarine

The Estuarine system, "consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land (Federal Geographic Data Committee 2013)." The Estuarine system has two subsystems: subtidal and intertidal. Subtidal estuarine wetlands are those where the substrate is continuously covered with tidal water (Federal Geographic Data Committee 2013). Intertidal estuarine wetlands are those with substrate flooded and exposed by tides (Federal Geographic Data Committee 2013).

15.2.4 Lacustrine

The Lacustrine system includes all wetlands and deepwater habitats that are at least 20 acres within a topographic depression or dammed river channel that lacks trees, shrubs, persistent emergent, emergency mosses or lichens with 30 percent or greater areal coverage with salinity less than 0.5 parts per thousand (ppt) (Federal Geographic Data Committee 2013). The Lacustrine system has two subsystems: limnetic and littoral. The limnetic subsystem encompasses all deepwater habitats within the Lacustrine system, whereas the littoral subsystem encompasses all wetland habitats within the Lacustrine system (Federal Geographic Data Committee 2013).

15.2.5 Palustrine

The Palustrine system includes nontidal wetlands dominated by trees, shrubs, persistent emergent, emergent mosses or lichens, and wetlands within tidal areas with salinity less than 0.5 ppt (Federal Geographic Data Committee 2013). The Palustrine system has no subsystems (Federal Geographic Data Committee 2013).

15.2.6 Riverine

The Riverine system includes all wetlands and deepwater habitats within a channel, except for (1) wetlands dominated by trees, shrubs, persistent emergent, emergent mosses, or lichens; or (2) habitats with water with a salinity of 0.5 ppt or greater (Federal Geographic Data Committee 2013). Three riverine subsystems are present within the SR 37 PEL Study Area[1]: lower perennial, upper perennial, and intermittent. Lower perennial riverine wetlands have no tidal influence with a substrate of mainly sand and mud with a lower gradient than the upper perennial subsystem (Federal Geographic Data Committee 2013). The upper perennial subsystem also has no tidal

[1] The Riverine system also includes the tidal subsystem. The tidal subsystem is not discussed because the study area does not include any Riverine Tidal wetlands or deepwater habitat.

influence, but has a substrate of rock, cobbles, or gravel with patches of sand with a higher gradient than the lower perennial subsystem (Federal Geographic Data Committee 2013). Intermittent riverine habitat has channels with flowing water only part of the year (Federal Geographic Data Committee 2013).

15.2.7 Wetland Classes and Subclasses

Wetland systems and subsystems are further categorized by classes that describe the general appearance of the wetland habitat either by dominant vegetation or the physiography and composition of the substrate (Federal Geographic Data Committee 2013). Subclasses further specify the life form with the greatest spatial coverage within the wetlands (Federal Geographic Data Committee 2013).

The definitions of each wetland class and subclass present within the SR 37 PEL Study Area are discussed below and is not a comprehensive list of all wetlands and deepwater habitat classes and subclasses under the Cowardin classification system.

15.2.8 Unconsolidated Bottom

All wetlands and deepwater habitats with at least 25 percent areal cover of particles smaller than stones and a vegetative cover less than 30 percent are part of the unconsolidated bottom wetland class (Federal Geographic Data Committee 2013).

15.2.9 Streambed

The streambed wetland class consists of all intermittent Riverine wetlands, tidal Riverine channels that are dewatered at low tide, and Estuarine channels (Federal Geographic Data Committee 2013).

15.2.10 Unconsolidated Shore

The unconsolidated shore wetland class encompasses wetland habitats with unconsolidated substrates with less than 75 percent areal cover of stones, boulders, or bedrock; and less than 30 percent areal cover of vegetation (e.g., beaches, bars, and flats) (Federal Geographic Data Committee 2013).

15.2.11 Emergent Wetland

Emergent wetlands are those with emergent plants (i.e., erect, rooted, herbaceous hydrophytes, excluding mosses and lichens) (Federal Geographic Data Committee 2013). The emergent wetlands within the SR 37 PEL Study Area are part of the persistent subclass. The persistent subclass of emergent wetlands on the Pacific Coast are typically dominated by woody saltwort (*Salicornia virginica*), broom seepweed (*Suaeda californica*), seaside arrow-grass (*Triglochin maritimum*), and California cordgrass (*Spartina foliosa*) (Federal Geographic Data Committee 2013).

15.2.12 Scrub-Shrub Wetland

Woody plants less than 20 feet tall are the dominant life form within scrub-shrub wetlands (Federal Geographic Data Committee 2013). The scrub-shrub wetlands within the SR 37 PEL Study Area are part of the broad-leaved deciduous subclass that are primarily covered with broad-leaved deciduous vegetation. Typically, in the Palustrine System, the dominant species include alders (*Alnus* spp.), willows (*Salix* spp.), buttonbush (*Cephalanthus occidentalis*), red osier dogwood (*Cornus stolonifera*), honeycup (*Zenobia pulverulenta*), Douglas' meadowsweet (*Spiraea douglasii*), bog birch (*Betula pumila*), and young red maple (*Acer rubrum*) (Federal Geographic Data Committee 2013).

15.2.13 Water Regimes

Water regime modifiers describe the hydrologic characteristics of the wetland in terms of duration and timing of surface inundation (Federal Geographic Data Committee 2013). The definitions of each water regime modifier present within the SR 37 PEL Study Area are discussed below and is not a comprehensive list of all water regimes under the Cowardin classification system.

15.2.14 Tidal Saltwater

Tidal Salt Water Regime Modifiers categorize wetlands and deepwater habitats in the Marine and Estuarine Systems where salinity equals or exceeds 0.5 ppt and describe tidal influence (Federal Geographic Data Committee 2013). Three types of Tidal Salt Water Regimes are present within the SR 37 PEL Study Area:

- **Subtidal:** Tidal saltwater continuously covers the substrate.
- **Irregularly Exposed:** Tides expose the substrate less often than daily.
- **Regularly Flooded:** Tides alternately flood and expose the substrate at least once daily.

15.2.15 Nontidal

Nontidal Water Regime Modifiers categorize all nontidal parts of the Palustrine, Lacustrine, and Riverine Systems (Federal Geographic Data Committee 2013). Six types of Nontidal Water Regimes are present within the SR 37 PEL Study Area:

- **Permanently Flooded:** Water covers the substrate throughout the year.
- **Semi-permanently Flooded:** Surface water persists throughout the growing season during most years.
- **Seasonally Flooded:** Surface water is present for extended periods (i.e., more than a month) during the growing season, but is typically absent by the end of the season.
- **Seasonally Saturated:** The substrate is saturated at or near the surface for extended periods during the growing season but is unsaturated by the end of the season.
- **Temporarily Flooded:** Surface water is present for brief periods (i.e., a few days up to a few weeks) during the growing season.
- **Artificially Flooded:** Amount and duration of flooding are controlled by pumps or siphons with dikes, berms, or dams.

15.2.16 Waters of the State

Waters of the State are overseen by the State Water Resources Control Board (State Water Board) and the nine Regional Water Quality Control Boards (Regional Boards) that protect water quality and allocate surface water rights. A "Waters of the State" is defined as "any surface water or groundwater, including saline waters, within the boundaries of the state" (Water Code section 13050(e)). This includes all waters within the state's boundaries, whether private or public, including waters in both natural and artificial channels. Waters of the State also include, but are not limited to, Waters of the US. As such, the above listed resource types would also be considered Waters of the State and would require a permit be submitted to the State Water Board for review and approval through the Section 401 Water Quality Certification process.

15.3 Existing Conditions

Surface waters in the SR 37 PEL Study Area include the San Pablo Bay and its tributaries, including Novato Creek, Petaluma River, Tolay Creek, Sonoma Creek, and the Napa River. In addition to these major tributaries, there are numerous other named and unnamed streams that drain into these tributaries upstream. Wetlands in the Study Area are associated with these surface waters. Based on a review of the NWI and CARI data, 49,449 acres of wetlands are present within the Study Area (Figure W-1 and Table W-1). Approximately 65 percent of the wetlands within the SR 37 PEL Study Area are part of the Estuarine System, 20 percent are part of the Palustrine System, 12 percent are part of the Lacustrine System, and three percent are part of the Riverine System. In addition, one USCG coastal maintained channel is located within the SR 37 PEL Study Area, which begins near the mouth of the Petaluma River.

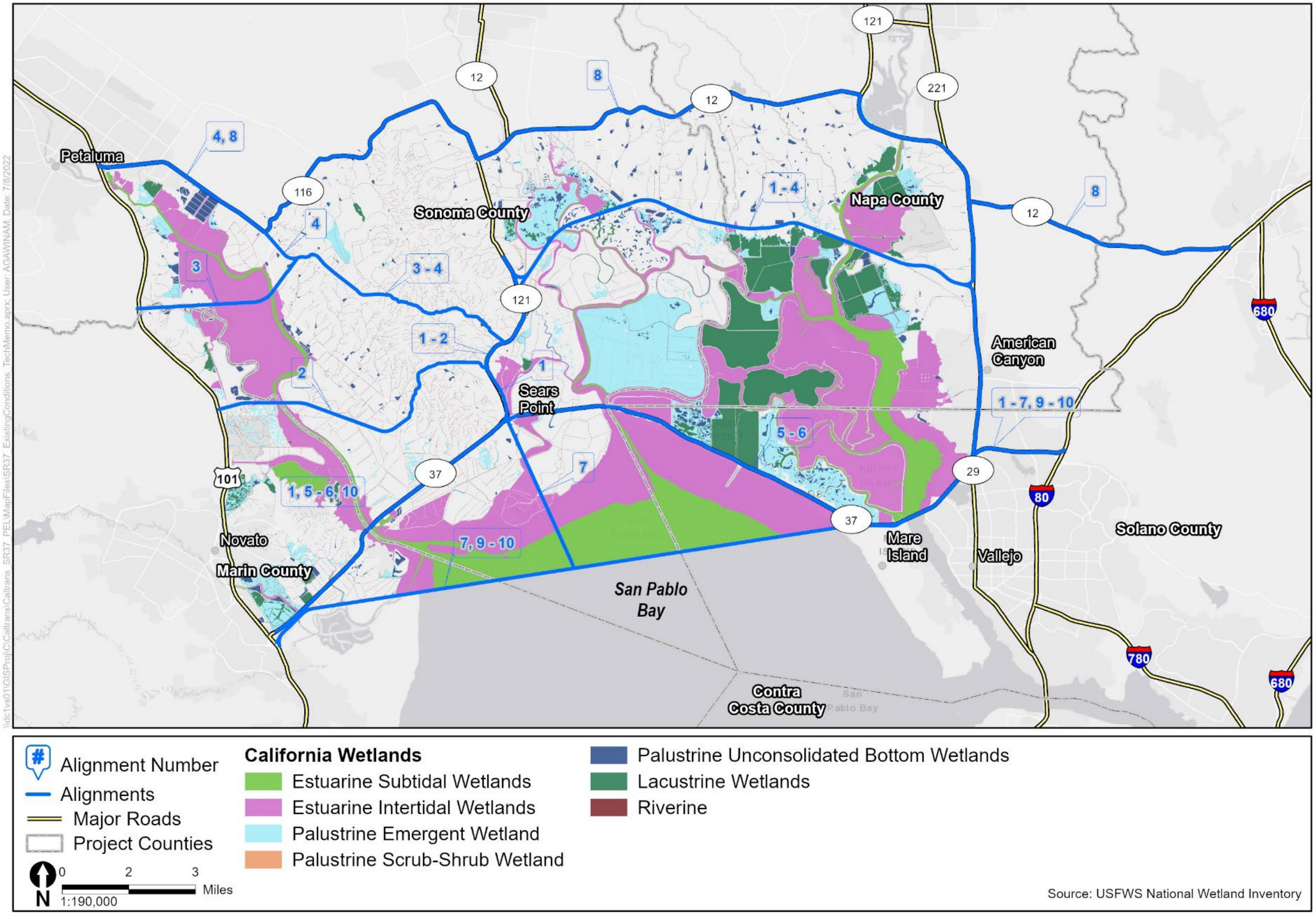

Figure W-1. National Wetland Inventory Data Within PEL Study Area

Table W-1. Wetlands Present in the PEL Study Area

System	Subsystem	Class and Subclass	Water Regime	Acres
Estuarine	Intertidal	Emergent, Persistent	Regularly Flooded	14,792
		Streambed	Regularly Flooded	668
		Unconsolidated Shore	Irregularly Exposed	542
			Regularly Flooded	7,189
	Subtidal	Unconsolidated Bottom	Subtidal	8,864
	Total Estuarine Wetlands			32,055
Lacustrine	Limnetic	Unconsolidated Bottom	Permanently Flooded	24
	Littoral	Unconsolidated Bottom	Artificially Flooded	3,629
			Permanently Flooded	1,569
		Unconsolidated Shore	Artificially Flooded	449
			Seasonally Flooded	18
	Total Lacustrine Wetlands			5,689
Palustrine	N/A	Emergent, Persistent	Artificially Flooded	370
			Seasonally Flooded	4,791
			Temporarily Flooded	2,955
			Seasonally Saturated	55
			Semi-permanently Flooded	1
		Scrub-Shrub	Temporarily Flooded	0.4
		Scrub-Shrub, Broad-Leaved Deciduous	Seasonally Flooded	0.2
			Seasonally Saturated	0.1
			Temporarily Flooded	3
		Unconsolidated Bottom	Artificially Flooded	219
			Permanently Flooded	1,635
			Seasonally Flooded	21
			Semi-permanently Flooded	14
	Total Palustrine Wetlands			10,065
Riverine	Intermittent	Streambed	Seasonally Flooded	302
			Temporary Flooded	1,048
	Lower Perennial	Unconsolidated Bottom	Permanently Flooded	1
	Upper Perennial	Unconsolidated Bottom	Permanently Flooded	289
	Total Riverine Wetlands			1,640
TOTAL				**49,449**

Source: USFWS 2022, SEFI 2017

15.4 Next Steps

The SR 37 PEL Study should consider the presence of wetlands and WOUS along the proposed alignments and evaluate the potential impacts as a result of project construction.

A field survey for any alternatives that are carried forward into subsequent National Environmental Policy Act (NEPA)/California Environmental Quality Act analysis would be necessary to delineate the location of WOTUS and jurisdictional wetlands pursuant to the *1987 Corps of Engineers Wetland Delineation Manual*; the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region*; as well as *A Guide to Ordinary High Water Mark (OHWM) Delineation for Non-Perennial Streams in the Western Mountains, Valleys, and Coast Region of the United States*.

The results of the delineation would be used to identify where impacts to WOTUS and jurisdictional wetlands would occur under any future project. If the alignment would result in the discharge of dredged or fill materials within WOTUS or jurisdictional wetlands, the project would require a CWA Section 404 permit from the Corps and a CWA Section 401 certification from the State Water Resources Control Board and the Regional Water Quality Control Boards prior to construction.

Although no formal jurisdictional delineation or impact assessment has occurred to date for any of the proposed alignments, because wetlands are widely distributed across the Study Area an Individual Permit, from the Corps, would likely be required for any future project. An Individual Permit requires mitigation to minimize or offset the impacts to WOTUS with no net loss of functions and values to the water resource. During the development of an Individual Permit, alternatives are evaluated and the least environmentally damaging practicable alternative (LEDPA) to achieve the project's overall purpose must be selected. Therefore, if a future project requires an Individual Permit, it must be demonstrated that the alignment is the LEDPA to receive the CWA Section 404 permit.

In addition, any alignment that may require a new bridge crossing over a navigable water would require a USCG bridge permit prior to construction. Issuance of a USCG Bridge Permit is a federal action that would require a NEPA evaluation to describe the potential environmental impacts of the alignment. Additional coordination with the USCG would be required to determine the appropriate timing of the Bridge Permit Application and public advertisement of the proposed new bridge crossing relative to the NEPA evaluation.

15.5 References

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Chapter 16
Ecological Resiliency and Connectivity Assessment of Existing Conditions

This chapter identifies existing ecological resiliency and connectivity within the SR 37 PEL Study Area. There are several ecological systems within the SR 37 PEL Study Area; however, this discussion focuses on the following resource areas that are likely to be impacted by future construction activities: rivers and creeks, tidal marsh, tidal bay flats, shallow bay, terrestrial corridors, and critical linkages.

16.1 Methodology

16.1.1 Data Gathering and Analysis Approach

Information regarding existing ecological systems and GIS data from EcoAtlas, California Biogeographic Information and Observation System, and Conservation Lands Network was collected for the SR 37 PEL Study Area. GIS data was used to identify important ecological systems and their potential resilience to Sea Level Rise (SLR) within the SR 37 PEL Study Area. The following definitions have been developed for the SR 37 PEL Study and are derived from the definitions used in the EcoAtlas Online and Conservation Lands Network data.

16.1.2 Definition of Resource Types

16.1.2.1 Rivers and Creeks

Rivers and creeks are designated as areas of water flowing on earth's surface that flow from upland areas to other rivers and streams and eventually reach an ocean. These freshwater features carry nutrients and minerals into tidal areas. These areas also provide riparian corridors for wildlife migration as well as food and shelter.

16.1.2.2 Tidal Marsh

A tidal marsh is a marsh found along rivers, coasts and estuaries which floods and drains by the tidal movement of the adjacent estuary, sea, or ocean. Tidal marsh provides habitat for semi-aquatic species and provides connection from tidal bay flats to uplands.

16.1.2.3 Tidal Bay Flats

Tidal bay flats are areas where river runoff, or inflow from tides, deposit sediments such as mud or sand. These areas provide shelter for various organisms and connect tidal marsh to shallow bay.

16.1.2.4 Shallow Bay

Shallow bay is typically unvegetated areas containing mud or sand substrate that provide connectivity from tidal bay flats to deep bay. These areas are inundated during high and low tide and vary in depth up to six feet.

16.1.2.5 Terrestrial Corridors

Terrestrial corridors are habitat linkages that a high concentration of various wildlife species utilize to travel from one habitat type to another. Terrestrial corridors are typically found within uplands but also cross rivers and creeks and often connect with the estuarine tidal areas of the bay.

16.1.2.6 Critical Linkages

Critical linkages provide pathways that a high concentration of a variety of wildlife species utilize to travel from one habitat type to another, often located along streams with associated riparian corridors. These riparian corridor linkages connect upland areas to the tidal marsh and tidal bay flats of the San Pablo Bay.

16.2 Existing Conditions

The SR 37 PEL Study Area falls within and adjacent to, the San Pablo Bay and within the jurisdiction of Marin, Sonoma, Napa, and Solano counties. The existing ecosystems are described in further detail below and organized by ecosystem type.

16.2.1 Rivers/Creeks

Several rivers and creeks (Napa River, Sonoma Creek, Tolay Creek, Petaluma River) occur within the PEL Study Area and provide freshwater connection to saltwater tidal flats and open bay. Rivers and creeks supply nutrients from upland riparian areas and carry these nutrients downstream into the estuarine tidal marsh and tidal bay flats. Rivers and creeks also provide spawning habitat for migratory aquatic species that live in the ocean and travel back to freshwater areas to spawn. The Petaluma River, Napa River, Tolay Creek, and Sonoma Creek provide habitat for a wide range of plant and animal species, including threatened or endangered species protected by the National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS) such as Ridgway's rail (*Rallus obsoletus*), black rail (*Laterallus jamaicensis*), salt marsh harvest mouse (*Reithrodontomys raviventris*), California red-legged frog (*Rana draytonii*), Central California Coast steelhead (*Oncorhynchus mykiss*), and soft bird's beak (*Cordylanthus mollis*) (Baumgarten et.al. 2018). Additionally, the California Endangered Species Act protects species that are not afforded federal protection but are considered special status species within the state. The California Natural Diversity Database, an inventory of the status and locations of rare plants and animals in California, lists special status species which include but are not limited to bank swallow (*Riparia riparia*), tri-colored blackbird (*Agelaius tricolor*), foothill yellow-legged frog (*Rana boylii*), and Mason's lilaeopsis (*Lilaeopsis masonii*). Rivers and creeks create an ecological connection between uplands and tidal marsh and tidal bay flats. Outside of projected future inundation areas; upland reaches would retain their functions; however, these resources are the pathways for the most part for greater inundation into uplands, and the conversion from fresh to salt/brackish water will have dramatic effects on the surrounding wildlife (Figure ERC-1). This resource type occurs along all alignments.

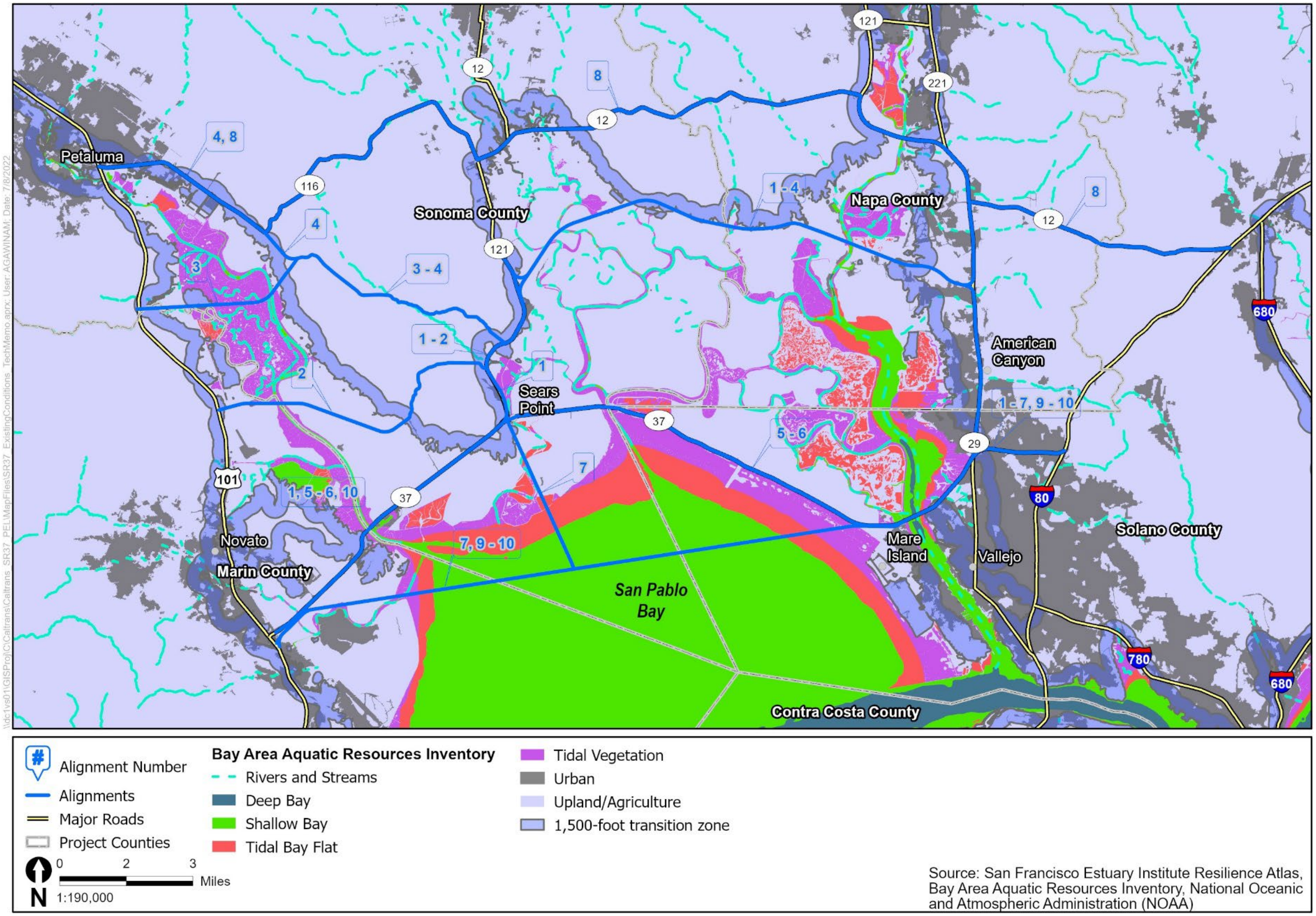

Figure ERC-1. Bay Area Aquatic Resources Map

16.2.2 Tidal Marsh

Tidal Marsh exists along a majority of the northern shoreline of the bay and along existing sloughs, creeks and rivers that flow into the bay. Tidal marshes provide spawning ground for aquatic species and rest-stops for migratory birds. Additionally, tidal marshes play an important role in flood protection of uplands by storing ground water and lessening storm surges. The area surrounding San Pablo Bay within the PEL Study Area provides critical and important marsh bird and waterfowl habitat. A majority of the existing tidal marsh near the bay shoreline would not be resilient to SLR and would likely be flooded and submerged. However, with all of the future planned marsh migration preparation space, new areas within existing uplands would eventually transition to tidal marsh in the future, recreating some of this habitat type (Figure ERC-1). This resource type occurs along all alignments.

16.2.3 Tidal Bay Flats

Tidal bay flats are created by river runoff, or inflow from tides, which deposit sediments such as mud or sand. Tidal flats are an important ecosystem that generates algae growth providing food to crustaceans which feed shorebirds, wading birds, and fish (SFEI 2019). These areas contain federal, and state protected threatened and endangered species. Tidal bay flats provide an ecological connection between tidal marsh and shallow bay. Existing tidal bay flats would not be resilient and would likely be submerged as sea levels rise and become shallow bay. However, existing upland areas would likely transition to tidal bay flats in some locations over time especially in low lying areas along creeks and rivers. This resource occurs along all alignments with the exception of Alignments 1, 4, and 8 (Figure ERC-1).

16.2.4 Shallow Bay

The shallow bay are areas up to six feet deep where the land is inundated with water during high and low tide and can contain some algae and vegetation growth due to sunlight penetration. This area is also habitat for marine species that migrate close to or within brackish water for spawning or feeding. These areas also contain protected Essential Fish Habitat species such as shrimp and other crustaceans. More than 90 percent of subtidal areas of the Bay consists predominantly of soft-bottom substrates, but also include shellfish beds, submerged aquatic vegetation, shell deposits, rocky bottom, underwater pinnacles, and macroalgal beds (San Francisco Bay Subtidal Habitat Goals Project 2022). Shallow bay provides an ecological connection between tidal bay flats and deep water bay. Current locations of shallow bay will likely transition to deeper bay waters losing the features that make these areas shallow bay under SLR projections. However, these areas would be replaced by the conversion of tidal flats, tidal marsh, and uplands to shallow bay type habitats. This resource occurs along Alignments 5, 6, 7, 9, and 10 (Figure ERC-1).

16.2.5 Terrestrial Corridors

Terrestrial Corridors are essential corridors that allow for migration and movement of terrestrial species from one upland to another and from upland to estuarine tidal areas. These areas are critical for maintaining ecological connectivity and diversity across the PEL Study Area. The three main terrestrial corridor types discussed in this document are Terrestrial Connectivity (Figure ERC-2), Essential Habitat Connectivity Areas (Figure ERC-3), and Terrestrial Linkage Potential (Figure ERC-4) (CDFW 2022). Each of these corridor types include a variety of terrestrial species and indicate the locations of highest density of movements within the landscape. These areas also contain federal and state protected threatened and endangered species and provide foraging and refuge for terrestrial species. A substantial portion of the terrestrial corridors will remain resilient to SLR as they occur within uplands; however, each alignment could have a direct effect on continued uninterrupted terrestrial movement within the project footprint along migration routes. This resource type occurs along all alignments.

16.2.5.1 Critical Linkages

Critical linkages are areas that a high concentration of a variety of wildlife species utilize to travel from one area to another, often located along streams with associated riparian corridors (Figure ERC-5). These linkages are critical for providing passage for terrestrial species from uplands to the estuarine tidal marsh (Conservation Lands Network 2022). These areas also provide shelter and food for migratory species in the area. Critical linkage corridors associated with riparian areas would not be resilient to SLR and may become narrower closer to the existing bay as SLR causes rivers and creeks to overtop their existing banks inundating some areas currently serving as existing routes for wildlife that are currently above sea level. This resource type occurs along all alignments.

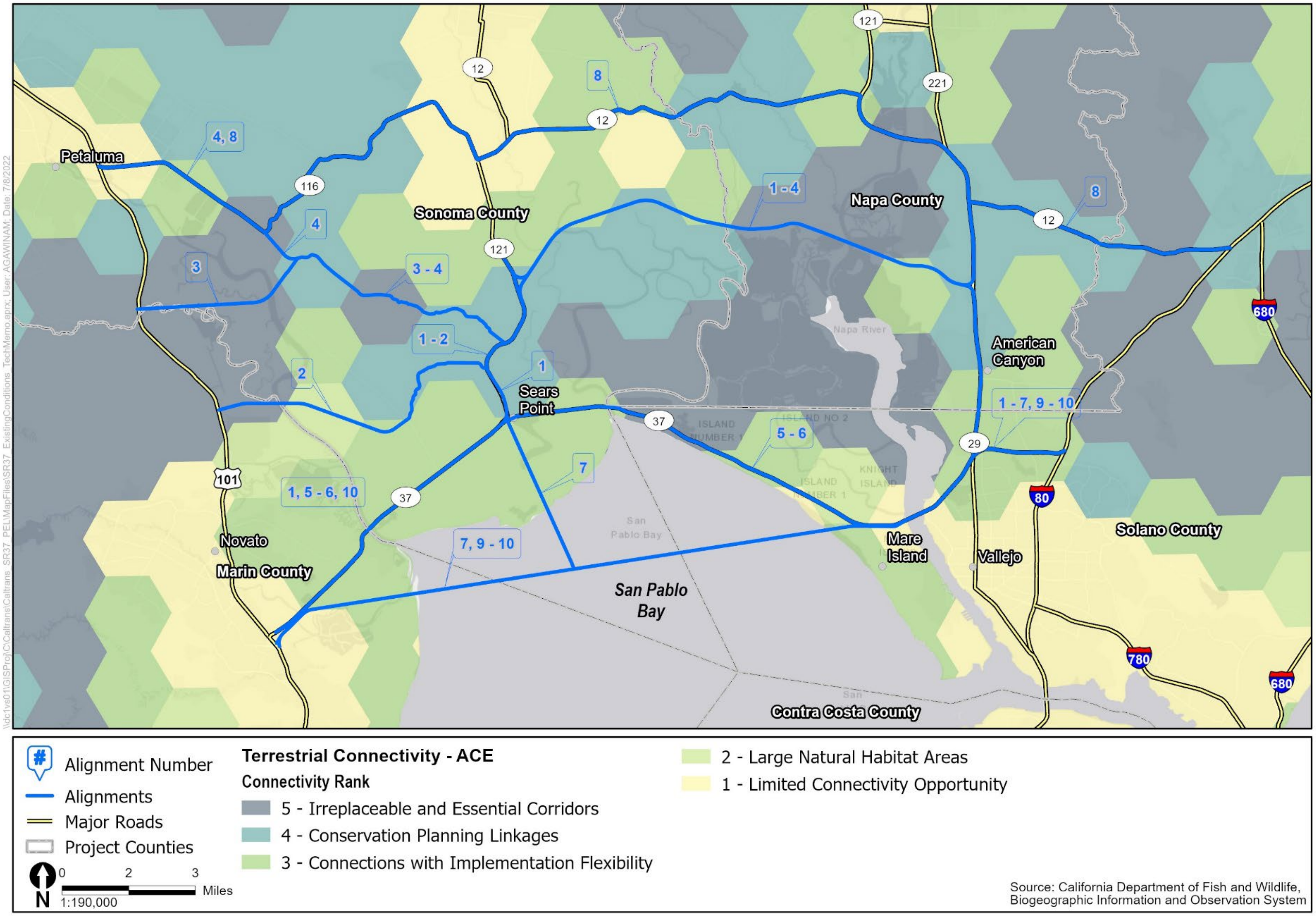

Figure ERC-2. Terrestrial Connectivity Map

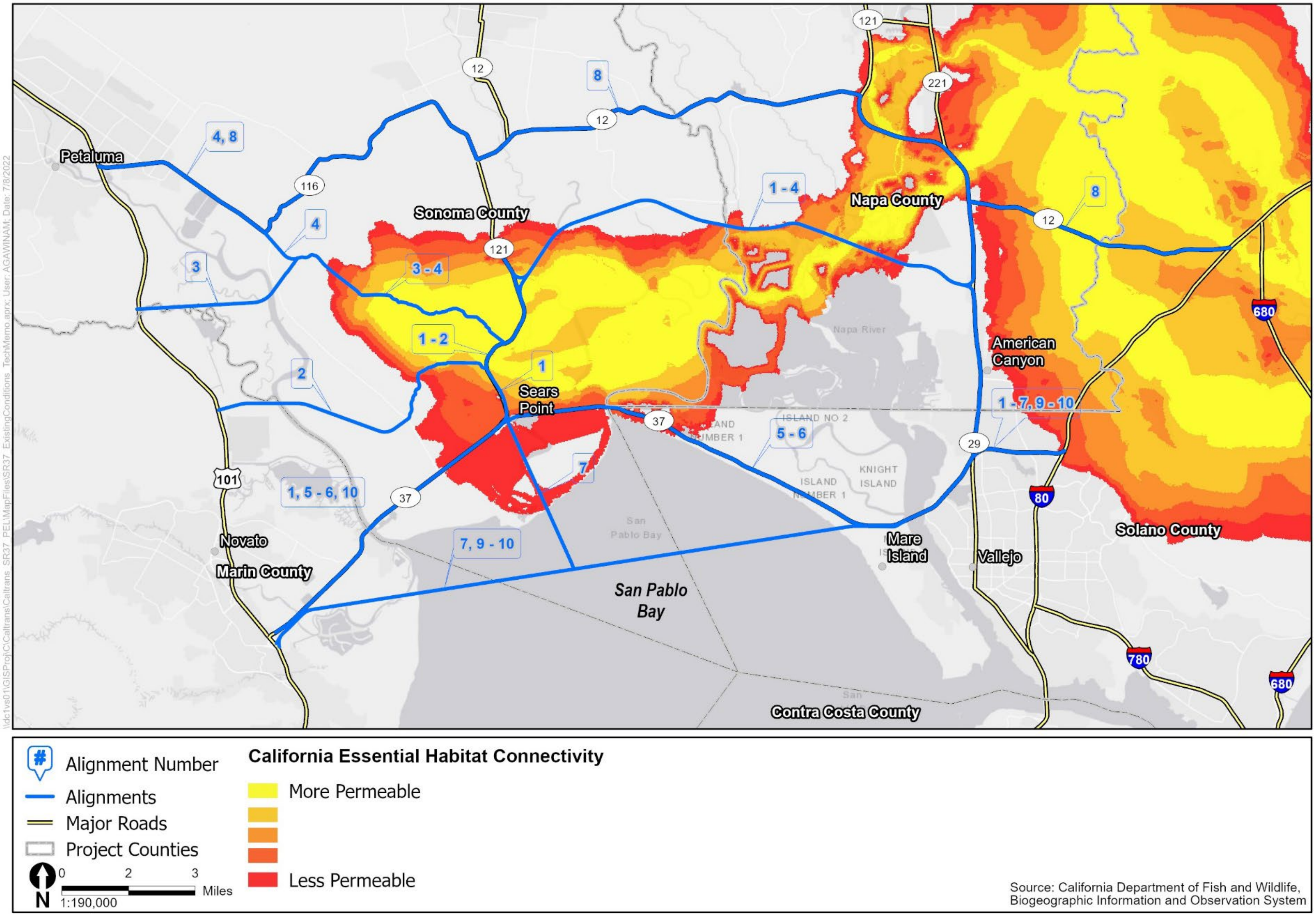

Figure ERC-3. California Essential Habitat Connectivity Map

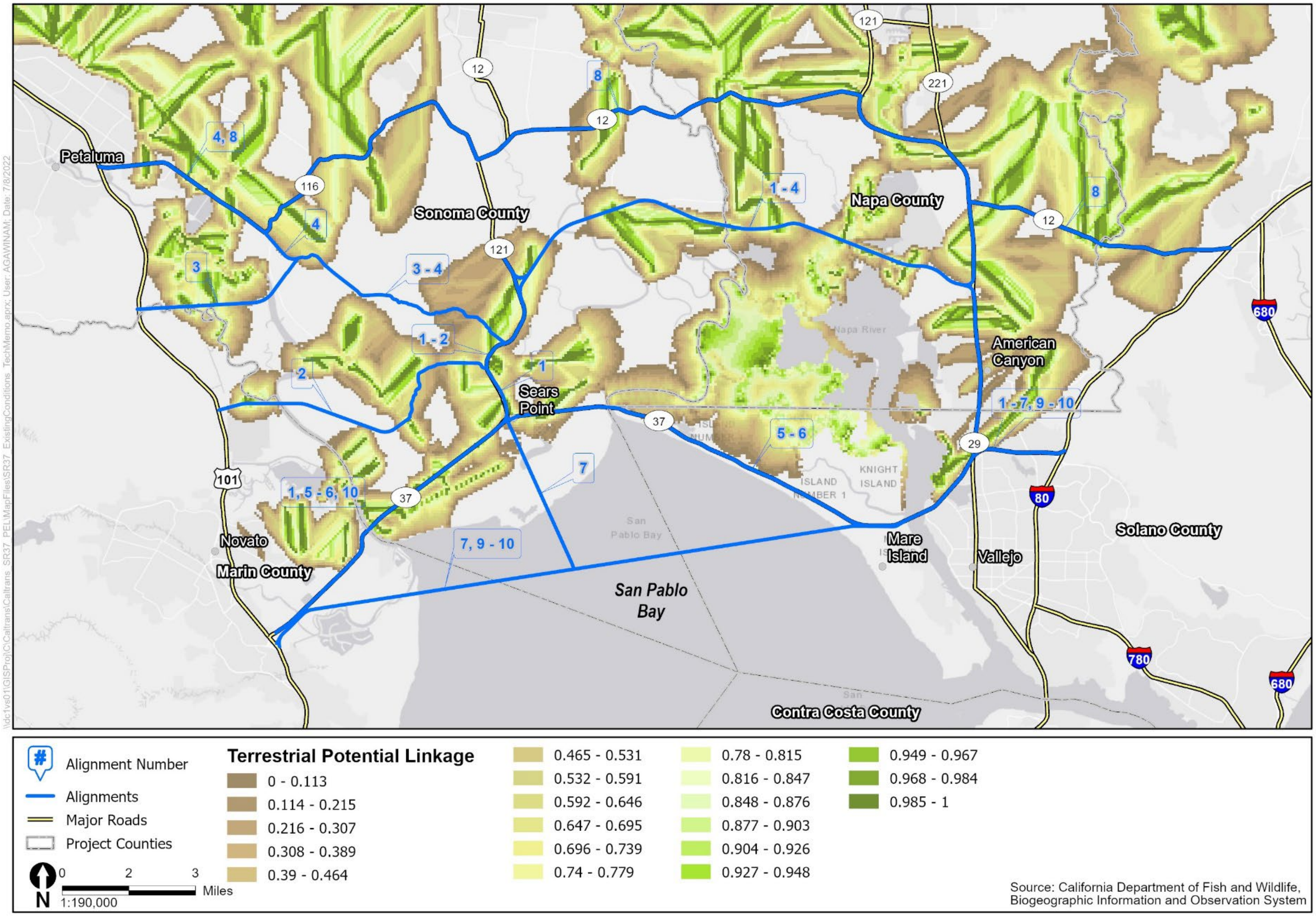

Figure ERC-4. Terrestrial Potential Linkage Map

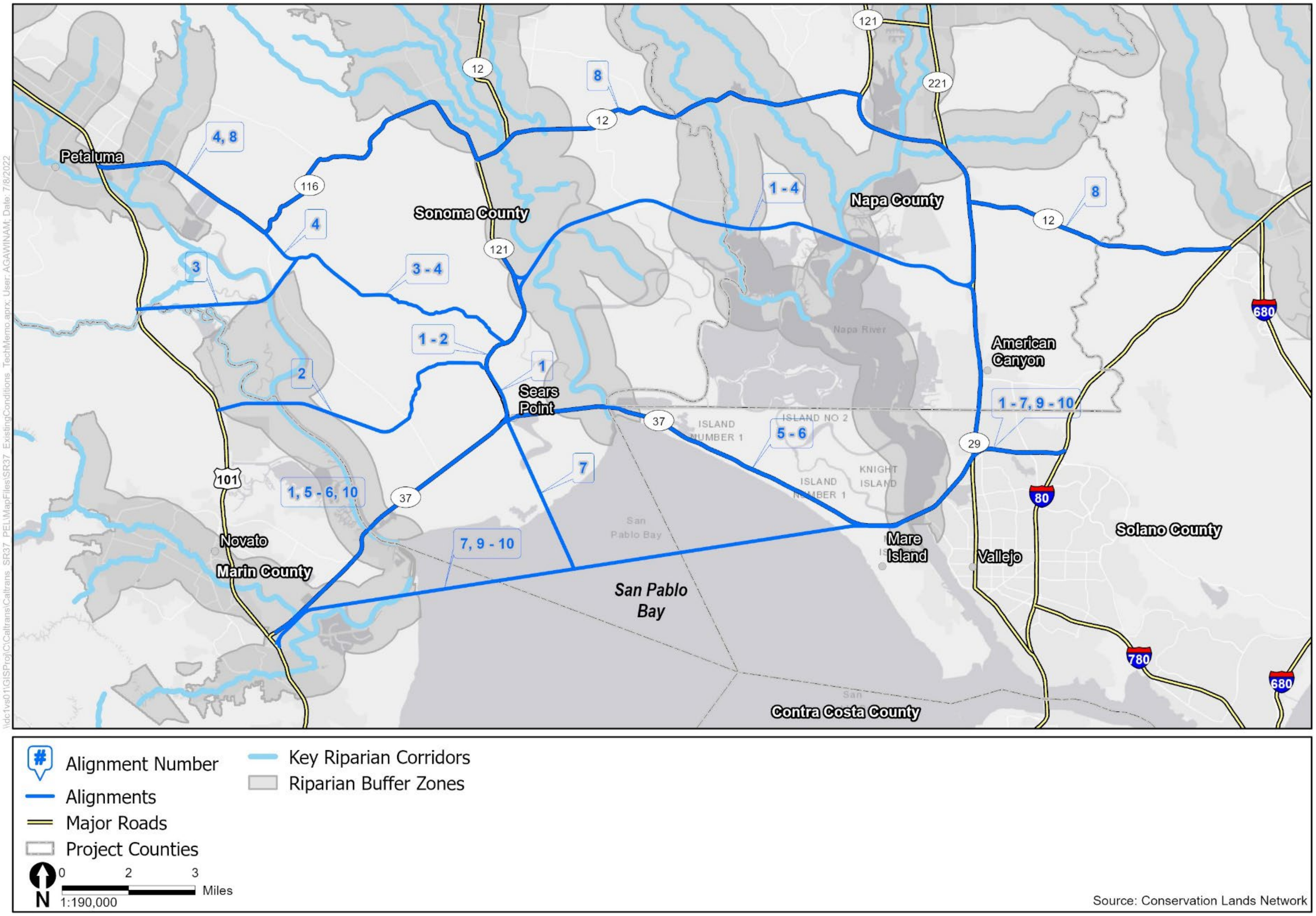

Figure ERC-5. Critical Linkages Map

16.3 Next Steps

The SR 37 PEL Study should consider the presence of these resource areas along the proposed alignments and evaluate the potential adverse impacts as a result of project construction to help us understand how we are meeting the Purpose and Need for resiliency and connectivity based on current conditions. Alignments that are carried forward into subsequent National Environmental Policy Act/California Environmental Quality Act analysis that would result in direct impacts to currently existing resources that contain protected species habitat in both aquatic and terrestrial areas would require coordination with the National Marine Fisheries Service, the United States Fish and Wildlife Service, and the California Department of Fish and Wildlife. Informal or Formal Section 7 Consultation may be required as well as the development of a Biological Assessment for impacts to species and or their designated critical habitats. Alignments should also analyze the maintenance of the hydrologic connectivity between resource types, in particular the sediment and nutrient flow from rivers and creeks to tidal marsh and tidal bay flats. Additionally, direct and indirect effects from SLR would need to be analyzed for these resources. At the time of construction, additional analysis of the existing conditions will need to be reevaluated to document any changes to resource conditions.

16.4 References

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Chapter 17

Tidal and Transition Zone Habitat Existing and Future Conditions

This chapter identifies tidal and transition zone habitat within the SR 37 PEL Study Area. A transition zone is based on relation to tide zones: Estuarine-terrestrial transitional habitats occupy the boundary between land and sea, from the zone of regular flooding to the effective limit of tidal influence. They harbor a unique plant community, provide critical wildlife support to adjacent ecosystems, and play an important role in linking marine and terrestrial processes. Estuarine-terrestrial transition zone is the area of existing and predicted future interactions among tidal and terrestrial or fluvial processes that result in mosaics of habitat types, assemblages of plant and animal species, and sets of ecosystem services that are distinct from those of adjoining estuarine, riverine, or terrestrial ecosystems (San Francisco Estuary Partnership 2017). The transition zone is a 1,500-foot-wide area as measured from the edge of projected Sea Level Rise (SLR) of 10 feet by the year 2130, this boundary is used to define the existing transition zones within the SR 37 PEL Study Area (Figure TT-1). There are several types of tidal transition zones that occur within the tidal and transition zone habitat within the PEL Study Area; however, this chapter includes discussion on the following transition zones that are likely to be impacted by future construction activities: tidal marsh adjacent to uplands, rivers and creeks, tidal marsh adjacent to tidal bay flats, tidal bay flats adjacent to shallow bay, tidal marsh adjacent to agriculture, and tidal marsh adjacent to urban areas.

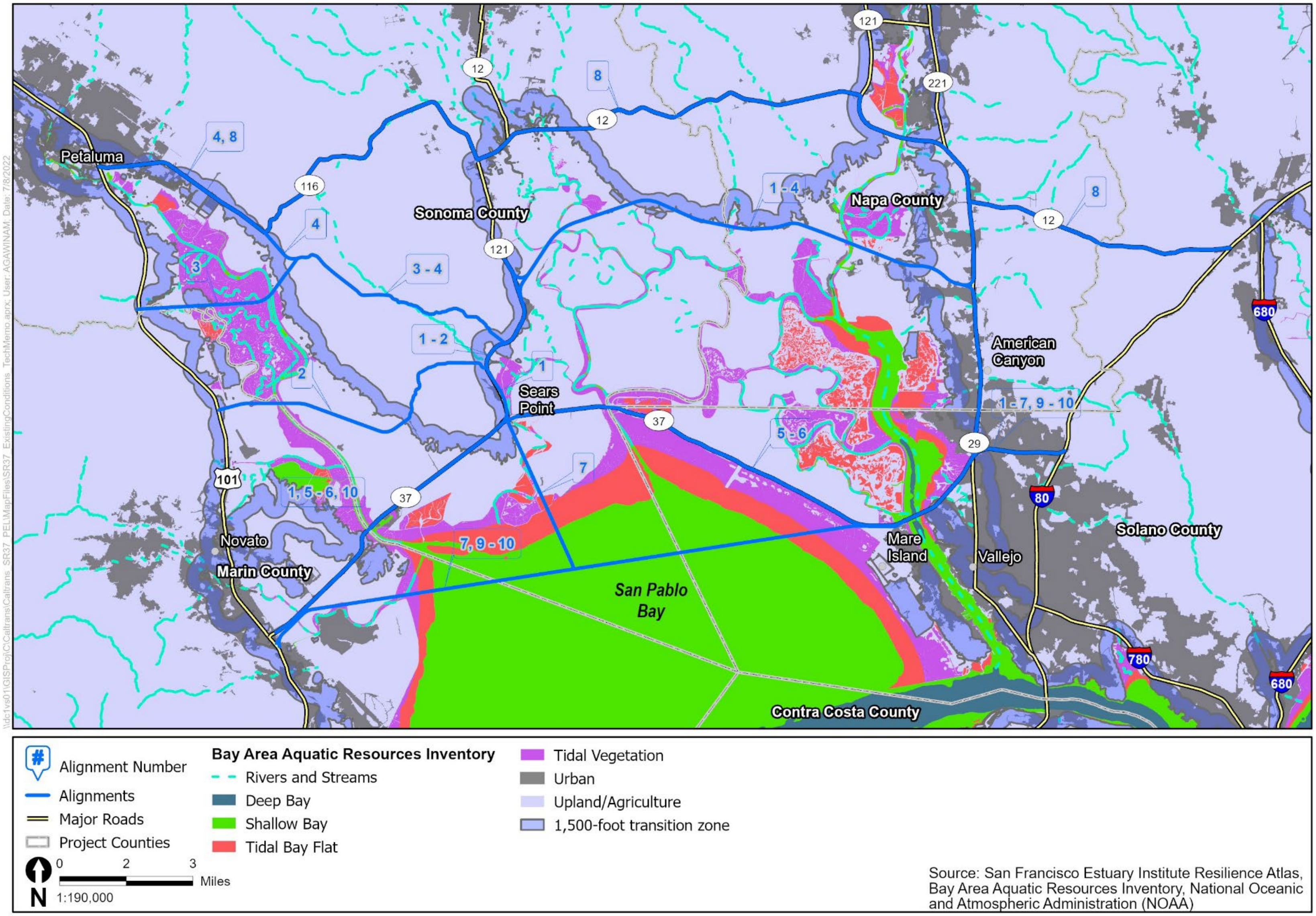

Figure TT-1. Bay Area Tidal and Transition Zone Habitat Areas Map

17.1 Methodology

17.1.1 Data Gathering and Analysis Approach

Information regarding existing habitat types and Geographical Information System(GIS) data from EcoAtlas was used to identify tidal and transition zone habitats within the SR 37 PEL Study Area. The following definitions have been developed for the PEL Study and are derived from the EcoAtlas Online data.

17.2 Definitions

17.2.1 Transition Zone

Estuarine-terrestrial transition zone is the area of existing and predicted future interactions among tidal and terrestrial or fluvial processes that result in mosaics of habitat types, assemblages of plant and animal species, and sets of ecosystem services that are distinct from those of adjoining estuarine, riverine, or terrestrial ecosystems.

17.2.2 Uplands

Uplands are land areas lying above the elevation where flooding generally occurs—areas found beyond riparian zones. Uplands can contain a variety of habitat types within them including but not limited to grasslands, shrublands, forests, rock outcrops, and bare soil. These areas provide foraging and shelter for many wildlife species.

17.2.3 Rivers and Creeks

Rivers and creeks are designated as areas of water flowing on earth's surface that flow from upland areas to other rivers and streams and eventually reach an ocean. These freshwater features carry nutrients and minerals into tidal areas. These areas also provide riparian corridors for wildlife migration as well as food and shelter.

17.2.4 Tidal Marsh

A tidal marsh is a marsh found along rivers, coasts and estuaries which floods and drains by the tidal movement of the adjacent estuary, sea, or ocean. Tidal marsh provides habitat for semi-aquatic species and provides connection from tidal bay flats to uplands.

17.2.5 Tidal Bay Flats

Tidal bay flats are areas where river runoff, or inflow from tides, deposit sediments such as mud or sand. These areas provide shelter for various organisms and connect tidal marsh to fully inundated areas.

17.2.6 Agriculture

Agricultural land is devoted to agriculture, the systematic and controlled use of other forms of life, particularly the rearing of livestock and production of crops to produce food for humans. These habitat areas are managed for a particular type of agriculture and range from grasslands to row crops.

17.2.7 Urban

Urban areas are defined as relating to or concerned with a city or densely populated areas. These areas can contain modified landscapes such as roadways, houses, and commercial buildings. An urban surface area generally contains non-porous substances such as asphalt and concrete within a majority of the area.

17.3 Existing Conditions

The land within the SR 37 PEL Study Area is adjacent to and falls within the San Pablo Bay and is within jurisdiction of Marin, Sonoma, Napa, and Solano counties. The existing habitat types are described in further detail below.

17.3.1 Tidal Marsh Adjacent to Uplands

The transition zone where tidal marsh is adjacent to upland areas within the PEL Study Area provides moderate quality transition zone and can vary in width depending on the slope of the upland area where it meets the tidal marsh. This area acts as a connection for terrestrial and aquatic migration. This transition zone occurs along all alignments (Figure TT-1).

17.3.2 Rivers and Creeks

The transition zone where tidal influence affects rivers and creeks (Napa River, Sonoma Creek, Tolay Creek, Petaluma River) within the SR 37 PEL Study Area along the northern portion of the bay provides a high-quality transition zone and connects freshwater areas with saltwater areas. This transition zone can vary in size, can be miles inland along the stream, and generally gets smaller the further inland you progress. This area acts as a connection from uplands to tidal marsh and is critical for many migratory terrestrial and aquatic species and provides habitat for a wide range of plant and animal species, including threatened or endangered species protected by the National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS) such as Ridgway's rail (*Rallus obsoletus*), black rail (*Laterallus jamaicensis*), salt marsh harvest mouse (*Reithrodontomys raviventris*), California red-legged frog (*Rana draytonii*), Central California Coast steelhead (*Oncorhynchus mykiss*), and soft bird's beak (*Cordylanthus mollis*) (Baumgarten et.al. 2018). Additionally, the California Endangered Species Act protects species that are not afforded federal protection but are considered special status species within the state. The California Natural Diversity Database, an inventory of the status and locations of rare plants and animals in California, lists special status species which include but are not limited to bank swallow (*Riparia riparia*), tri-colored blackbird (*Agelaius tricolor*), foothill yellow-legged frog (*Rana boylii*), and Mason's lilaeopsis (*Lilaeopsis masonii*). This transition zone occurs along all alignments (Figure TT-1).

17.3.3 Tidal Marsh Adjacent to Tidal Bay Flats

The transition zone where tidal marsh is adjacent to tidal bay flats within the SR 37 PEL Study Area provides a high-quality transition zone and can vary in width and location. These areas fluctuate depending on the amount of sediment carried in by the tide and through sediment deposited by rivers and creeks. These areas provide some opportunity for habitat restoration with future SLR and provide spawning ground for aquatic species and rest-stops for migratory birds (San Francisco Bay Subtidal Habitat Goals Project 2022). These transition zones are found along the coastal portion of the bay and inland along rivers such as the Petaluma and Napa River. This transition zone occurs along all alignments, with Alignments 1, 5, and 6 having the greatest amount and Alignment 8 having the least amount of this transition zone (Figure TT-1).

17.3.4 Tidal Bay Flats Adjacent to Shallow Bay

The transition zone where tidal bay flats are adjacent to shallow bay within the SR 37 PEL Study Area provides a high-quality transition zone between fully submerged areas and areas subject to tidal inundation. These transition zones fluctuate depending on the amount of sediment carried in by tide and through sediment deposited by rivers and creeks. Tidal bay flats are an important ecosystem connection creating algae growth that provides food to crustaceans which feed shorebirds, wading birds, and fish (SFEI 2019). These transition zones are found along the coastal portion of the bay and inland along rivers such as the Petaluma and Napa River. This transition zone occurs along all alignments with Alignments 7, 9, and 10 having the greatest amount and Alignment 8 having the least amount of this transition zone (Figure TT-1).

17.3.5 Tidal Marsh Adjacent to Agriculture

The transition zone where tidal marsh is adjacent to agriculture within the PEL Study Area provides a moderate quality transition zone. This transition zone can be large and provides a migration corridor for terrestrial species to interact with the estuarine areas. This transition zone provides some opportunity for habitat restoration and natural habitat transition to occur with future SLR and is found along the northern portion of the San Pablo Bay. This transition zone occurs along all alignments (Figure TT-1).

17.3.6 Tidal Marsh Adjacent to Urban

The transition zone where tidal marsh is adjacent to urban areas does not provide a high-quality ecological transition zone. This transition area is relatively small and provides minimal opportunity for habitat restoration or natural habitat transition to occur with future SLR. This habitat type occurs within the transition zone primarily along the northeastern and northwestern sides of the bay within the cities of Novato and Vallejo. This transition zone occurs along all alignments (Figure TT-1).

17.4 Next Steps

The SR 37 PEL Study should consider the presence of tidal marsh and transition zones along the proposed alignments and evaluate the potential adverse impacts as a result of project construction. Tidal marsh is an important indicator of ecosystem health; therefore, alignments that are carried forward into subsequent National Environmental Policy Act/California Environmental Quality Act analysis will evaluate impacts to the tidal marsh and transition zone habitat. At the time of construction, additional analysis will need to be reevaluated to document any changes to tidal marsh and transition zone condition and location. This information is also intended to inform alternative development by identifying potential future conditions and where these new critical transition zones may occur within the SR 37 PEL Study Area.

17.5 References

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Chapter 18
Noise and Vibration

This chapter describes the existing ambient noise conditions in the SR 37 PEL Study Area. Sensitive receptors within 1,000 feet of these roadways are also part of the SR 37 PEL Study Area. Noise-sensitive land uses are described in more detail below and are categorized by county and city jurisdiction.

18.1 Methodology

The proposed alignments were generally evaluated to determine existing sources of noise, including highway facilities, and existing land uses. Sources and receptors were generally identified for each county and city jurisdiction using aerial imagery.

Traffic noise levels for existing conditions were based on annual traffic census data developed by the California Department of Transportation (Caltrans). Traffic volumes were based on average daily traffic (ADT), counted during the year 2019 (Caltrans 2019). Using this information, traffic noise levels were calculated from data tables developed from the Federal Highway Administration (FHWA) Traffic Noise Model Version 2.5 (FHWA 1998).

18.2 Existing Conditions

18.2.1 Noise Sources

Noise sources are described below by roadway. Vehicle traffic is a noise source along all roadways; the discussions below focus on other noise sources.

18.2.1.1 State Route 12

Unincorporated areas along SR 12 include low-density development such as residences, ranches, agricultural uses, wineries, and commercial and industrial uses. There is also open space that is undeveloped. Some general aviation noise is generated from use of airports like the Sonoma Skypark (located about 0.8 mile north of SR 12/SR 121 near Schellville), Sonoma Valley Airport (located about 1.2 miles south of SR 12/SR 121 near Schellville), and Napa County Airport (about 0.8 mile west of SR 12/SR 29 near American Canyon). A railroad is also adjacent to SR 12 in Solano County and crossing it at Schellville.

18.2.1.2 State Route 29

Unincorporated areas along SR 29 consists of a low-density development, including residences, ranches, agricultural uses, wineries, and commercial and industrial uses. Some areas are also developed with single-family residential and mixed commercial uses. Concrete fences along the frontage of residences in American Canyon reduce the level of traffic noise experienced by residents in this area. Some general aviation noise is also generated from use of airports like the Napa County Airport (about 0.8 mile west of SR 12/SR 29 near American Canyon).

18.2.1.3 State Route 37

Unincorporated areas along SR 37 consist of low-density development, including residences, ranches, agricultural uses, and commercial and industrial uses. Uses also include open space that is undeveloped. There are denser residential, commercial, and other developments along the eastern extent of SR 37 in Vallejo. In Vallejo, there is a mix of wooden and concrete fences along residential frontage, which reduce to varying degrees the noise experienced by residents. Some general aviation noise is also generated from use of airports like Gnoss Field (about 3 miles north of SR 37 near Novato). Rail noise is also generated along US 101 to SR 121.

18.2.1.4 State Route 116

Unincorporated areas along SR 116 consist of low-density development, including residences, ranches, agricultural uses, wineries, and commercial and industrial uses. In Petaluma, land uses include single-family and multifamily residential development, hotels, commercial uses, and a water recycling facility. There are concrete fences along the frontage of residential development in some of these areas, which reduces levels of traffic noise experienced in these areas.

18.2.1.5 State Route 121

Areas along SR 121 consist of low-density development, including residences, ranches, agricultural uses, wineries, and commercial and industrial uses. Some general aviation noise is also generated from use of airports like Sonoma Valley Airport (adjacent to SR 121 south of Schellville) and Sonoma Skypark (about 0.8 mile north of SR 12/SR 121 near Schellville),

18.2.1.6 U.S. Highway 101

Unincorporated areas along US 101 primarily consist of undeveloped land and open space areas. There is also a low-density development along unincorporated segments of US 101, consisting of residences, ranches, agricultural uses, wineries, and commercial buildings. In Petaluma and Novato, land uses along US 101 are primarily single-family and multifamily residential development, hotels, and other commercial uses. Some general aviation noise is also generated from use of airports like Gnoss Field (adjacent to US 101 near Novato). There are concrete fences along the frontage of residential development in some of these areas, which reduces levels of traffic noise from US 101 in these areas. The Sonoma-Marin Area Rail Transit train also parallels US 101 in some areas, which may produce some noise in the corridor.

18.2.2 Noise Levels

Noise levels calculated based on ADT are provided by roadway.

18.2.2.1 State Route 12

Table NOI-1 contains existing traffic noise levels for SR 12.

Table NOI-1. Existing Traffic Noise Levels based on Traffic Census Data for SR 12

Roadway Location	Average Daily Traffic Volume (ADT)	Calculated L_{dn} Noise Level Value at 100 feet from centerline (dBA)	Calculated Distance to 60 L_{dn} Noise Level Contour (feet)
Sonoma County			
PM 41, Junction Route 121	5,900	60	104
Napa County			
PM 0, Junction Route 29	35,100	68	236
PM 2, North Of Napa/Solano County Line	41,700	69	255
PM 3, Solano/Napa County Line	41,700	69	255
Solano County			
PM 0, Solano/Napa County Line	41,700	69	255
PM 2, Junction Route 80	41,700	69	255

Source: Caltrans 2019.
Assumes an average highway speed of 55 miles per hour.
dBA = A-weighted decibels; L_{dn} = 24-hour day-night sound level; SR = State Route; PM = post mile

18.2.2.2 State Route 29

Table NOI-2 contains existing traffic noise levels for SR 29.

Table NOI-2. Existing Traffic Noise Levels based on Traffic Census Data for SR 29

Roadway Location	Average Daily Traffic Volume (ADT)	Calculated L_{dn} Noise Level Value at 100 feet from centerline (dBA)	Calculated Distance to 60 L_{dn} Noise Level Contour (feet)
Solano County			
PM 0, Vallejo, Junction Route 80	9,700	62	130
PM 1, Vallejo, Lemon Street	9,700	62	130
PM 2, Vallejo, Maine Street	18,300	65	175
PM 3, Vallejo, Tennessee Street	18,300	65	175
PM 5, Rte 29/Wb 37 On/Off Ramps	51,400	70	282
PM 6, Solano/Napa County Line	51,400	70	282
Napa County			
PM 0, Solano/Napa County Line	45,200	69	265
PM 1, American Canyon Road	36,800	68	241
PM 3, Green Island Road	36,800	68	241
PM 4, Kelly Road South	36,800	68	241
PM 5, Junction Route 12 East	41,500	69	255
PM 6, Junction Route 221 North	61,200	70	307

Source: Caltrans 2019.
Assumes an average highway speed of 55 miles per hour.
dBA = A-weighted decibels; L_{dn} = 24-hour day-night sound level; SR = State Route; PM = post mile

18.2.2.3 State Route 37

Table NOI-3 contains existing traffic noise levels for SR 37.

Table NOI-3. Existing Traffic Noise Levels based on Traffic Census Data for SR 37

Roadway Location	Average Daily Traffic Volume (ADT)	Calculated L_{dn} Noise Level Value at 100 feet from centerline (dBA)	Calculated Distance to 60 L_{dn} Noise Level Contour (feet)
Marin County			
PM 11, Novato, Junction Route 101	42,500	69	257
PM 14, Atherton Avenue	31,900	68	226
PM 15, Marin/Sonoma County Line	33,800	68	231
Sonoma County			
PM 0, Marin/Sonoma County Line	33,800	68	231
PM 2, Lakeville Road	33,800	68	231
PM 4, Junction Route 121 North	33,800	68	231
PM 6, Sonoma/Solano County Line	33,800	68	231
Solano County			
PM 0, Sonoma/Solano County Line	33,800	68	231
PM 7, Walnut Avenue	35,800	68	238
PM 8, Wilson Avenue	36,700	68	241
PM 10, Junction Route 29	38,700	68	247
PM 11, Vallejo, Fairgrounds Drive	69,600	71	327
PM 12, Junction Route 80, Right Align	48,300	69	274

Source: Caltrans 2019.
Assumes an average highway speed of 55 miles per hour.
dBA = A-weighted decibels; L_{dn} = 24-hour day-night sound level; SR = State Route; PM = post mile

18.2.2.4 State Route 116

Table NOI-4 contains existing traffic noise levels for SR 116.

Table NOI-4. Existing Traffic Noise Levels based on Traffic Census Data for SR 116

Roadway Location	Average Daily Traffic Volume (ADT)	Calculated L_{dn} Noise Level Value at 100 feet from centerline (dBA)	Calculated Distance to 60 L_{dn} Noise Level Contour (feet)
Sonoma County			
PM 35, Petaluma, Junction Route 101	24,000	66	197
PM 36, Frates Road/Cader Lane	39,500	69	249
PM 39, Lakeville Road	21,100	66	187
PM 42, Adobe Road	23,700	66	196
PM 44, Watmaugh Road	26,300	67	206
PM 45, Arnold Drive	23,600	66	196
PM 47, Junction Route 121	20,900	66	186

Source: Caltrans 2019.
Assumes an average highway speed of 55 miles per hour.
dBA = A-weighted decibels; L_{dn} = 24-hour day-night sound level; SR = State Route; PM = post mile

18.2.2.5 State Route 121

Table NOI-5 contains existing traffic noise levels for SR 121.

Table NOI-5. Existing Traffic Noise Levels based on Traffic Census Data for SR 121

Roadway Location	Average Daily Traffic Volume (ADT)	Calculated L_{dn} Noise Level Value at 100 feet from centerline (dBA)	Calculated Distance to 60 L_{dn} Noise Level Contour (feet)
Sonoma County			
PM 0, Junction Route 37	18,900	65	178
PM 7, Junction Route 116 West	22,100	66	190
PM 8, Schellville, Eighth Street	19,500	66	180
PM 10, Ramal Road	19,200	65	179
PM 11, Napa Road	18,200	65	174
PM 12, Sonoma/Napa County Line	27,300	67	210
Napa County			
PM 0, Sonoma/Napa County Line	27,300	67	210
PM 2, Old Sonoma Road	28,900	67	216
PM 3, Cutting Wharf Road	26,800	67	208
PM 4, South Junction Route 29	28,400	67	214

Source: Caltrans 2019.
Assumes an average highway speed of 55 miles per hour.
dBA = A-weighted decibels; L_{dn} = 24-hour day-night sound level; SR = State Route; PM = post mile

18.2.2.6 U.S. Highway 101

Table NOI-6 contains existing traffic noise levels for US 101.

Table NOI-6. Existing Traffic Noise Levels based on Traffic Census Data for US 101

Roadway Location	Average Daily Traffic Volume (ADT)	Calculated L_{dn} Noise Level Value at 100 feet from centerline (dBA)	Calculated Distance to 60 L_{dn} Noise Level Contour (feet)
Sonoma County			
PM 2, Kastania Road	84,000	72	357
PM 3, South Petaluma	84,000	72	357
PM 4, Petaluma, South Junction Route 116 East	82,000	72	353
PM 5, Petaluma, East Washington Street	98,000	73	386
PM 8, Petaluma, Old Redwood Highway	103,000	73	395
Marin County			
PM 19, Novato, Junction Route 37 East	154,000	74	485
PM 20, Novato, Rowland Avenue	127,000	74	439
PM 21, Novato, De Long Avenue	111,000	73	410
PM 22, Atherton Avenue	93,000	72	376
PM 27, San Antonio Road	85,000	72	359

Source: Caltrans 2019.
Assumes an average highway speed of 55 miles per hour.
dBA = A-weighted decibels; L_{dn} = 24-hour day-night sound level; SR = State Route; PM = post mile

18.3 Next Steps

Following the SR 37 PEL Study, traffic noise levels under future conditions for each of the project alternatives carried forward into the PA/ED process should be measured to determine whether new noise barriers or retrofits to existing noise barriers should be considered. Such a study would include a noise monitoring program to establish existing noise levels and would be used also to validate traffic noise models. Based on traffic noise modeling, the study would determine if traffic noise impacts would occur based on exceedance of noise abatement criteria at noise-sensitive receptors established in the Caltrans Protocol. The technical study would also determine locations where a substantial increase relative to existing noise levels would occur.

Alternative 7, 9, and 10 would most likely result in the lowest magnitude of impacts to noise-sensitive land uses, as the SR 121 alignment under this alternative would cover the least amount of land area among the alternatives and would primarily cross areas where there are no nearby sensitive land uses. However, Alternative 7, 9, and 10 would have the highest potential for impacts to aquatic organisms in San Pablo Bay during construction of bridge piers, which would likely require pile driving using impact hammers. However, this effect would be temporary.

Alternatives 5 and 6 would likely result in the next-lowest magnitude of impacts after Alternative 7. The project would increase capacity along the existing SR 37 corridor, and noise barriers are currently reducing traffic noise along the corridor in Vallejo. The increase in traffic noise would potentially require some modifications to existing noise walls, but overall, the need for additional mitigation would be low relative to the other alternatives.

Impacts to sensitive receptors due to a substantial increase in noise levels are more likely for those alternatives that involve constructing a highway in a new location, due to the lower influence of traffic noise from existing highway corridors. Impacts due to a substantial increase in noise levels would be likely to occur for Alternatives 1, 2, 3, and 4, although the density of sensitive receptors is generally low along the areas being considered for new corridors under these alternatives.

Alternative 8 would likely result in the highest level of noise impacts. The corridor under this alternative would follow SR 12 and SR 116, and much of the corridor is developed, with land uses having driveway access to the corridor. The added capacity under the project would increase traffic noise in these areas, and there are few existing noise barriers along the corridor. There is a high potential for noise abatement measures to be evaluated, but given safety and access requirements, it is unlikely that noise barriers would be feasible in many locations.

Based on the results of the technical study, a Noise Study Report (NSR) would be prepared, consistent with Caltrans documentation standards. The noise barriers determined to be feasible for construction in the NSR would be further evaluated in a Noise Abatement Decision Report, which would present findings on the reasonableness of barriers.

18.4 References

California Department of Transportation (Caltrans). 2019. *Traffic Census Program Annual Average Daily Traffic*. Available: https://dot.ca.gov/programs/traffic-operations/census. Accessed: April 28, 2022.

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Chapter 19
Recreational Resources, Section 4(f), and Section 6(f)

This chapter describes the existing parks, trails, and recreation facilities in the SR 37 PEL Study Area. Recreational resources located directly along the proposed alignments are also considered to be part of the SR 37 PEL Study Area for parks and recreation. These resources are described in more detail below and organized by jurisdictional entity.

19.1 Methodology

This chapter was drafted based on review of local planning documents and publicly available information pertinent to recreational resources. Refer to Section 6, *References*, for a complete list of information cited herein.

19.2 Existing Conditions

19.2.1 California Department of Parks and Recreation

The California Department of Parks and Recreation (DPR) operates 280 state park units, over 340 miles of coastline, 970 miles of lake and river frontage, 15,000 campsites, 5,200 miles of trails, 3,195 historic buildings, and more than 11,000 known prehistoric and historic archaeological sites (DPR 2022a). Of these, the Olompali State Historic Park, located at 8901 Redwood Boulevard in Novato, is the only state park in the SR 37 PEL Study Area for parks and recreation (DPR 2022b). The 700-acre park features picnic areas, the historic Burdell mansion, gardens, a ranch facility, and hiking trails (DPR 2011).

19.2.2 County Operated Recreational Resources

The SR 37 PEL Study Area for parks and recreation includes facilities operated by the Counties of Marin, Sonoma, and Napa. State and County facilities are described in more detail below and shown on Figure REC-2. Solano County recreational facilities are not in the SR 37 PEL Study Area for parks and recreation (Solano County Parks 2022).

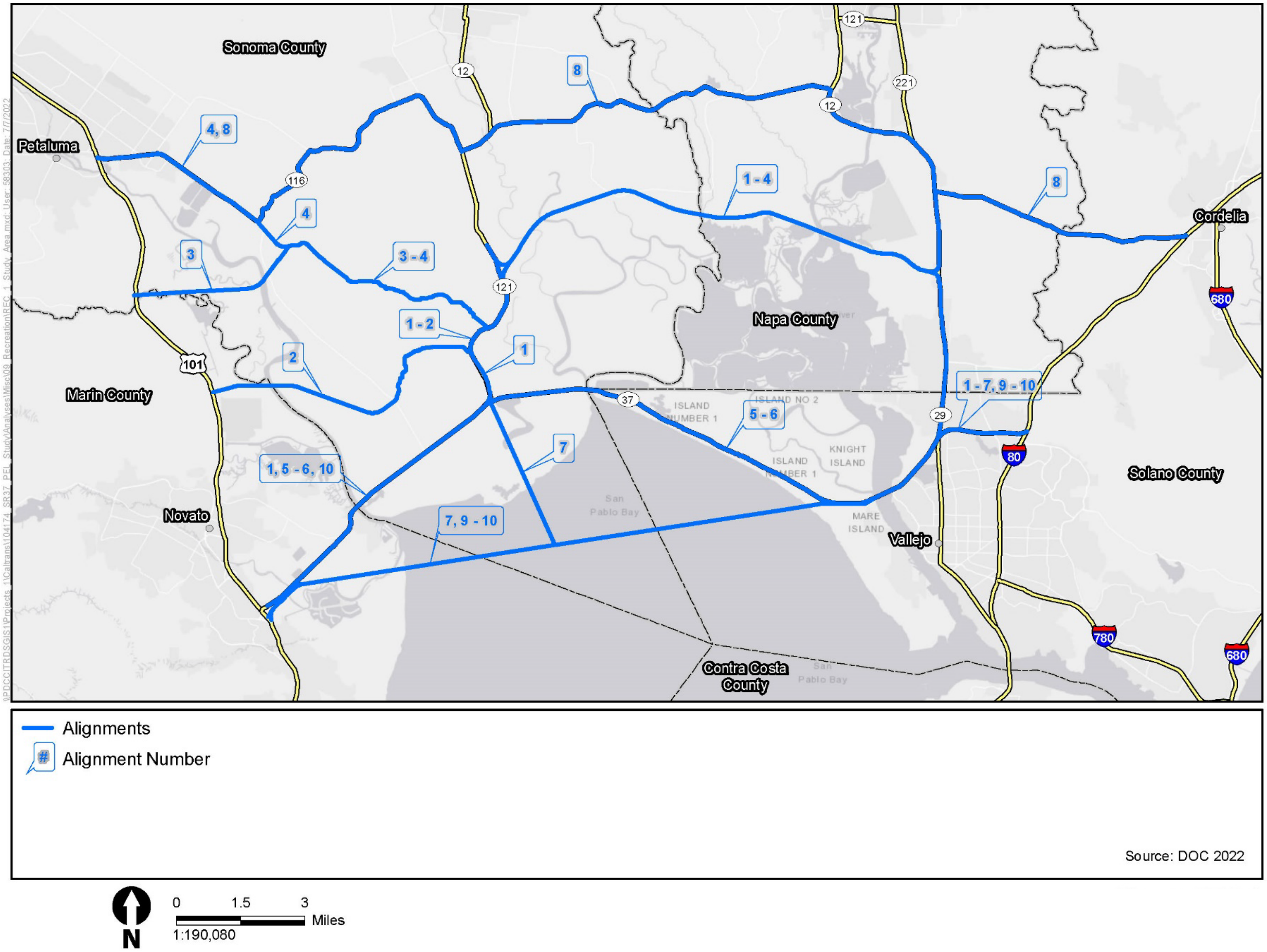

Figure REC-1. Study Area

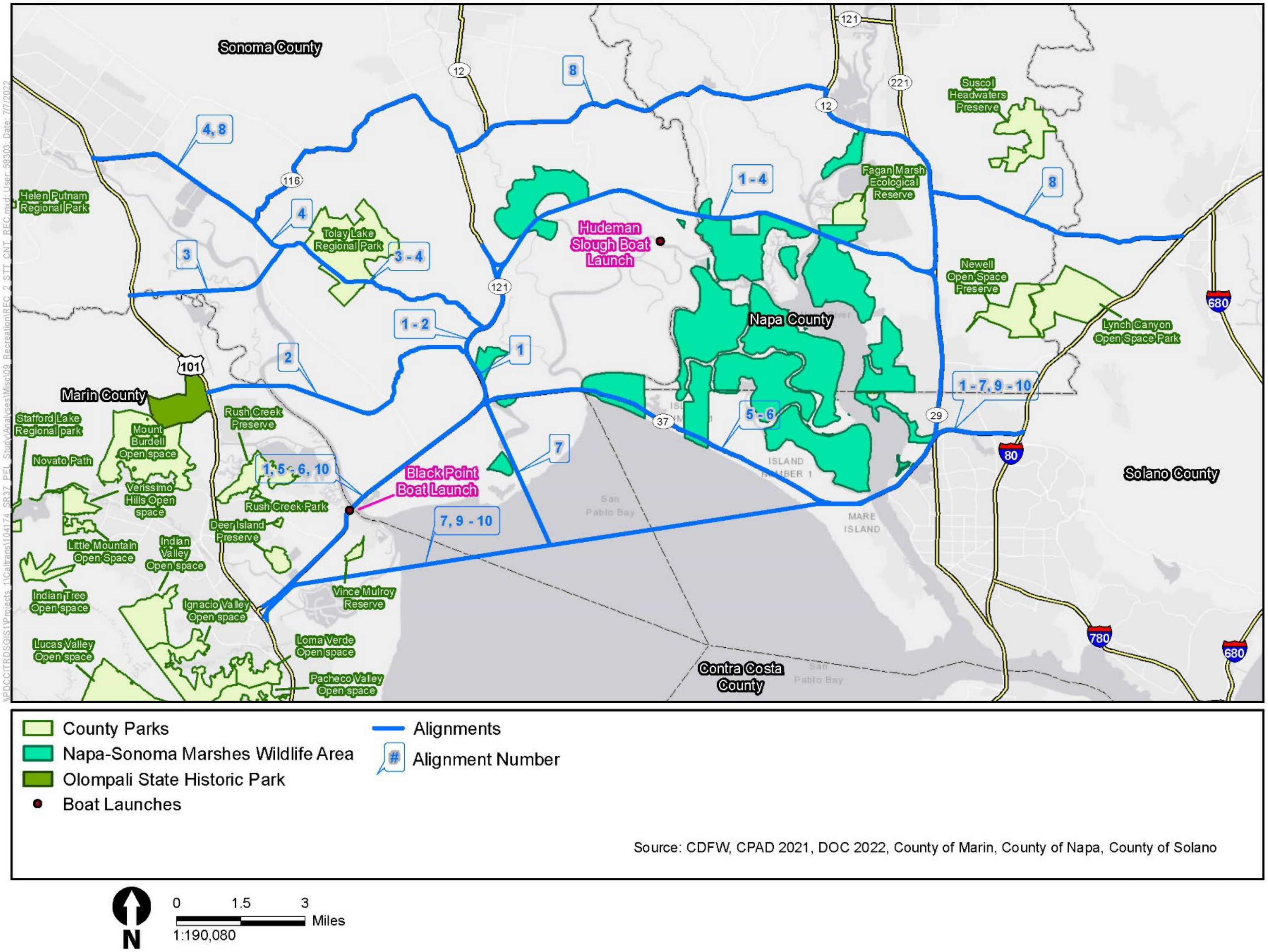

Figure REC-2. State and County Operated Recreational Resources

19.2.2.1 Marin County Parks

Marin County Parks manages over 18,000 acres of open space preserves, parks, and pathways. The following facilities are owned and operated by the County of Marin within the SR 37 PEL Study Area for parks and recreation (Marin County Parks 2021):

- **Black Point Boat Launch** is located at 200 Harbor Drive in Novato. The location features a boat ramp for river access via motorboats, kayaks, canoe, and paddle boards. Additional amenities include walking paths and picnic tables.
- **Deer Island Preserve** access point is located on Deer Island Lane in Novato. The 154-acre park features trails and remnants of an historic dairy farm.
- **Pacheco Valley Preserve** access point is located at the intersection of Alameda Del Prado and Clay Street in Novato. The undeveloped 519-acre refuge features hiking trails, a seasonal waterfall, and open areas.
- **Rush Creek Preserve** access point is located on Binford Road in Novato. The 522-acre preserve features trails, views of wetlands, and open areas.
- **Vince Mulroy Reserve** access point is located on Grandview in Novato. The 64-acre reserve features hiking trails and open areas.

19.2.2.2 Sonoma County Regional Parks

Sonoma County Regional Parks manages 54 parks and beaches that offer trails, open space, sports fields, playgrounds, and campgrounds. The following facilities are operated by Sonoma County Regional Parks in the SR 37 PEL Study Area for parks and recreation (Sonoma County Regional Parks 2021):

- **Hudeman Slough Boat Launch**, located at 28020 Skaggs Island Road in Sonoma, is owned by the California Department of Fish and Wildlife and operated by Sonoma County Regional Parks. The park features a boat launch with access to tidal waterways linked to the San Pablo Bay.
- **Tolay Lake Regional Park** is located at 5869 Cannon Lane in Petaluma. The 3,400-acre park features trails for hiking, biking, and horseback riding.

19.2.2.3 Napa County Regional Park and Open Space District

The Napa County Regional Park and Open Space District is charged with operating open space resources within Napa County. The following facilities are owned and operated by Napa County Regional Park and Open Space District in the SR 37 PEL Study Area for parks and recreation (Napa County Regional Park and Open Space District 2021):

- **Fagan March Ecological Reserve** is west of the Napa County Airport, near Airport Road. The 306-acre reserve includes baylands, tidal sloughs, and wetland habitat. Most of the reserve is accessible by boat only.
- **Napa-Sonoma Marshes Wildlife Area** is comprised of 8,208 acres of habitat, open water, mud flats, and tidal, salt, and freshwater marshes. Visitors can access areas of the park via multiple access points, but some areas are only accessible by boat. Recreational activities include fishing, boating, wildlife viewing, hiking, and hunting.

- **Newell Open Space Preserve** is located at 70000 Newell Drive in American Canyon. The 620-acre preserve features open space areas, picnic tables, and trails for hiking, biking, and horseback riding.

19.2.3 City-Operated Recreational Resources

The SR 37 PEL Study Area for parks and recreation includes facilities operated by Petaluma, Novato, American Canyon, and Vallejo. The following subsections describe these facilities in more detail and the facilities are shown on Figure REC-3.

19.2.3.1 City of Petaluma Parks, Open Spaces, and Recreation Facilities

The City of Petaluma maintains approximately 50 parks and open space areas. The following facilities are in the SR 37 PEL Study Area for parks and recreation (City of Petaluma 2021):

- **Alman Marsh Open Space** is located at 1400 Cader Lane. The 80-acre marsh features trails and is comprised of tidal wetlands and pasture uplands containing seasonal freshwater wetlands.
- **Petaluma Marina** is located at 781 Baywood Drive. The facility offers access to the Petaluma River and boat mooring opportunities. Additional facilities include restrooms and water fountains.
- **Rocky Memorial Dog Park** is located at 2204 Casa Grande Road. The 21.1-acre park features bicycle access and restrooms.
- **Shollenberger Park and Open Space** is located at 745 Baywood Drive. The 165-acre open space area features trails and wildlife viewing areas.

19.2.3.2 City of Novato Parks, Recreation, and Community Services Department

The City of Novato maintains approximately 39 recreational areas. The following facilities are in the SR 37 PEL Study Area for parks and recreation (City of Novato 2022):

- **Bahia Mini Park** is located at the Topaz Drive and Santana Road intersection. The park is comprised of several small open spaces that add up to 1.83 acres.
- **Olive Tot Lot** is located at 2 Elmwood Court. The park features play equipment, picnic tables, a barbecue, a shade structure, and a permanent chess table.
- **Scottsdale Pond** is located at the Redwood Boulevard and Rowland Boulevard intersection. The park features a pond suitable for fishing, interpretative signs, and a wooden gazebo.
- **Slade Park** is located at 593 Manuel Drive. The 3-acre park features a play structure, a barbecue, picnic tables, and a baseball backstop.

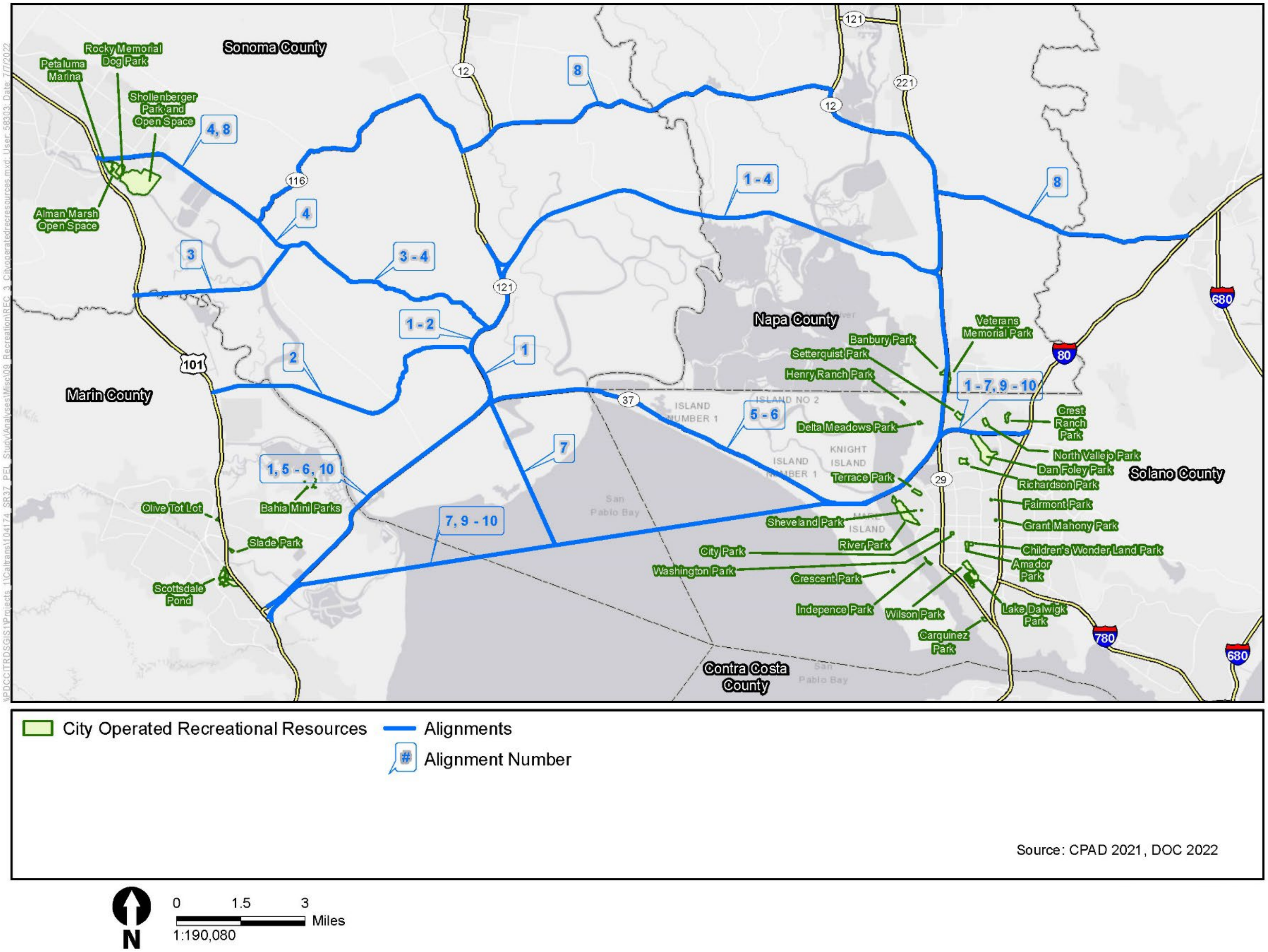

Figure REC-3. City Operated Recreational Resources

19.2.3.3 City of American Canyon Parks, Trails, and Open Space

The City of American Canyon maintains a variety of parks and open space areas. The following facilities are in the SR 37 PEL Study Area for parks and recreation (City of American Canyon 2022):

- **Banbury Park** is located at 100 Banbury Way and features play equipment.
- **Veteran's Memorial Park** is located at 2801 Broadway Street. The park features picnic tables, a barbecue, play equipment, walking paths, grassy areas, bocce ball courts, and a dog park.

19.2.3.4 Greater Vallejo Recreation District

The City of Vallejo maintains a variety of parks and open space areas. The following facilities are in the SR 37 PEL Study Area for parks and recreation (City of Vallejo 2022):

- **Amador Park** is located at the Amador Street and Florida Street intersection and features sports fields.
- **Carquinez Park** is located at 1161 Porter Street. The park features play equipment, a multi-use field, picnic tables, and trails.
- **Children's Wonderland Park** is located at 360 Glenn Street. The park features picnic areas, play structures, and two playgrounds.
- **City Park** is located at 425 Alabama Street. The park features two play areas, picnic tables, and a horseshoe pit.
- **Crescent Park** is located at 501 Poplar Avenue and features a playground.
- **Crest Ranch Park** is located at 216 Nicole Way. The park features a play area, picnic tables, sports fields, and a horseshoe pit.
- **Dan Foley Park** is located at 1461 North Camino Alto. The park features a cultural center, sports fields, picnic tables, play equipment, a fishing dock, and trails located along Lake Chabot.
- **Delta Meadows Park** is located at 841 Jack London Drive. The park features a play area, half basketball courts, a walkway, and views of the Napa River.
- **Fairmont Park** is located at 227 Edgemont Avenue. The park features a play area and picnic tables.
- **Grant Mahony Park** is located at 818 Mariposa Street. The park features a play area, picnic tables, a labyrinth, and a rose garden.
- **Henry Ranch Park** is located at 602 Auburn Drive and features a playground and open space.
- **Independence Park** is located along Mare Island Way and features walking paths and view of the Napa River and Mare Island.
- **Lake Dalwigk Park** is located 457 5th Street. The park features a play area, picnic tables, basketball courts, and a walking trail.
- **North Vallejo Park** is located at 1121 Whitney Avenue. The park features a community center, play equipment, and sports fields.
- **Richardson Park** is located at 325 Richardson Drive. The park features play areas and picnic tables with barbecues.

- **River Park** is located along Wilson Avenue and features walking trails.
- **Setterquist Park** is located at 300 Standford Drive. The park features play areas and sports fields.
- **Sheveland Park** is located along Coghlan Street. The park features play equipment, picnic areas, and a sports field.
- **Terrace Park** is located at the Selfridge Street and Gardner Avenue intersection. The park features play equipment, play areas, picnic tables with barbecues, and a sports field.
- **Washington Park** is located at 900 Ohio Street. The park features a play area, picnic tables, a sports field, and a walking path.
- **Wilson Park** is located at 1007 Solano Avenue. The park features play equipment, open space, a walking trail, picnic areas with barbecues, and sports fields.

19.2.4 Other Regional Recreational Resources

The SR 37 PEL Study Area for parks and recreation includes facilities operated by nonprofit organizations and other entities. The following subsections describe these facilities in more detail and are shown on Figure REC-4.

19.2.4.1 San Francisco Bay Joint Venture

The *North American Waterfowl Management Plan* serves as the foundation for collaborative bird conservation efforts between the United States, Canada, and Mexico. Conservation strategies established by the *North American Waterfowl Management Plan* are implemented at the regional level by migratory bird joint ventures comprised of federal, state, provincial, tribal, and local governments, businesses, conservation organizations, and individuals. Currently, 22 joint ventures address bird and habitat conservation issues. Eighteen of those are in the United States and one, the San Francisco Bay Joint Venture, is in the SR 37 PEL Study Area for parks and recreation (USFWS 2016).

The San Francisco Bay Joint Venture (SFBJV), convened in 1995, is in the SR 37 PEL Study Area for parks and recreation. The SFBJV seeks to protect, restore, increase, and enhance all types of wetlands, riparian habitat, and associated uplands throughout the nine-county San Francisco Bay Area (Bay Area) to benefit waterfowl, fish, and wildlife populations. In collaboration with more than 100 Bay Area organizations, the SFBJV tracks and facilitates habitat protection, restoration, and enhancements projects throughout the Bay Area, including Marin, Sonoma, Napa, and Solano Counties (SFBJV 2022).

19.2.4.2 Mare Island Shoreline Heritage Preserve

As shown in Figure REC-4, the Island Shoreline Heritage Preserve, located on the southern end of the Mare Island Naval Shipyard, is owned by the City of Vallejo and operated by the Mare Island Heritage Trust, a nonprofit organization. Formerly the Mare Island Naval Ammunition Depot, the 130-acre preserve is now designated for recreational purposes and features a 5,000-square-foot visitors center, former naval housing, a naval cemetery, picnic areas, overnight camping, expansive views of the bay, and open space areas. The Mare Island Heritage Trust also hosts onsite special events including festivals, holiday celebrations, and weddings (Mare Island Preserve 2022).

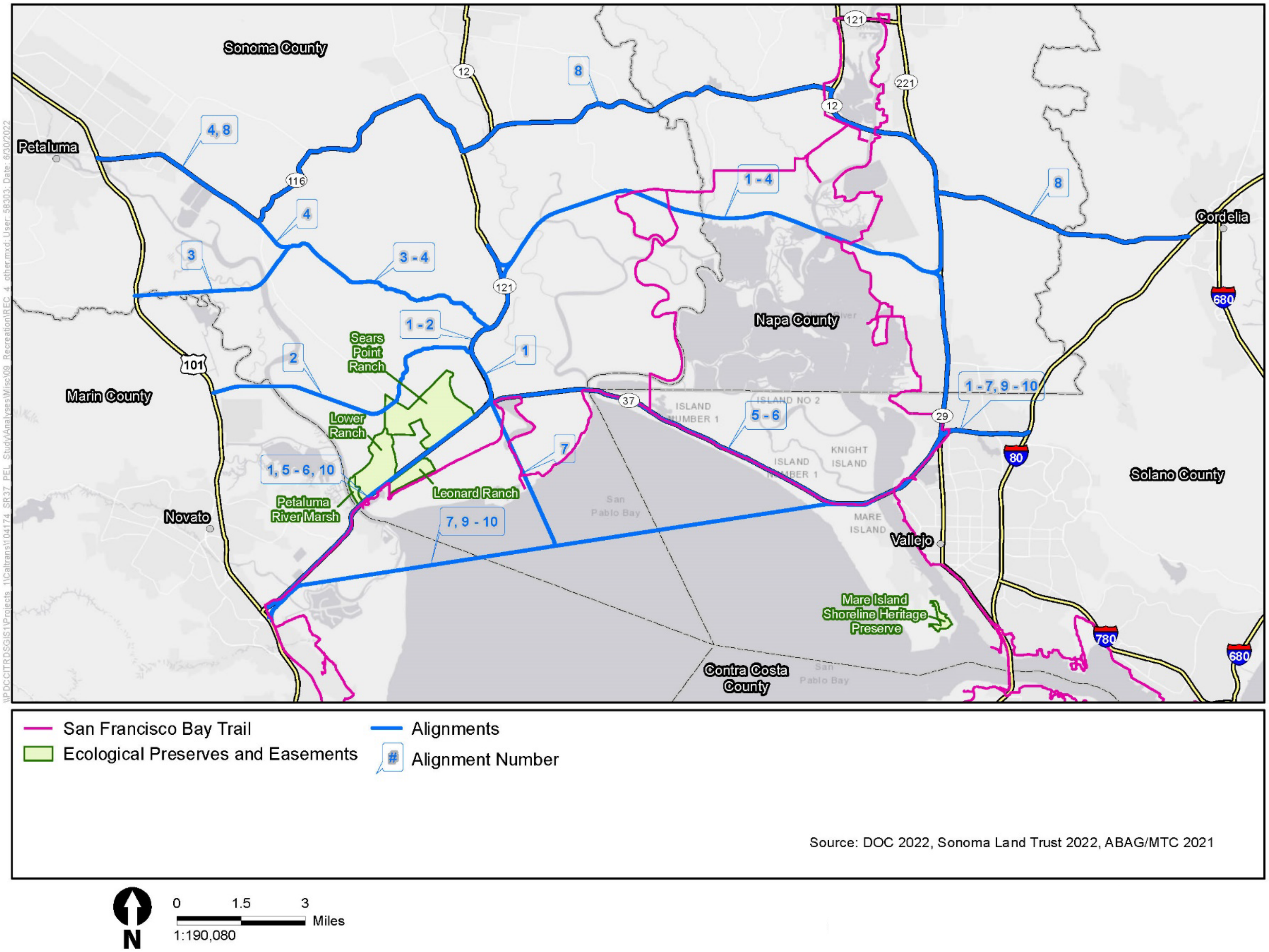

Figure REC-4. Other Regional Recreational Resources

19.2.4.3 San Francisco Bay Trail

The San Francisco Bay Trail (Bay Trail) is a planned 500-mile walking and cycling path around the entire nine-county Bay Area. The Bay Trail Plan, adopted by the Association of Bay Area Governments (ABAG), includes proposed trail alignments, policies to guide trail selection and implementation, design and construction of routes, and strategies for implementation and financing. Collectively, jurisdictions in the Bay Area have completed approximately 350 miles of the proposed Bay Trail (Bay Trail 2022a). As shown on Figure REC-4, planned and completed sections of the Bay Trail are located in Sonoma County, Napa County, Novato, American Canyon, and Vallejo (Bay Trail 2022b).

19.2.4.4 Sonoma Land Trust

Sonoma Land Trust, a nonprofit organization, maintains a network of 19 preserves encompassing more than 4,000 acres of wildlife habitat, farms and ranches, creeks, and riparian corridors in Sonoma County (Sonoma Land Trust 2022a). The following preserves are in the SR 37 PEL Study Area for parks and recreation and are shown in Figure REC-4 (Sonoma Land Trust 2022b).

- **Sears Point Ranch**, located north of SR 37, is a 1,142-acre preserve with seasonal creeks, grasslands, and grazing land utilized by the onsite cattle ranch.
- **Leonard Ranch**, located south of SR 37, is a 244-acre agricultural property that features a tidal marsh, seasonal wetlands, and agricultural lands that produce oat hay.
- **Lower Ranch** is located north of SR 37 near the Petaluma River. The 528-acre property is protected by an agricultural easement that requires the land to remain in productive agricultural use and contribute to the undeveloped nature of the surrounding marsh and farmlands.
- **Petaluma River Marsh** is a 49-acre tidal marsh located north of SR 37 and east of the Petaluma River.

19.2.5 Privately Owned Facilities Used for Recreational Purposes

The SR 37 PEL Study Area for parks and recreation also includes a variety of privately owned recreational resources linked to the local economy. These range widely in character, and include the Sonoma Valley Raceway at Sears Point, numerous wineries, golf courses, boat launches, and other visitor-serving attractions (such as Cornerstone Sonoma). Please refer to Figure REC-5 for locations of some of these facilities (County of Sonoma 2008; County of Napa 2008).

19.3 Section 4(f)

Section 4(f) protects publicly owned park and recreation areas that are open to the general public, publicly owned wildlife and waterfowl refuges, and public or privately owned historic sites. The term historic sites includes prehistoric and historic districts, sites, buildings, structures or objects listed in, or eligible for, the National Register of Historic Places (FHWA 2021). For the purposes of this report, all publicly owned parks, recreation areas, wildlife and waterfowl refuges, and historic sites are considered potential Section 4(f) protected facilities.

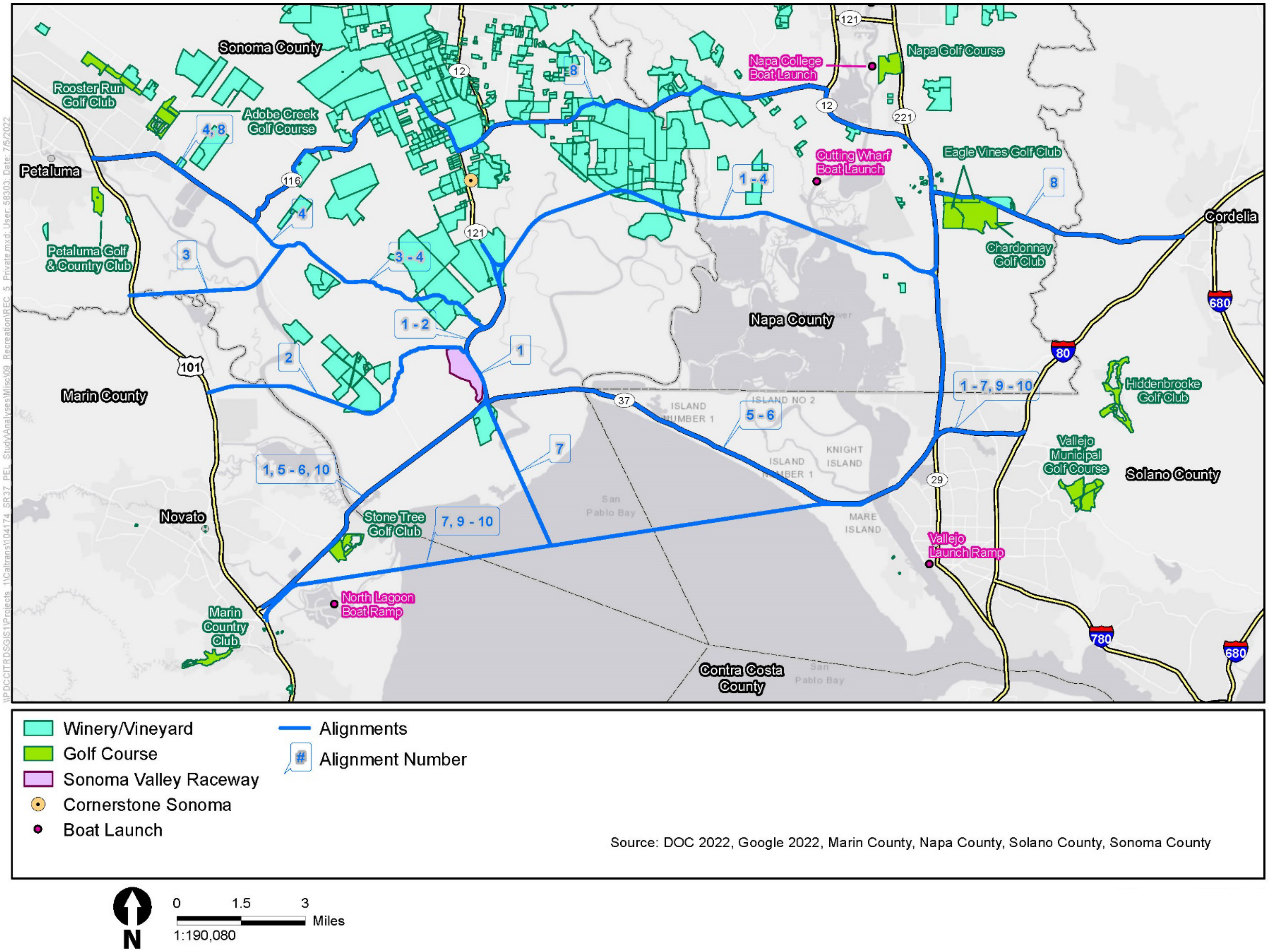

Figure REC-5. Privately Owned Facilities Uses for Recreational Purposes

19.4 Section 6(f) Land and Water Conservation Fund Areas

The Land and Water Conservation Fund (LWCF) Program was established in 1965 by the federal government. Section 6(f) of the LWCF Act provides matching funds to states or municipalities for planning, improvements, or acquisition of outdoor recreational lands. Any property that was planned, purchased, or improved with LWCF money is considered a 6(f) property. Section 6(f)(3) contains provisions to protect these types of properties that are purchased or improved with grant monies from the LWCF. Section 6(f) applies to all projects that could involve possible conversion of the use of these public outdoor recreational properties (U.S. Department of the Interior 2021).

The San Pablo Bay National Wildlife Refuge (National Wildlife Refuge), an LWCF area, is in the SR 37 PEL Study Area (USFW 2022). The National Wildlife Refuge was established in 1974 to protect migratory birds, wetland habitat, and endangered species. As shown in Figure REC-6, the National Wildlife Refuge consists of more than 19,000 acres along the northern boundary of San Pablo Bay. The existing SR 37 traverses through the southern area of the National Wildlife Refuge. The National Wildlife Refuge provides critical migratory and wintering habitat for shorebirds and waterfowl, particularly diving ducks, and provides year-round habitat for endangered, threatened, and sensitive species including the California Ridgway's rail, California clapper rail, California black rail, San Pablo song sparrow, salt marsh harvest mouse, and Suisun shrew (USFWS 2021).

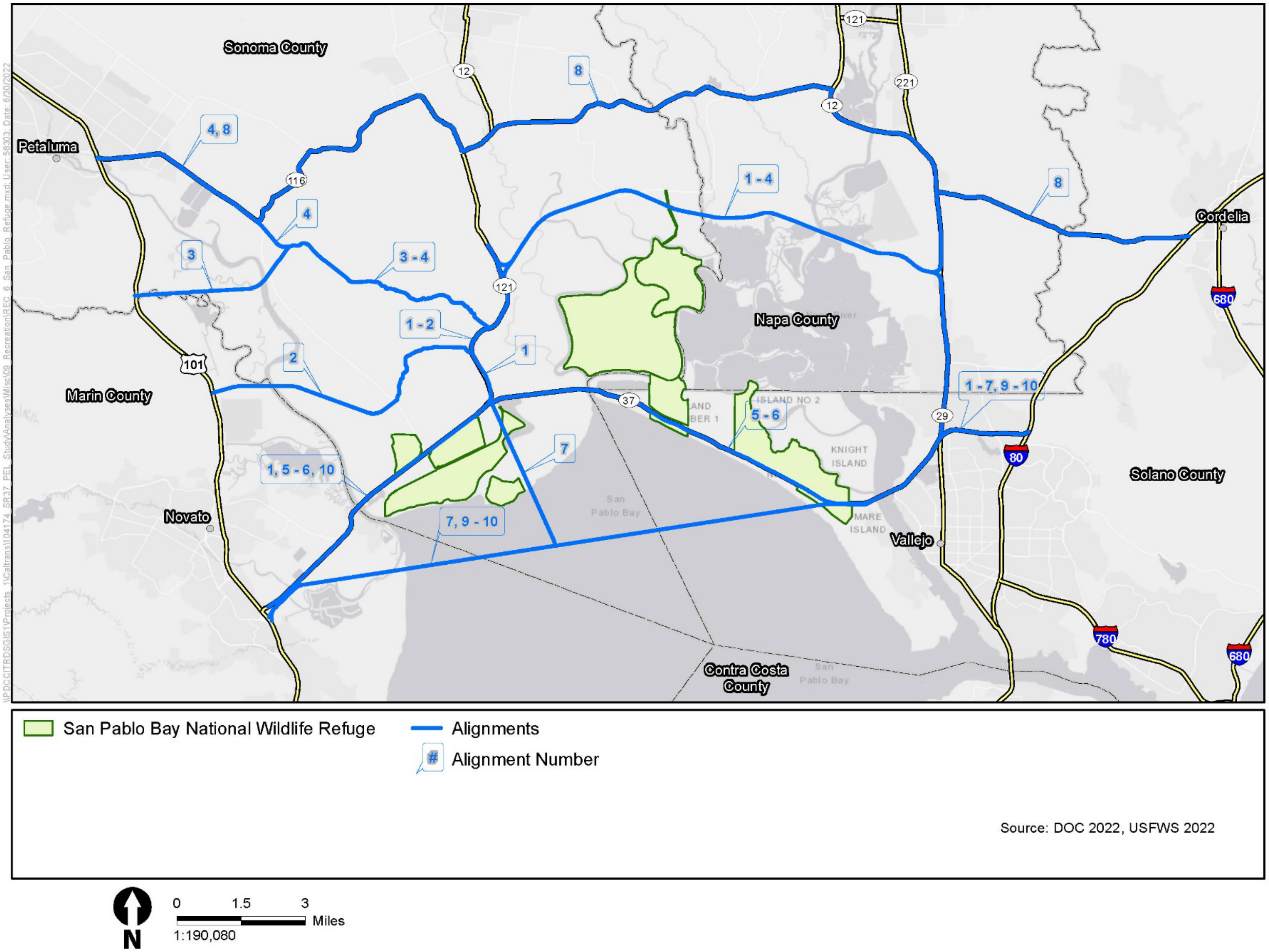

Figure REC-6. San Pablo Bay National Wildlife Refuge

19.5 Next Steps

The SR 37 PEL Study should consider the proximity of recreational resources along the proposed alignments. Future coordination with governing agency/body may be required. Section 6(f) prohibits the conversion of recreational properties to a non-recreational purpose without prior approval from the National Park Service. If there is a Federal Highway Administration nexus, further evaluation of potential Section 4(f) properties and 6(f) properties, will be required.

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Chapter 20
Transportation

This chapter describes the existing (2021/22) transportation conditions within the SR 37 PEL Study Area, and specific transportation topics that relevant to the transportation planning and future environmental impact analysis. These topics are briefly described below.

- **Destination Access** includes the existing major employment, government, education, shopping/entertainment, and recreation destinations served by SR 37.
- **Multimodal Opportunities** are the existing roadway, transit, pedestrian, and bicycle facilities in the Study Area that serve the major destinations.
- **Mobility** describes the volume, speed, occupancy, and reliability of vehicle travel in the SR 37 corridor as well as information about the number of vehicle miles traveled (VMT) in the corridor and region.

Safety includes information about the physical and operational conditions of the SR 37 corridor related to collisions or potential collision risk.

20.1 Methodology

The existing conditions report was drafted based on qualitative and quantitative evaluation of publicly available information pertinent to the transportation topics noted above. Refer to Section 5, *References*, for a complete list of information cited herein.

Specific methodology or technical approaches are summarized below.

- **Destination Access—**Geographic information systems (GIS) mapping of existing major destinations.
- **Multimodal Opportunities—**GIS mapping of existing facilities.
- **Mobility—**Measurement of volume, speed, and reliability for SR 37 obtained from the California Department of Transportation (Caltrans) Performance Measurement System (PeMS). Occupancy estimates obtained from *Plan Bay Area 2050 Draft Environmental Impact Report* (MTC and ABAG 2021) and VMT estimates obtained from the Caltrans Highway Performance Monitoring System (HPMS) and Metropolitan Transportation Commission (MTC) travel demand model.
- **Safety—**Data about the physical and operational conditions of the SR 37 corridor related to collisions or potential collision risk.

20.2 Existing Conditions

20.2.1 Destination Access

SR 37 serves as a gateway between many destinations on the east and west sides of the corridor. Within the Study Area there are also some recreational and entertainment destinations.

Key cities on the east side of the corridor include Vallejo, Benicia, American Canyon, Napa, and Fairfield, while on the west side of the corridor include Novato, San Rafael, Petaluma, Sonoma, Santa Rosa, as well as northern access to San Francisco via the Golden Gate Bridge. The key destinations served by the SR 37 corridor are shown in Figure TR-1.

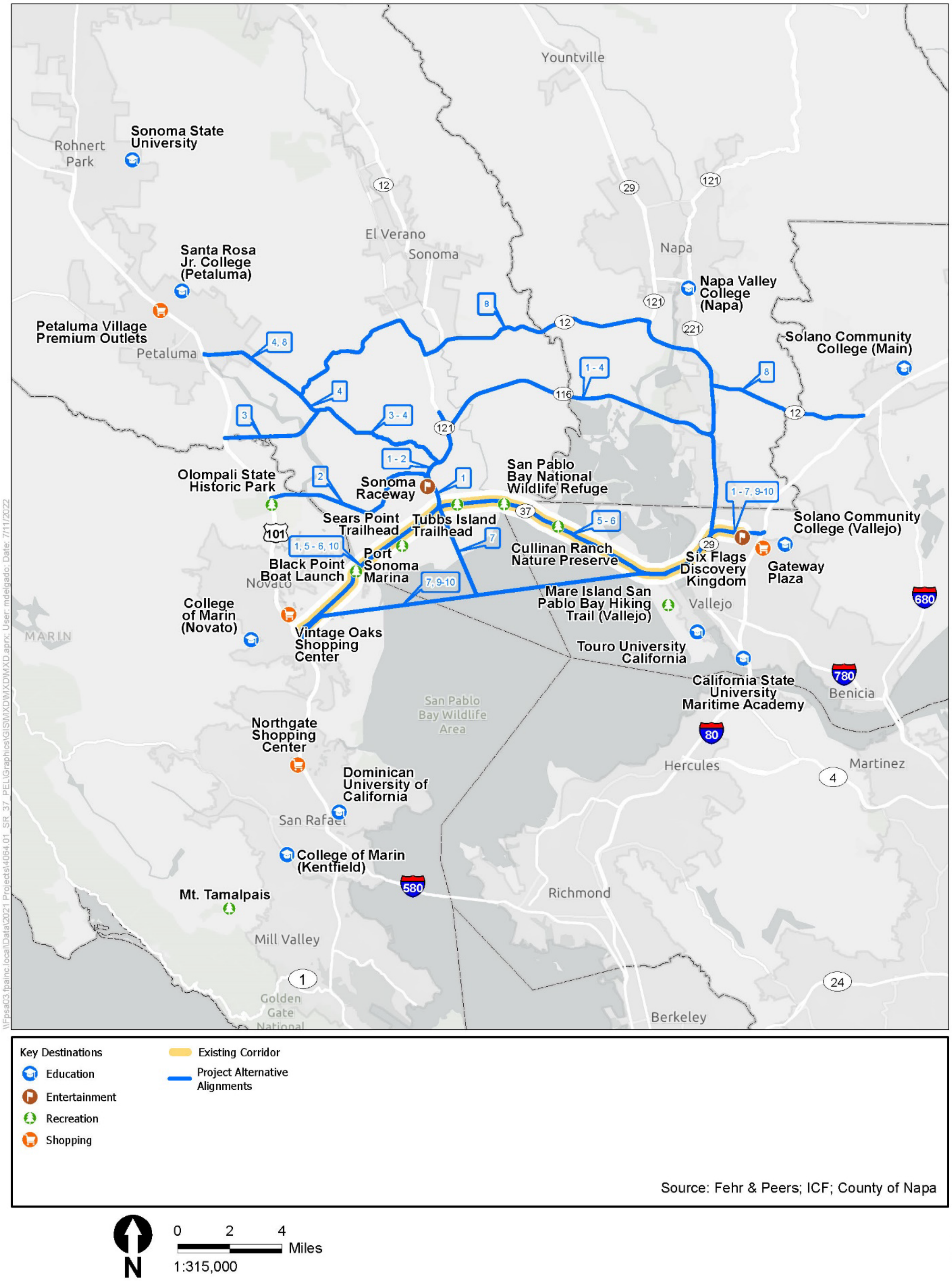


Figure TR-1. Key Destinations

20.2.1.1 Employment and Government

The area served by SR 37 has several major population and employment areas within each of the four counties of the Study Area. Table TR-1 shows recent population and employment estimates for each county and the key cities directly served by SR 37.

Table TR-1. Population and Employment Summary for Jurisdictions Served by SR 37

County	City	Population (2021)	Employment (2019)
Marin County		260,200	131,000
	Novato	52,700	28,900
	San Rafael	60,800	29,500
Solano County		451,700	215,000
	Vallejo	124,900	57,700
	Fairfield	119,700	54,400
Sonoma County		485,900	258,800
	Petaluma	59,400	31,300
	Rohnert Park	44,400	23,500
	Santa Rosa	176,900	91,900
Napa County		136,200	71,100
	Napa	78,800	41,600

Source: U.S. Census Bureau 2021

Notable employment centers in the Study Area include the following:

- Pharmaceutical and industrial business park area southeast of SR 37 and US 101 in Novato
- Industrial and office park area near Smith Ranch Road and US 101 in San Rafael
- Marin County Government offices at Civic Center and US 101 in San Rafael
- Primarily industrial business park at Lakeville Highway (SR 116) in southeast Petaluma
- Industrial and warehousing areas along SR 29 at SR 12, between Napa and American Canyon

20.2.1.2 Education

Several educational institutions are located throughout the greater area surrounding SR 37. Major universities and colleges in the area are listed below:

- Dominican University of California in San Rafael
- College of Marin in Kentfield (main campus) and Novato (Indian Valley campus)
- Sonoma State University in Rohnert Park
- Santa Rosa Junior College in Santa Rosa (main campus) and Petaluma
- Solano Community College in Fairfield (main campus) and Vallejo
- Touro University California in Vallejo

- California State University Maritime Academy in Vallejo
- Napa Valley College in Napa

20.2.1.3 Shopping, Entertainment, and Recreation

SR 37 serves as a gateway connecting to several recreation and entertainment destinations in the region:

- Six Flags Discovery Kingdom Theme Park in Vallejo
- Shopping area near Columbus Parkway, SR 37, and Interstate (I-) 80 in Vallejo
- Mare Island San Pablo Bay Hiking Trail in Vallejo
- Various wineries in Napa
- Black Point Boat Launch in Novato
- Olompali State Historic Park
- Shopping area near Rowland Boulevard and US 101 in Novato
- Point Reyes National Seashore
- Mount Tamalpais State Park
- Shopping mall near Freitas Parkway and US 101 in San Rafael
- Outlet mall near US 101 in Petaluma

Within the Study Area, the main entertainment destination is the Sonoma Raceway at Sears Point (SR 37 at SR 121). Along the corridor there are also several wildlife viewing areas and recreational trails, including San Pablo Bay National Wildlife Refuge, Sears Point Trail, Tubbs Island Trail, and Cullinan Ranch Nature Preserve.

20.2.2 Multimodal Opportunities

This section summarizes the existing transportation facilities along SR 37 for all modes of travel.

20.2.2.1 SR 37 Roadway

SR 37 is an east-west corridor in the North Bay extending through four counties and connecting I-80 to US 101. In the *State Route 37 Comprehensive Multimodal Corridor Plan* (Caltrans 2021), Caltrans has defined the corridor as containing three distinct sections as shown in Figure TR-2 and described as follows:

- **Western Section**: From US 101 in Novato to the signalized SR 121 intersection at Sears Point, SR 37 is a four-lane expressway with 3.4 miles in Marin County and 3.9 miles in Sonoma County.
- **Middle Section**: East of SR 121 (Sears Point), SR 37 becomes a two-lane conventional highway with a median barrier as it crosses the Napa-Sonoma marshlands from SR 121 to Mare Island with 2.3 miles in Sonoma County and 7 miles in Solano County.

- **Eastern Section**: SR 37 becomes a four-lane freeway starting at Mare Island and continues 4.4 miles eastward on mostly filled roadway and structures to its termination at I-80 in Solano County.

These three parts are also determined by a change in the number of lanes as well as in the designation of the facility.

Source: Caltrans 2021

Figure TR-2. SR 37 Corridor

20.2.2.2 Roadway Network

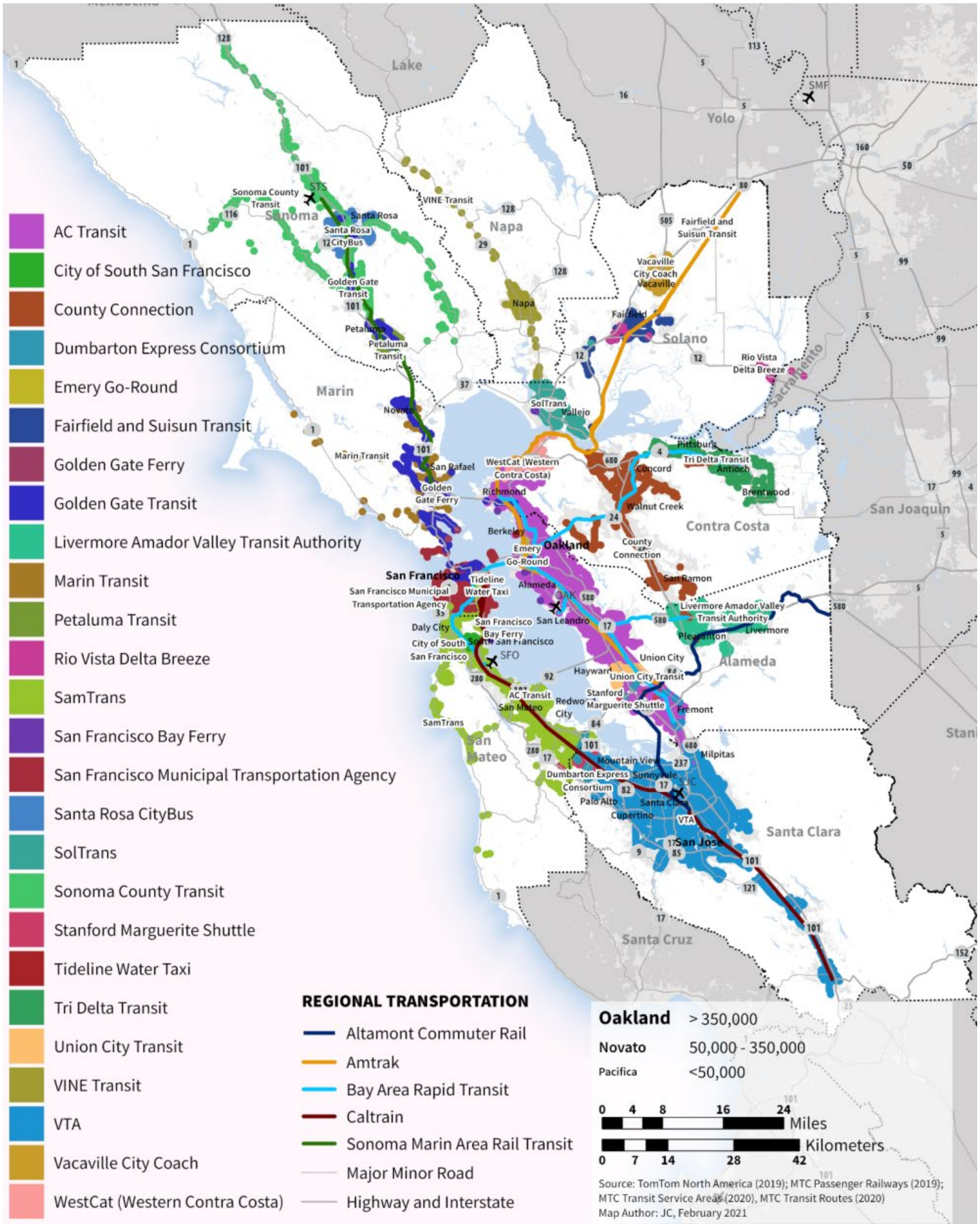
In the Study Area there are various roadways that intersect SR 37. These roadways (listed from west to east) include:

- US 101 is a north-south freeway at the western terminus of SR 37 in Novato in Marin County. US 101 transitions between freeway and highway segments along its entire length traversing near or along the California, Oregon, and Washington coast. To the south the freeway crosses the Golden Gate Bridge to San Francisco; to the north the freeway transitions into Sonoma County toward Santa Rosa.
- Atherton Avenue is an east-west two-lane roadway in Novato with an interchange and underpass at SR 37. The roadway connects to the Black Point Park and Ride on the north side of SR 37 and the Black Point Boat Launch to the east.
- Harbor Drive is a two-lane roadway along the mouth of the Petaluma River that intersects SR 37 at a partial interchange and traverses under SR 37 at the Black Point Boat Launch.
- Sears Point Road is a two-lane road that intersects then parallels SR 37 on the south side of the highway. The road intersects SR 37 in the four-lane expressway section with at an uncontrolled full-access intersection with turn pockets.
- Lakeville Highway is a north-south two-lane undivided highway connecting SR 37 to SR 116 and Petaluma. The highway intersects SR 37 at a full-access signalized intersection with turn pockets.
- Reclamation Road is a local road that transitions from Lakeville Highway south of SR 37. The roadway provides access to a wetlands area and the Sears Point Trail.

- SR 121 is a north-south two-lane undivided highway that connects to SR 12, Sonoma, and Napa. The highway intersects SR 37 at a full-access signalized intersection, with free-flow ramps for the westbound direction on- and off-ramps with SR 37. The intersection is adjacent to the Sonoma Raceway.
- Tubbs Island Trailhead is a small driveway in the two-lane divided highway section of SR 37. The driveway is only accessible on the eastbound direction of SR 37 and features a small parking area for the Tubbs Island Trail.
- Noble Road is a local access road on the north and south side of SR 37 and features a break in the divided highway section with an uncontrolled full-access intersection and small segment of two-way left-turn median.
- One driveway for a wildlife viewing area is located on the south side of SR 37, west of Sonoma Creek and accessible from eastbound SR 37. A separate driveway is located on the north side of SR 37, east of Sonoma Creek, and accessible from westbound SR 37. Both driveways feature a small parking area.
- Skaggs Island Road is a restricted-access road on the north side of SR 37 and intersects SR 37 in the divided highway section with an uncontrolled full-access intersection with inbound turn pockets. A gate restriction is located approximately 200 feet from SR 37.
- Skaggs Island Road at Cullinan Ranch is a restricted-access road on the north side of SR 37. A small parking area is located within public access until approximately 250 feet from SR 37, where there is a gate restriction. The road is only accessible on westbound SR 37 in the two-lane divided highway segment. The area serves as another wildlife viewing area.
- Walnut Avenue is a north-south roadway connecting to Mare Island with an interchange and overpass at SR 37.
- Wilson Avenue is a two-lane north-south roadway in Vallejo, along the east side of the Napa River with an undercrossing and interchange for the eastbound direction of SR 37.
- Sacramento Street is a two-lane roadway in Vallejo with an overcrossing and interchange for the westbound direction of SR 37.
- SR 29 (Sonoma Boulevard) is a north-south four-lane divided highway with an interchange and undercrossing at SR 37. The roadway connects to Vallejo to the south and Napa to the north.
- Broadway is a two-lane collector roadway with an undercrossing of SR 37.
- Mini Drive is a two-lane collector roadway with an undercrossing of SR 37.
- Fairgrounds Drive is a four-lane roadway with an interchange and undercrossing at SR 37.
- Sage Street is a local roadway with an undercrossing of SR 37.
- I-80 is an east-west interstate freeway at the eastern terminus of SR 37 in Vallejo in Solano County. The freeway connects to Oakland and San Francisco to the southwest and Fairfield and Sacramento to the northeast, before continuing east.

20.2.2.3 Transit

There is no conventional transit service on the SR 37 corridor. Amtrak operates five buses daily in each direction of Thruway Bus service to connect the Amtrak train station in Martinez with Vallejo, Napa, Petaluma, Rohnert Park, Santa Rosa, and cities further north to Eureka. The service route map indicates buses use the SR 12 and SR 116 east-west corridor between Petaluma and Napa; however, a couple of the trips are noted to exclude a stop in Napa and potentially might use the direct route along SR 37. Due to the infrequency and limited destination access this bus service provides, there is still a significant gap in the regional transit system along SR 37, as represented in Figure TR-3 from the *Plan Bay Area 2050 Draft Environmental Impact Report* (MTC and ABAG 2021).



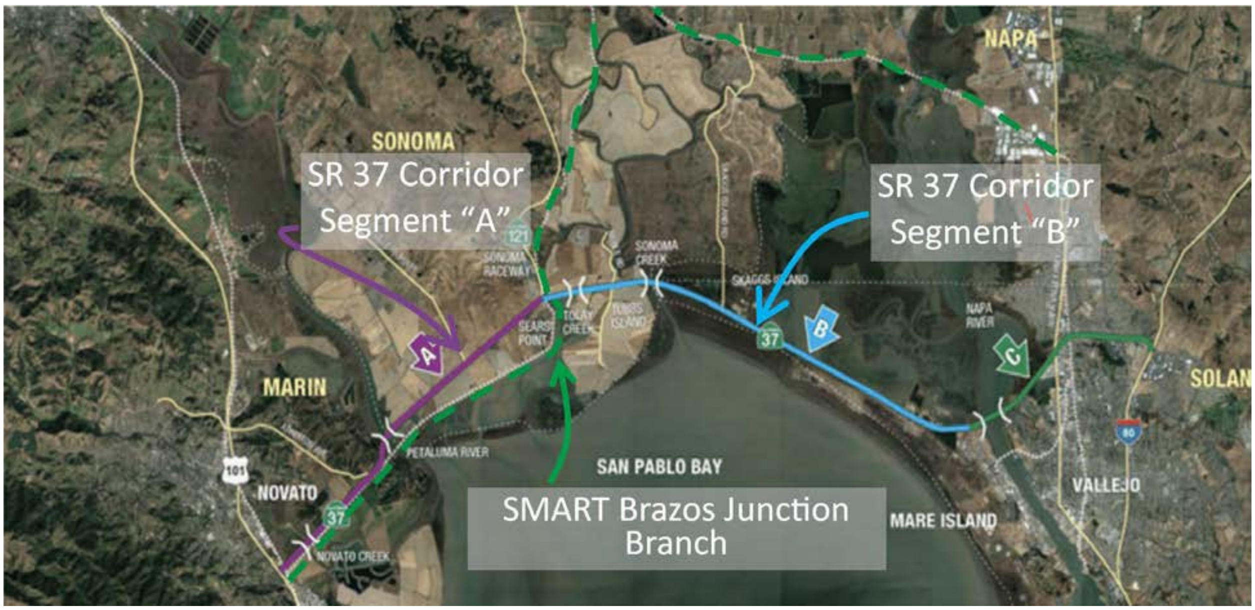
Source: MTC and ABAG 2021

Figure TR-3. Regional Transit System

20.2.2.4 Rail

The Sonoma-Marin Area Rail Transit (SMART) operates a short-line freight rail service along its right-of-way from Novato-Hamilton Station eastward to approximately American Canyon. This rail line closely parallels SR 37 between Novato and the Petaluma River, diverges slightly south of SR 37 between the Petaluma River and Sears Point, crosses SR 37 at-grade east of SR 121, then diverges northeast outside of the SR 37 corridor to near American Canyon. SMART also operates north-south passenger service between Marin and Sonoma County, but there is no existing passenger rail service that parallels SR 37.

SMART has identified opportunities to combine highway and rail facilities on the SR 37 segment between Novato and Sears Point (at SR 121), and to add a rail corridor along SR 37 between SR 121 and Vallejo. The existing rail facilities and rail opportunities vision is identified in Figure TR-4 from the *State Route 37 Corridor – Freight and Passenger Rail Opportunities White Paper* (SMART 2022).



Source: SMART 2021

Figure TR-4. SR 37 Highway and Rail Corridors

20.2.2.5 Pedestrian and Bicycle

There are few pedestrian facilities on SR 37 within the Study Area except along the Napa River bridge and the approaches to that bridge. A few recreational trails are located off SR 37, and include the Sears Point Trail, Tubbs Island Trail, SMART Trail, and San Francisco Bay Trail. Sidewalks are also located along the SR 37 grade-separated crossings at Atherton Avenue, Walnut Avenue, Sacramento Street, Broadway, Mini Drive, Fairgrounds Drive, and Sage Street.

Bicyclists are permitted on the shoulders of SR 37 along the non-freeway section between Lakeville Highway and Wilson/Avenue/Sacramento Avenue; however, there are generally no bike lanes marked along the corridor. One segment of bike lane is marked through the right-in right-out driveway intersection of SR 37 at Skaggs Island Road/Cullinan Ranch. Nearby bicycle facilities include the SMART Trail, bike lanes on Atherton Avenue, bike lanes on Wilson Avenue, bike lanes on Sacramento Street, and the San Francisco Bay Trail.

20.2.3 Mobility

Mobility relates to the ease of moving between origins and destinations and is commonly measured based on metrics like travel time. Travel time depends on the distance and speed of travel. In the SR 37 corridor, travel generally occurs in vehicles due to the long distances between origin-destination pairs and is subject to varying speed conditions due to congestion. Congestion is often severe enough that travel time reliability and predictability are affected. These issues are discussed in more detail below, starting with important fundamentals about the traffic operations in the SR 37 corridor that affect traffic flows and speeds, followed by their influence on travel time reliability. The final section discusses the contributing role that existing vehicle occupancies play in these outcomes.

20.2.3.1 Traffic Operations

Traffic operations generally describes the flow (or volume) and speed of traffic. To describe the existing traffic operations of the SR 37 corridor, Performance Measurement System (PeMS) speed and volume charts were developed from three available data locations on SR 37:

- Petaluma River Bridge, 1.5 miles west of Lakeville Road
- Noble Road, 1.5 miles east of SR 121
- Mare Island, Walnut Avenue/Railroad Avenue interchange

Figures TR-5 through TR-10 provide speed and flow by hour for a week in October 2019. A separate chart is provided for each direction. Key observations from the data are as follows:

- At the Petaluma River Bridge, eastbound speeds typically dip during the PM peak period on weekdays. On Saturday, the speed dropped to 30 miles per hour (mph) during the midday period, likely caused by queuing from the signal at Lakeville Road. In the westbound direction, the AM peak period volume is highest, and this location is not congested.
- At Noble Road, speeds reliably drop to 30–40 mph when volumes are high in both directions. The capacity of the two-lane highway is about 1,300 vehicles per hour in each direction. Westbound has low speeds due to queuing from the signal at SR 121, but eastbound also shows low speeds even though no signal exists to the east. The speed drop is likely due to volume levels reaching capacity.
- At Mare Island, eastbound speed is at the posted speed throughout the day as the highway widens to two lanes. The westbound direction regularly has very slow speeds (<10 mph) during the morning peak period due to the lane reduction just to the west. Due to this bottleneck, the capacity is around 1,100 vehicles per hour on weekdays, but about 1,300 vehicles per hour on weekends.

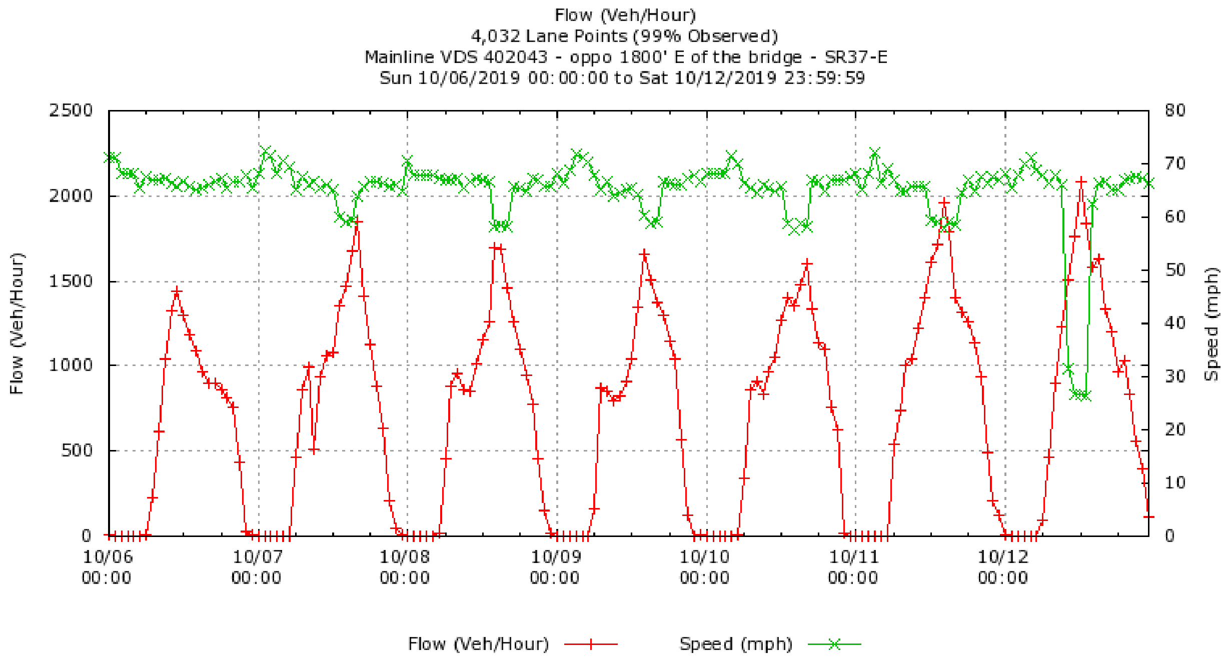


Figure TR-5. SR 37 Eastbound Speed & Flow at Petaluma River Bridge, 1.5 miles west of Lakeville Rd (October 6–12, 2019)

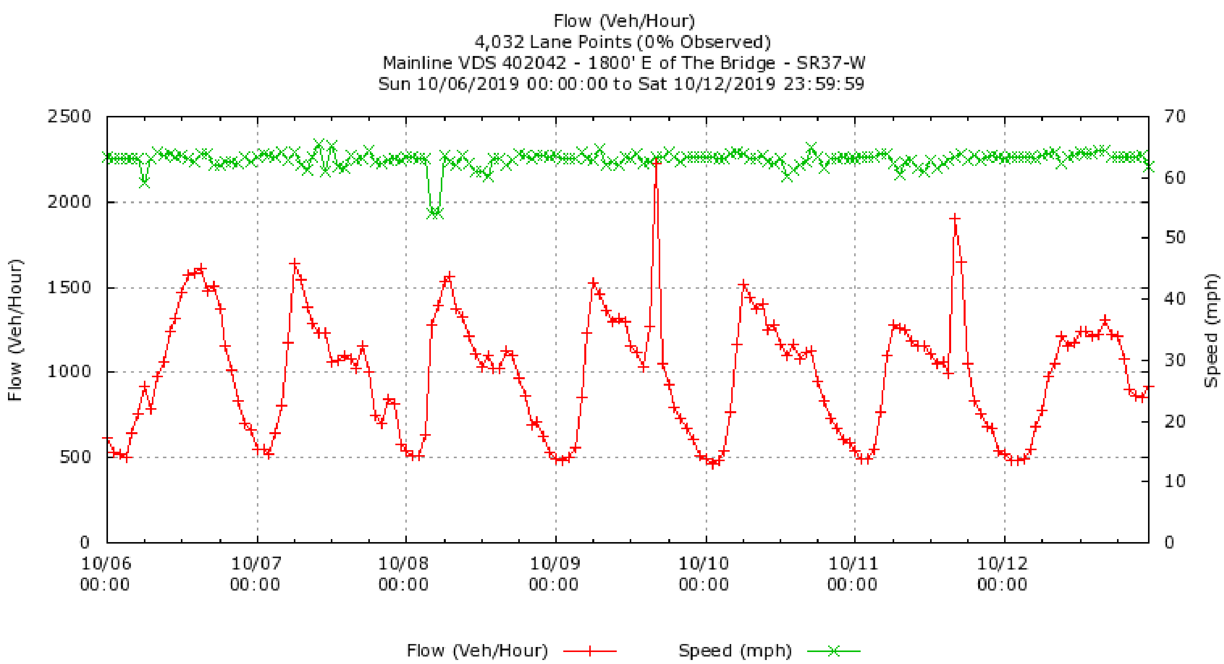


Figure TR-6. SR 37 Westbound Speed & Flow at Petaluma River Bridge, 1.5 miles west of Lakeville Rd (October 6–12, 2019)

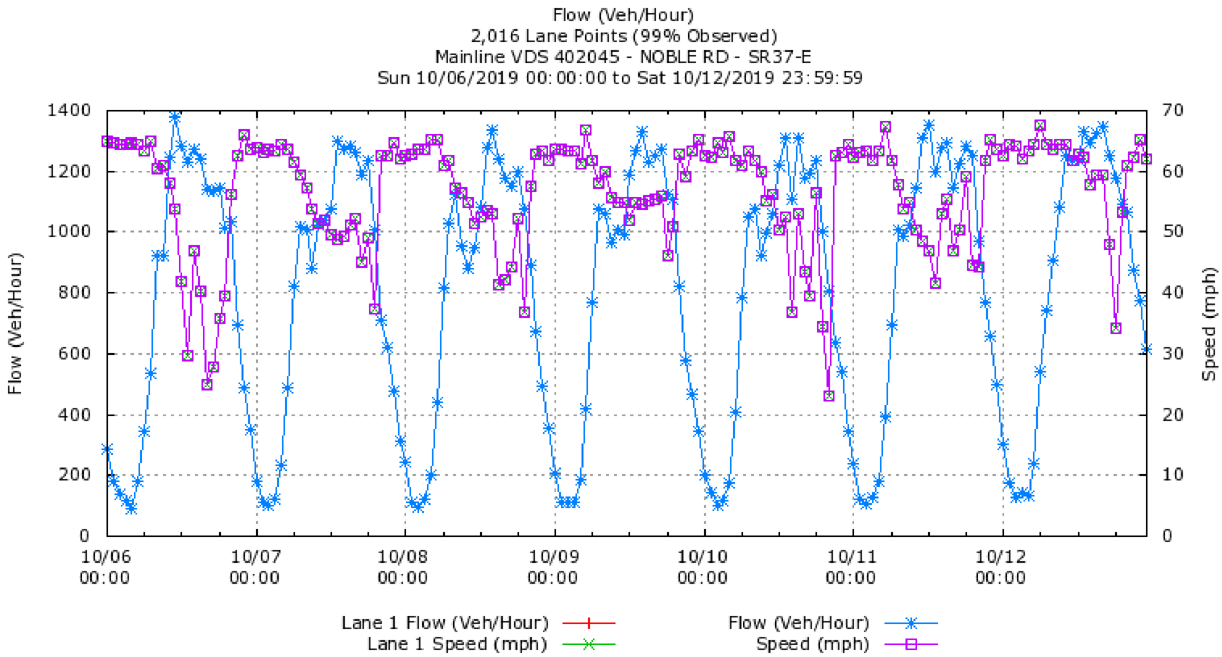


Figure TR-7. SR 37 Eastbound Speed & Flow at Noble Rd., 1.5 Miles East of SR 121 (October 6–12, 2019)

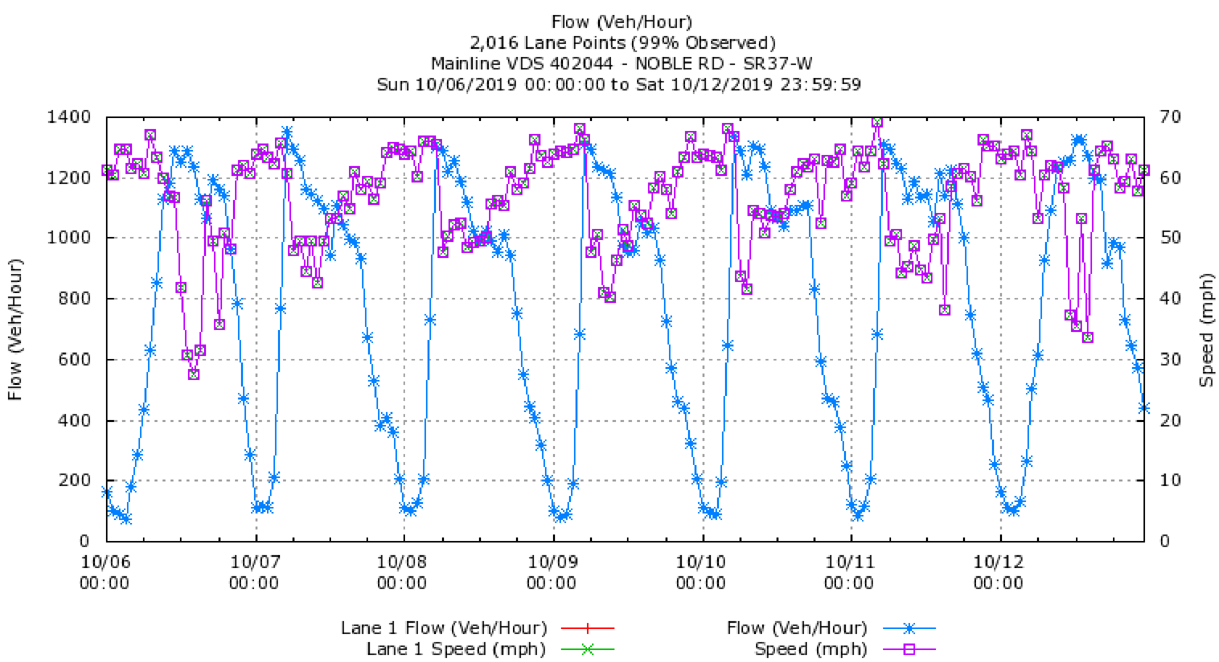


Figure TR-8. SR 37 Westbound Speed & Flow at Noble Rd., 1.5 Miles East of SR 121 (October 6–12, 2019)

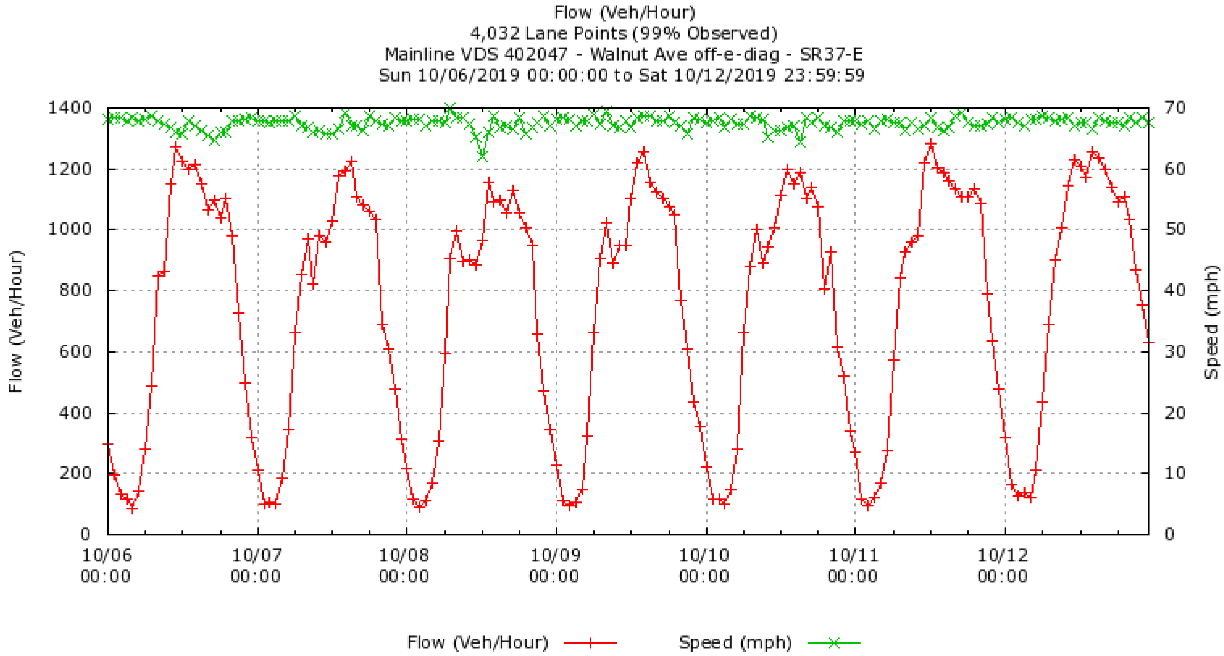


Figure TR-9. SR 37 Eastbound Speed & Flow at Mare Island, Walnut Ave./Railroad Ave. Interchange (October 6–12, 2019)

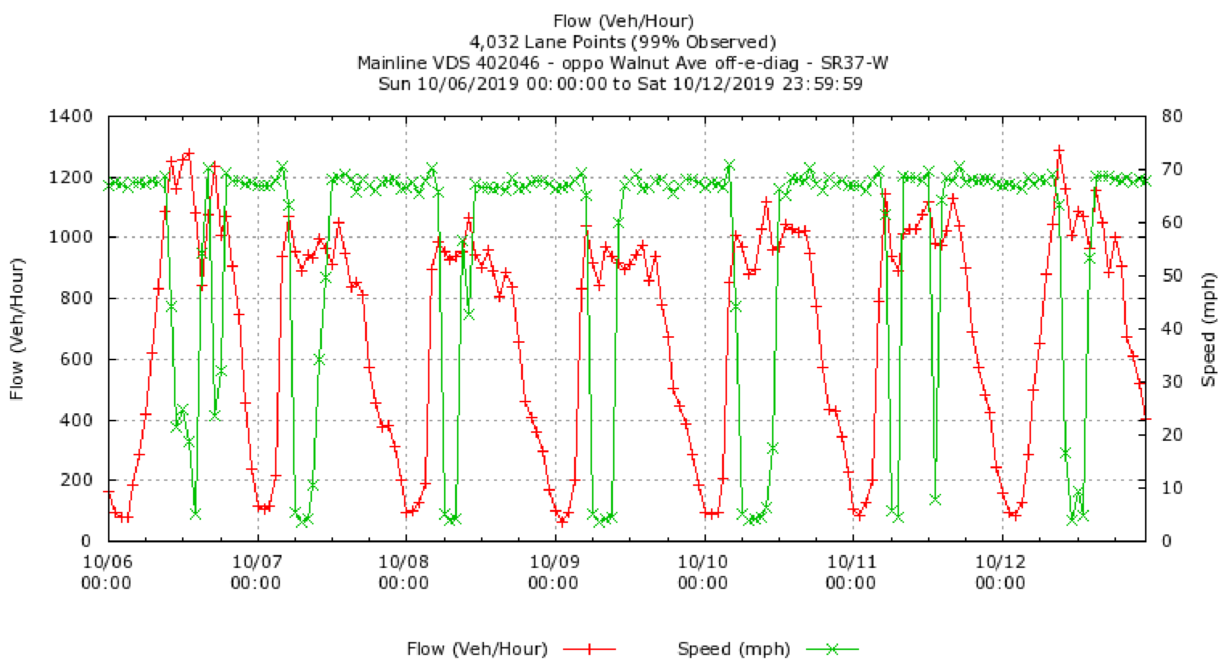


Figure TR-10. SR 37 Westbound Speed & Flow at Mare Island, Walnut Ave./Railroad Ave. Interchange (October 6–12, 2019)

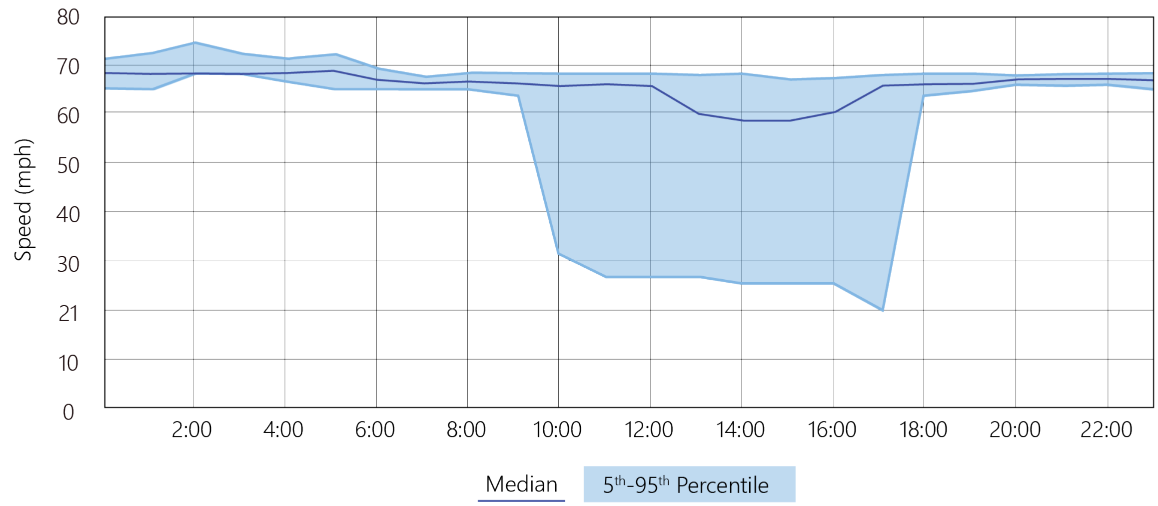
SR 37 is prone to closures due to flooding, which heavily affects traffic conditions for travelers across the highway and on local streets nearby. According to an article from American Society of Civil Engineers (Landers 2022), SR 37 was closed most recently in 2017 for 28 days and in 2019 for eight days due to flooding. Flooding often closes more susceptible locations of the highway at Novato Creek, Tubbs Island, and Mare Island. These closures result in lengthy detours on lower-capacity and circuitous parallel facilities including SR 116 and SR 12 near Sonoma and Napa to the north of SR 37, or I-580 and I-80 through San Rafael and Richmond to the south. The closure also heavily adds traffic congestion to local roadways, including Atherton Avenue in Novato. In addition, studies of storm events and sea-level rise indicate that SR 37 will be more susceptible to flooding, from a 25-year storm event capable of flooding portions of the highway today to a 5- to 10-year storm event capable of flooding those locations by 2030.

20.2.3.2 Travel Time Reliability

PeMS data was also used to assess weekday travel time reliability resulting from existing (October 2019) traffic operations in the SR 37 corridor. Figures TR-11 through TR-16 plot the 5th, 50th (median), and 95th percentile speeds at the three locations identified above (See Appendix A for additional plots). The 95th percentile speed represents free-flow conditions, while the 5th percentile represents close to the worst operating conditions. The 50th or median percentile speed is the midpoint of the speed range distribution. Key observations of weekday conditions from the data are as follows:

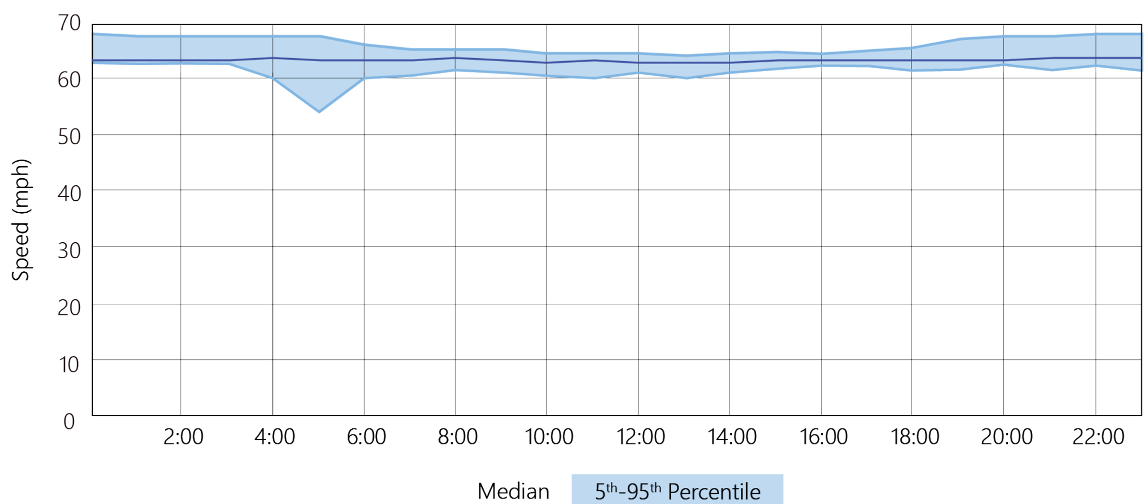
- At the Petaluma River Bridge, eastbound travel becomes unreliable between 10 a.m. and 5 p.m., while westbound travel is generally reliable throughout the day.
- At Noble Road, eastbound speed is less reliable during the afternoon and evening hours. Westbound speed is typically slower during morning hours but can be slow throughout the day.
- At Mare Island, westbound travel time is unreliable from 5 a.m. to 4 p.m. Typical speeds are lower than the posted speed from 6 to 10 a.m.

These findings are generally consistent with the recent *State Route 37 Sears Point to Mare Island Improvement Project, Draft Environmental Impact Report/Environmental Assessment* (Caltrans 2022) that reported travel time reliability could vary by as much as 100% between peak and off-peak periods.



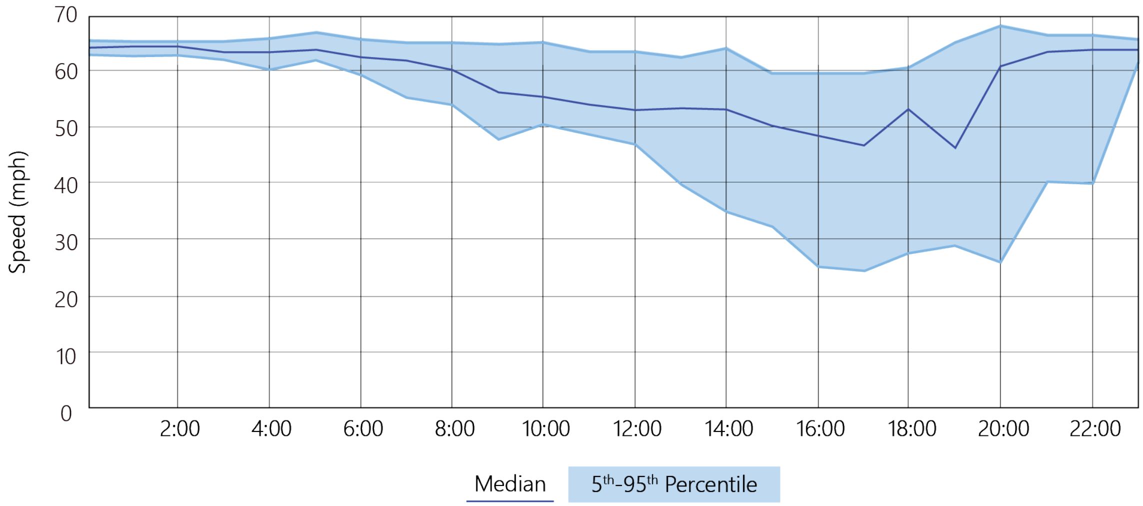
Notes:
16,500 Lane Points (92% Observed)
Mainline VDS 402043 - oppo 1800' E of the bridge - SR 37-E
Tue 10/01/2019 00:00:00 to Thu 10/31/2019 23:59:59

Figure TR-11. SR 37 Eastbound Speed Distribution by Time of Day at Petaluma River Bridge, 1.5 miles west of Lakeville Rd (October 2019)



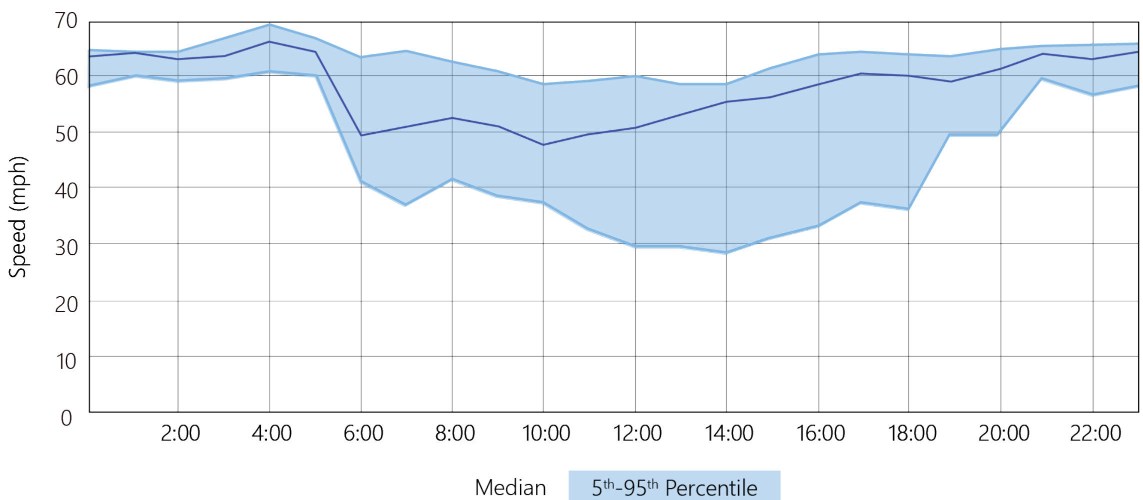
Notes:
0 Lane Points (0% Observed)
Mainline VDS 402042 - oppo 1800' E of the bridge - SR 37-W
Tue 10/01/2019 00:00:00 to Thu 10/31/2019 23:59:59

Figure TR-12. SR 37 Westbound Speed Distribution by Time of Day at Petaluma River Bridge, 1.5 miles west of Lakeville Rd (October 2019)



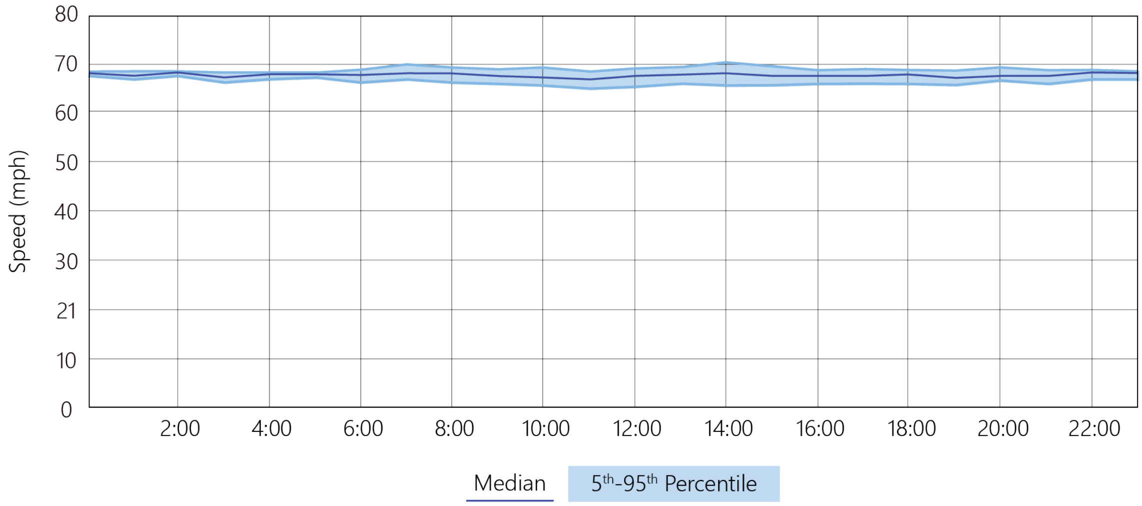
Notes:
8,251 Lane Points (92% Observed)
Mainline VDS 402045 - NOBLE RD - SR 37-E
Tue 10/01/2019 00:00:00 to Thu 10/31/2019 23:59:59

Figure TR-13. SR 37 Eastbound Speed Distribution by Time of Day at Noble Road, 1.5 miles east of SR 121 (October 2019)



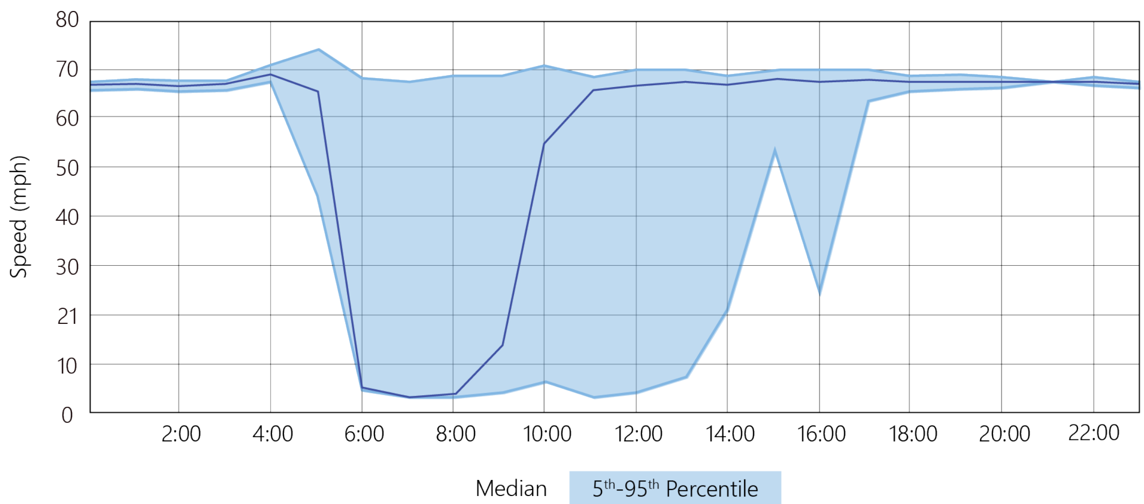
Notes:
8,251 Lane Points (92% Observed)
Mainline VDS 402044 - NOBLE RD - SR 37-E
Tue 10/01/2019 00:00:00 to Thu 10/31/2019 23:59:59

Figure TR-14. SR 37 Westbound Speed Distribution by Time of Day at Noble Road, 1.5 miles east of SR 121 (October 2019)



Notes:
16,496 Lane Points (92% Observed)
Mainline VDS 402047 - Walnut Ave off-e-diag - SR 37-E
Tue 10/01/2019 00:00:00 to Thu 10/31/2019 23:59:59

Figure TR-15. SR 37 Eastbound Speed Distribution by Time of Day at Mare Island, Walnut Ave./Railroad Ave. Interchange (October 2019)



Notes:
16,496 Lane Points (92% Observed)
Mainline VDS 402046 - Walnut Ave off-e-diag - SR 37-W
Tue 10/01/2019 00:00:00 to Thu 10/31/2019 23:59:59

Figure TR-16. SR 37 Westbound Speed Distribution by Time of Day at Mare Island, Walnut Ave./Railroad Ave. Interchange (October 2019)

20.2.3.3 Vehicle Occupancy

Available data that helps to identify the vehicle occupancy along SR 37 include high-occupancy vehicle (HOV) counts conducted in 2019 on SR 37 at Noble Road, as part of the *State Route 37 Sears Point to Mare Island Improvement Project, Draft Environmental Impact Report/Environmental Assessment* (Caltrans 2022). In the AM peak period, vehicles with two or more passengers accounted for approximately 19% of the total vehicles in the eastbound direction, and 13% in the westbound direction. Table TR-2 provides a summary of total traffic distribution by vehicle type.

Table TR-2. SR 37 Vehicle Composition and Occupancy (2019)

Location/direction	Single-Occupant Vehicles	High-Occupancy Vehicles with two or more people	Trucks
AM Peak Period			
SR 37 Eastbound at Noble Rd.	71%	19%	10%
SR 37 Westbound at Noble Road	81%	13%	6%
PM Peak Period			
SR 37 Eastbound at Noble Rd.	80%	17%	3%
SR 37 Westbound at Noble Road	82%	14%	4%

Source: Caltrans 2022

Single-occupant vehicles accounted for 71–82% of total traffic. A site visit during the PM peak period in February 2022 revealed that most passenger vehicles in the corridor had five or more seats. The low occupancy of existing vehicles would yield a seat utilization generally less than 25% for the PM peak period. According to data from *Plan Bay Area 2050 Draft EIR* (MTC and ABAG 2021), the regional weekday average for persons per vehicles was approximately 1.26. The low existing vehicle occupancies and seat utilization may indicate that barriers or constraints exist that prevent greater sharing of existing available seats. If these barriers or constraints are not addressed, then adding new lanes, even if they offer high-occupancy preferences, may not be sufficient to change existing travel behavior as highlighted in Figure TR-17, which show adding carpool lanes in California has not produced higher carpool rates. The carpooling trend has gone in the opposite direction.

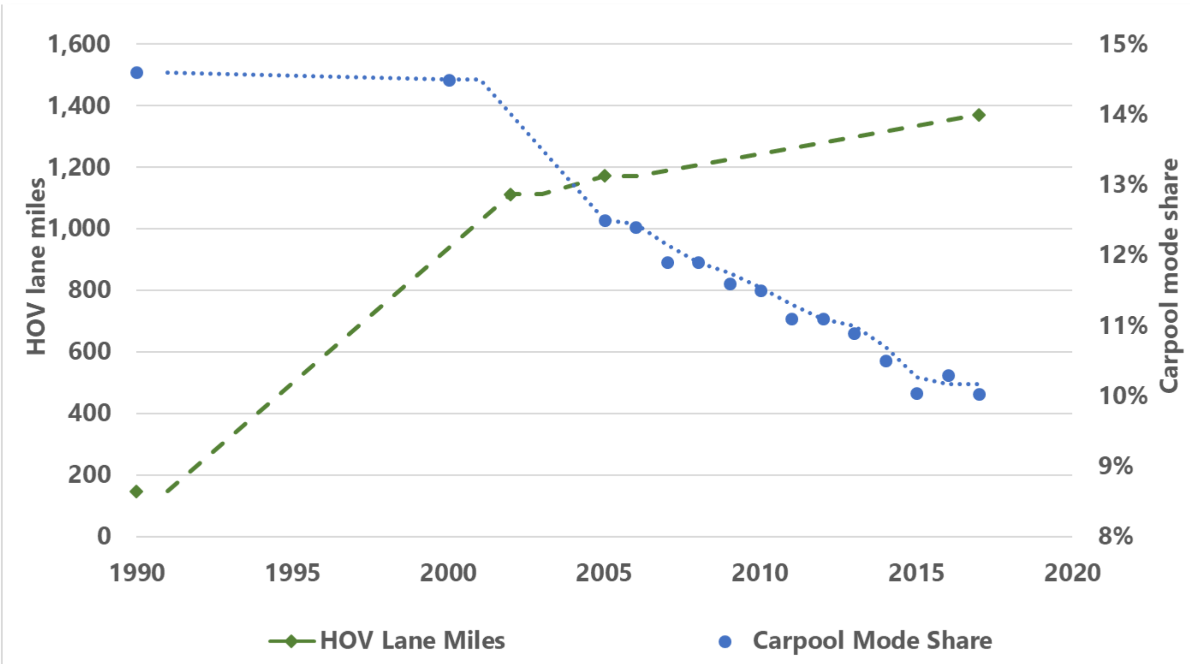


Figure TR-17. California Mode Share vs. HOV Lane Miles (1990–2016)

Source: Mode share data from U.S. Census Bureau, Decennial Census & American Community Survey; HOV lane mile data from Caltrans, High Occupancy Vehicle Guidelines (various years) and May et al. 2007

20.2.3.4 Vehicle Miles Traveled

For purposes of this study, total VMT describes the amount of all passenger and commercial vehicle travel on specific portions of the transportation network within a physical boundary as shown in the image below.

Total VMT	All vehicle-trips (i.e., passenger and commercial vehicles) assigned on the network within a specific geographic boundary (i.e., model-wide, region-wide, city-wide). Vehicle volume on each link is multiplied by link distance.	

Table TR-3 summarizes the weekday VMT prior to the COVID-19 pandemic from available data sources and includes the following specific estimates:

- Weekday VMT on the SR 37 corridor between I-80 and US 101.
- Weekday VMT occurring on the entire network within the four counties that SR 37 connects (Marin, Napa, Solano, and Sonoma).
- Weekday VMT occurring within the MTC region.

Table TR-3. Weekday VMT Estimates, Pre-COVID-19 Conditions

Geography	MTC Travel Demand Model VMT Estimate (2015)[1]	Caltrans HPMS (2015)	Caltrans HPMS (2019)
SR 37 Corridor	630,000	Not available	Not available
Marin, Napa, Solano, and Sonoma Counties	26,900,000	35,495,720	39,756,290
Bay Area Region	142,500,000	171,971,200	180,283,620

Sources: Caltrans 2015, 2019; MTC 2015

[1] According to the State Route 37 Sears Point to Mare Island Improvement Project, Draft Environmental Impact Report/Environmental Assessment (Caltrans 2022), the Bay Area Region weekday VMT increased to 149,948,925 by 2020.

The VMT in Table TR-3 is an aggregation of vehicle travel occurring on specific portions of the roadway network. The VMT is generated by people driving vehicles to engage in activities such as working, shopping, socializing, recreating, obtaining education, and delivering goods. The VMT metric is relevant for environmental impact evaluation of SR 37 alternatives because the existing corridor experiences congestion. Relief of congestion and the associated reduction in travel time would lower the cost of driving across the corridor, potentially motivating more people to drive who were otherwise dissuaded by congestion. Therefore, the project alternatives have the potential to induce new driving and increase VMT independent of new population or employment in the region.

Despite using the same geographic boundaries and analysis years, the VMT estimates in Table TR-3 differ more than is reasonable. The Caltrans HPMS estimates are often the source of VMT used to validate regional models. A review of the *Draft Travel Model 1.5.2 Development: Calibration and Validation, Technical Report* (ABAG and MTC 2021), which describes the validation of the MTC travel demand model did not show any validation related to VMT. Hence, the model estimates may require further refinement before use in analysis. Differences between the model and HPMS VMT estimates greater than 5% would typically warrant further calibration based on *Travel Model Validation and Reasonableness Checking Manual, Second Edition* (FHWA 2010).

A final issue related to VMT estimates is that recent evidence in the studies listed below has revealed statewide VMT per capita trends were increasing prior to COVID-19 (Chart TR-14).

- *2018 Progress Report, California's Sustainable Communities and Climate Protection Act* (CARB 2018) (referred to as the Progress Report in the remainder of this document).
- California Air Resources Board Improved Program Measurement Would Help California Work More Strategically to Meet Its Climate Change Goals (Auditor of the State of California 2021) (referred to as the Audit Report in the remainder of this document).

The Progress Report measures the effect of Senate Bill 375, which required metropolitan planning organizations to develop regional transportation plans and associated sustainable communities strategies (SCSs) to reduce greenhouse gas (GHG) emissions per capita. Figure TR-18 reveals that VMT and GHG per capita increased in California between 2010 and 2016 and are trending upward and that SCS forecasts did not reasonably reflect these trends.

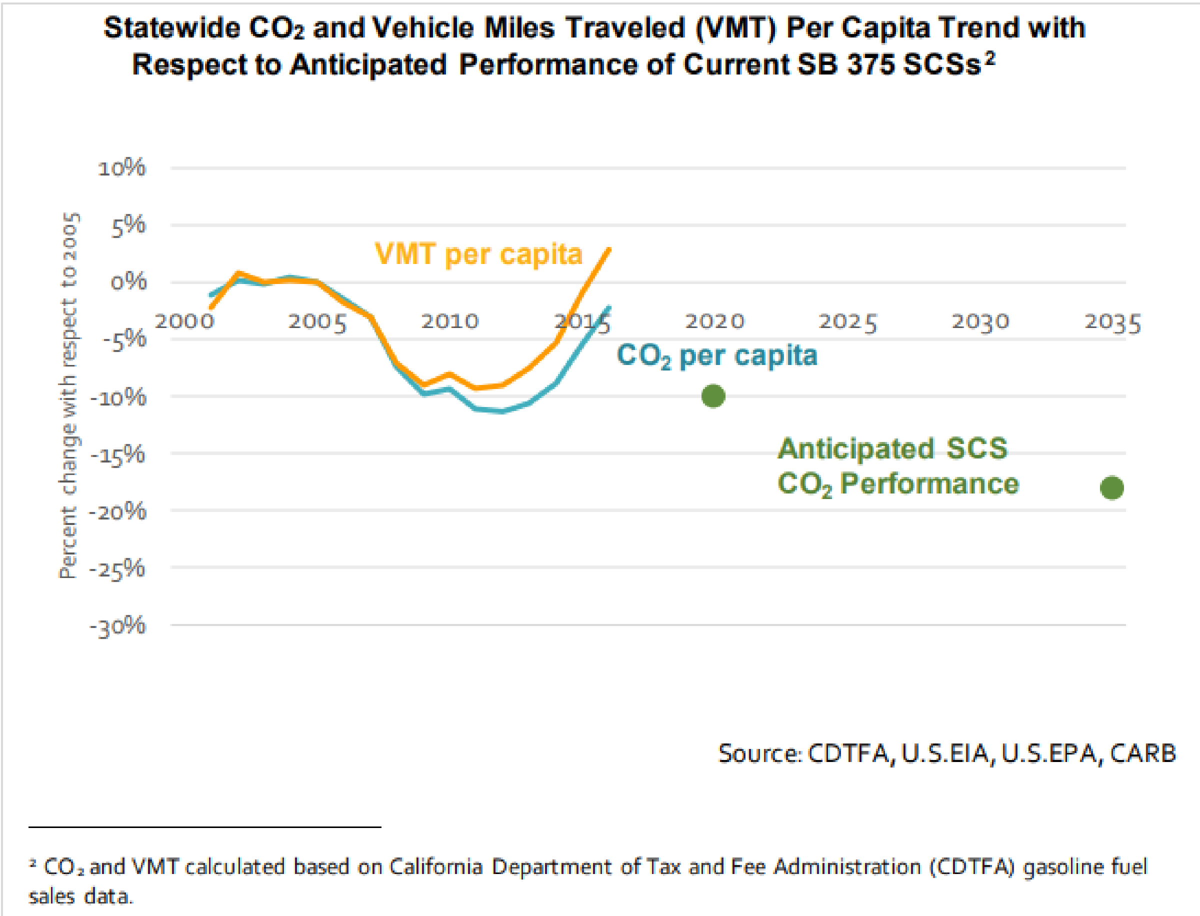


Figure TR-18. California VMT Per Capita Trends

The Audit Report is a more recent assessment of the California Air Resources Board's GHG reduction programs, which also found that VMT and its associated GHG emissions were trending upward through 2018. Per the audit, the state is not on track to achieve 2030 GHG reduction goals, and emissions from transportation have not been declining.

Overall travel decreased immediately following the start of the COVID-19 pandemic in March 2020, attributed to lockdowns, remote work, and various business and school restrictions. Observation of VMT trends during COVID-19 was determined using StreetLight Data from 2019 (pre-pandemic) to the latest available data through 2022. StreetLight Data, Inc. is a third-party vendor that obtains (anonymous) traveler information from mobile apps on cell phones. This data was used to estimate average weekday VMT each year for the SR 37 corridor and the adjacent four-county area (Marin, Napa, Solano, and Sonoma Counties), as reported in Table TR-4.

Table TR-4. Weekday VMT Estimates through COVID-19

Geography	StreetLight Data[1] (2019)	StreetLight Data[1] (2020)	StreetLight Data[1] (2021)	StreetLight Data[1] (2022)
SR 37 Corridor[2]	775,300	645,497	666,848	712,925
Marin, Napa, Solano, and Sonoma Counties[3]	34,991,575	26,233,775	28,210,486	28,626,256

Notes:

[1] Data source from StreetLight, during the months of February, March, April, September, and October, for typical weekdays (Tuesday–Thursday). Available data for 2022 only includes February and March.

[2] Represents total VMT on the SR 37 corridor.

[3] Represents total VMT generated by the four counties, which include internal to internal, internal to external, and external to internal trips. This VMT type does not include trips that pass through the four-county area, which differs from the VMT type identified in Table TR-3. This VMT type is reported to identify trends in VMT prior to and during COVID-19, and not for comparison with VMT estimates from other sources.

VMT decreased approximately 17% on the SR 37 corridor, and about 25% in the adjacent four-county area in the initial year of COVID-19 (2020). Since then, VMT has continued to increase closer to pre-COVID conditions. The latest available data from February and March 2022 estimates VMT on the SR 37 corridor has increased back to 8% below pre-COVID levels, and the four-county area VMT has increased back to 18% below pre-COVID levels. The earlier months of 2022 still reflected some business and school restrictions due to fluctuating COVID variant levels; travel is expected to increase in subsequent months as more business operations return to normal.

20.2.4 Safety

Safety involves multiple perspectives as it relates to travel in the SR 37 corridor. Ideally, people would be 'free from harm' when they travel, but that is often not the case on California highways. Use of roadways, whether in a vehicle, bicycling, or walking, involves inherent risk of collisions that can lead to property damage, injuries, and fatalities. In the SR 37 corridor, safety is a topic of public concern as reported in the *State Route 37 Comprehensive Multimodal Corridor Plan* (Caltrans 2021).

The outreach team for the SR 37 Multimodal Corridor Plan conducted an online survey to collect input from a broad diversity of SR 37 users. The survey was open to the public between December 1, 2017 and January 16, 2018 and more than 3,750 responses were collected. Survey participants were asked to answer several questions about their major concerns along SR 37 and their priorities for improvements along the route. Safety ranked second among the concerns, with the locations in Figure TR-19 garnering specific mentions.

Source: Caltrans 2021

Figure TR-19. SR 37 Safety Concern Locations

The public comments about safety concerns generally match the concentration of crashes, as shown in Figure TR-19 (UC Berkeley 2021). This is particularly true near the SR 121 signalized intersection. Crash density tends to be much lower in the section between Mare Island and SR 121, where a median barrier exists with very few intersections, as reflected in Figure TR-20.

The concentration of crashes tends to be near at-grade intersections. Figure TR-21 shows the mapped location of injury and fatal crashes between 2016 and 2020.

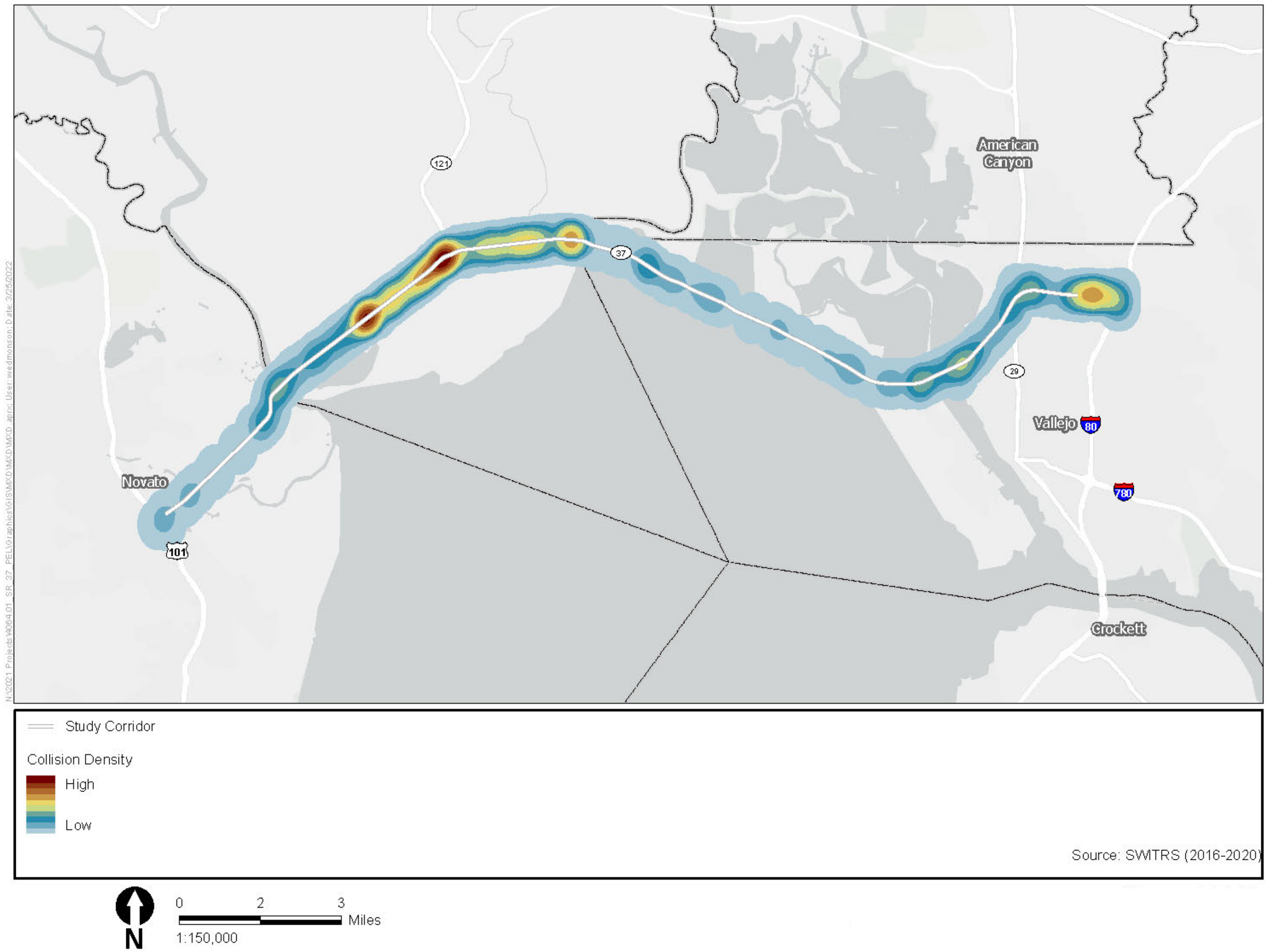


Figure TR-20. SR 37 Collision Heat Map

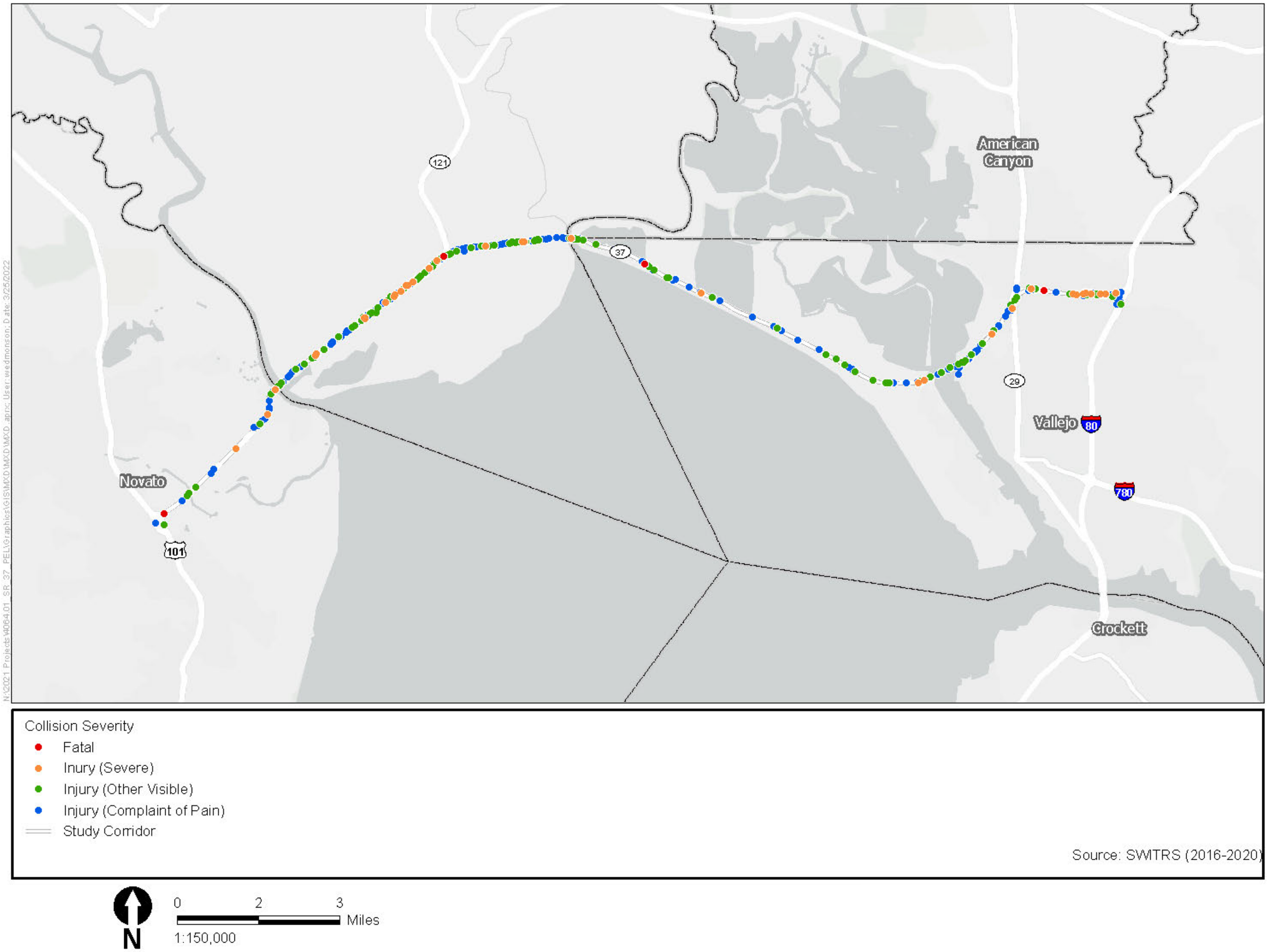
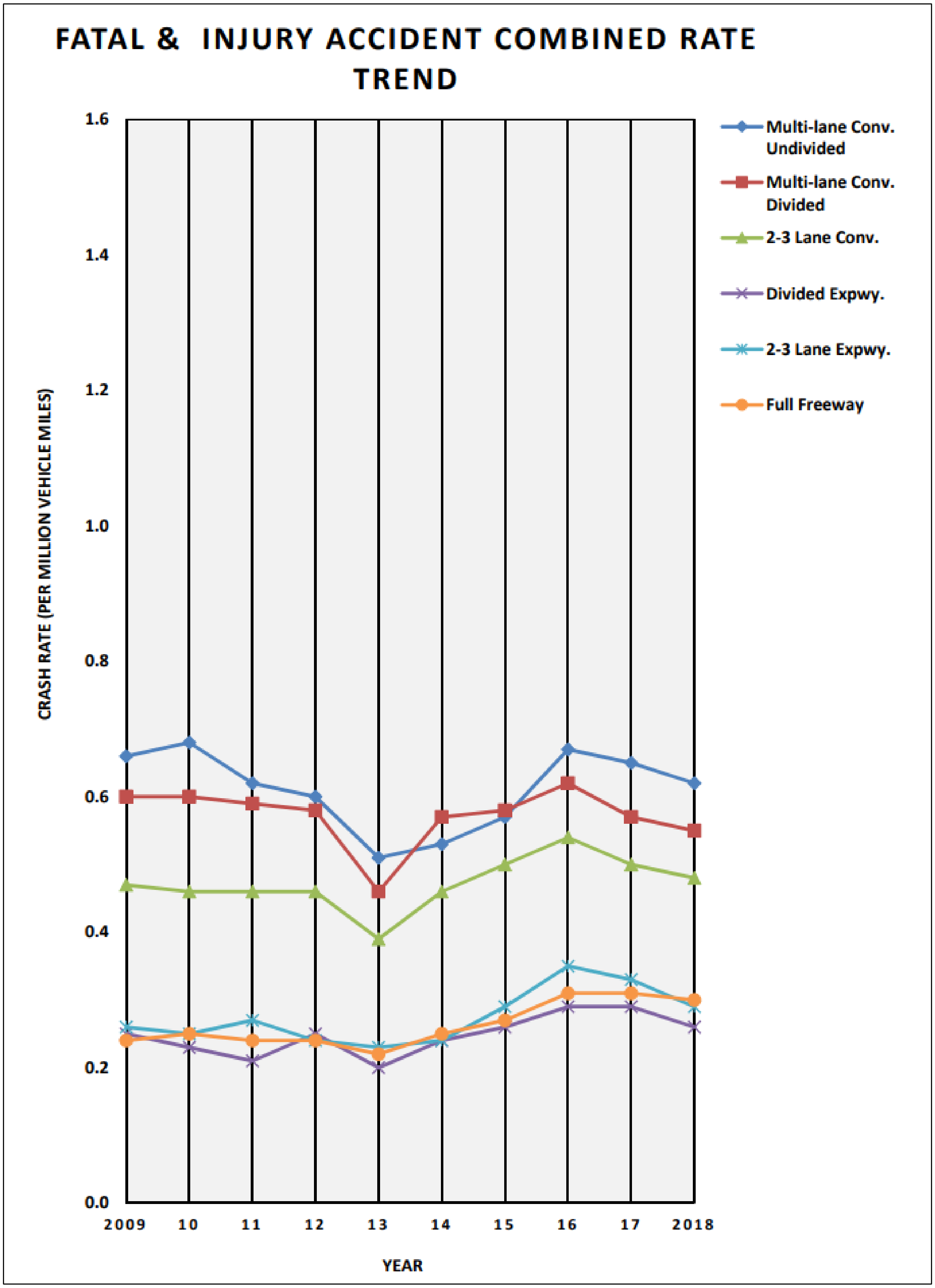


Figure TR-21. SR 37 Collision Severity (2016-2020)

Details about the crashes over the five-year average shown in the graphics above are summarized below.

- Crashes per year = 84.2
- 0.6% of all crashes result in fatalities, 6.2% result in severe injuries, and 26.1% result in other visible injuries. The rest (67%) result in other complaint of pain.
- 63.7% of the crashes involved unsafe speeding. Other major crash factors include the following:
  - Improper turning (12.6%)
  - Driving under the influence of alcohol or drug (7.4%)
  - Unsafe lane change (5.2%)
  - Following too closely (3.3%)
- Rear-ending is the most common crash type (66.5%). Other major crash types include the following:
  - Hit object (16.4%)
  - Sideswipe (7.6%)
  - Overturned (4.5%)
  - Broadside (2.4%)
- 97.4% of the crashes occurred on the highway and the rest (2.6%) occurred on the ramps.

Since the highest concentration of crashes occurred near at-grade intersections, it may be important to consider that the *Highway Safety Manual* (AASHTO 2010) reports that converting an at-grade, four-leg intersection to a grade-separated interchange reduces injury crashes by 57%. Converting a signalized intersection into a grade-separated interchange reduces injury crashes by 28%. Caltrans crash data also supports this difference in crash outcomes across different functional classifications, as shown in Figure TR-22.



Source: Caltrans 2020

Figure TR-22. Crash Rate Comparison by Functional Classification

20.3 Next Steps

The SR 37 PEL Study should consider how to balance the inherent tradeoffs associated with addressing existing transportation problems and accommodating future travel demand versus minimizing environmental impacts. Some metrics such as VMT will increase due to potential roadway capacity expansion. Induced VMT results in higher fuel consumption and related emissions. Hence, the alternatives should consider this relationship in trying to balance competing objectives.

20.4 References

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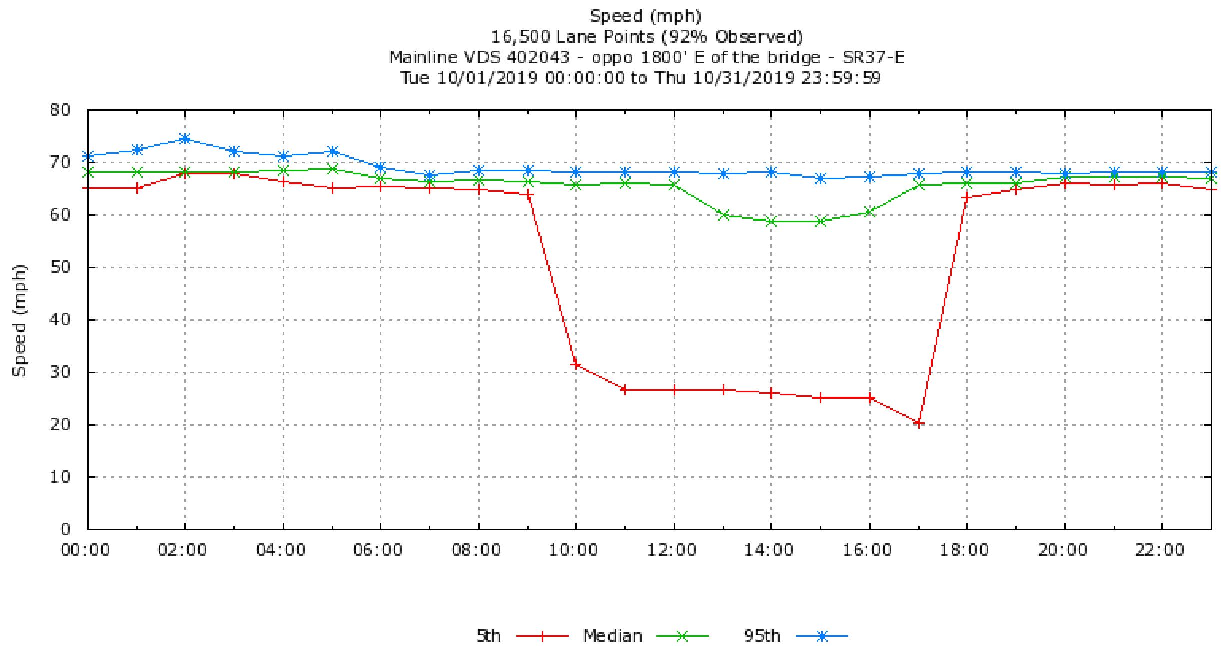
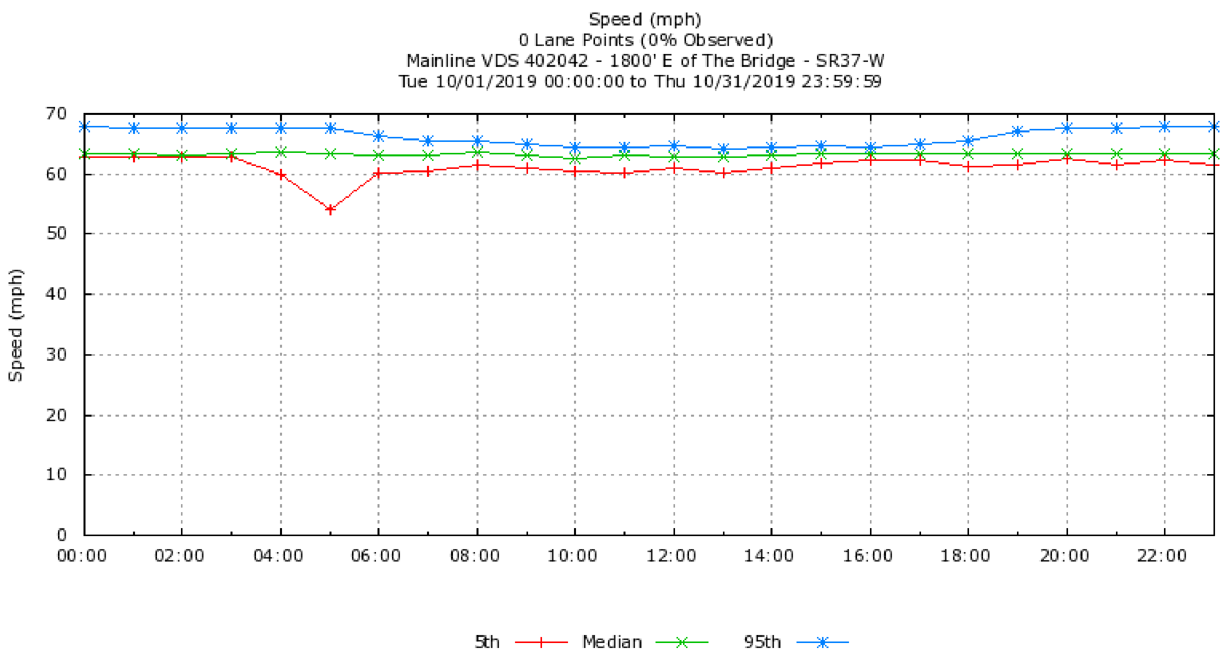
APPENDIX A

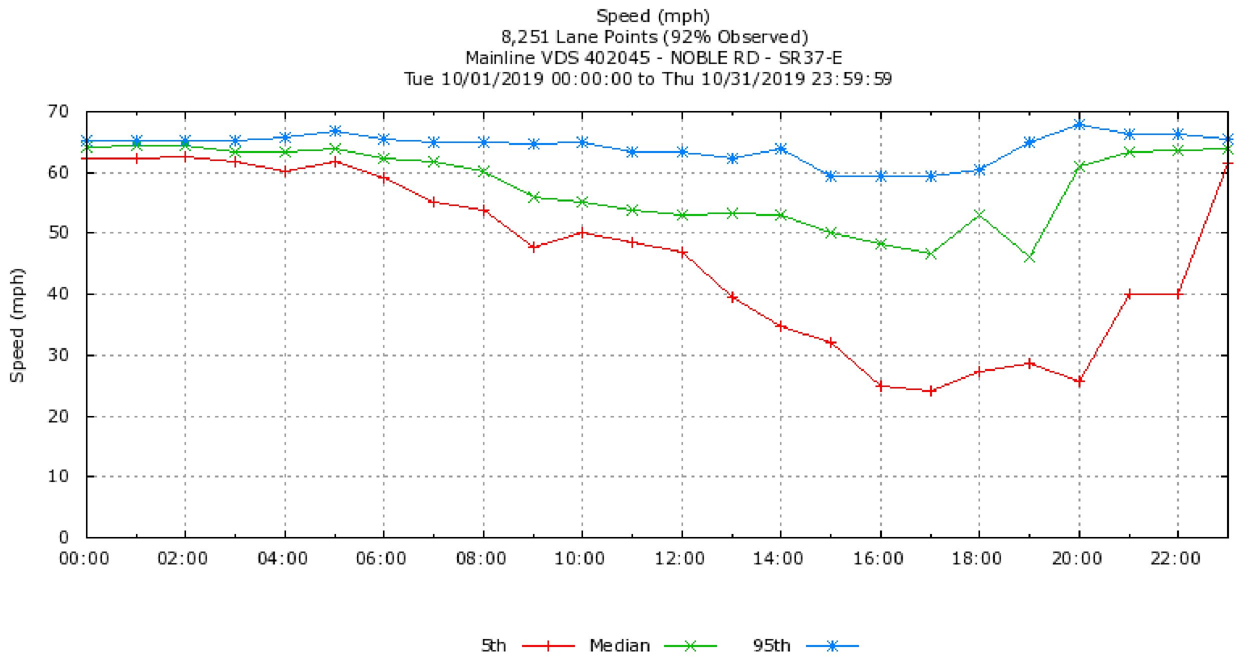
SR 37 Eastbound Speed Distribution by Time of Day at Petaluma River Bridge, 1.5 miles west of Lakeville Rd (October 2019)



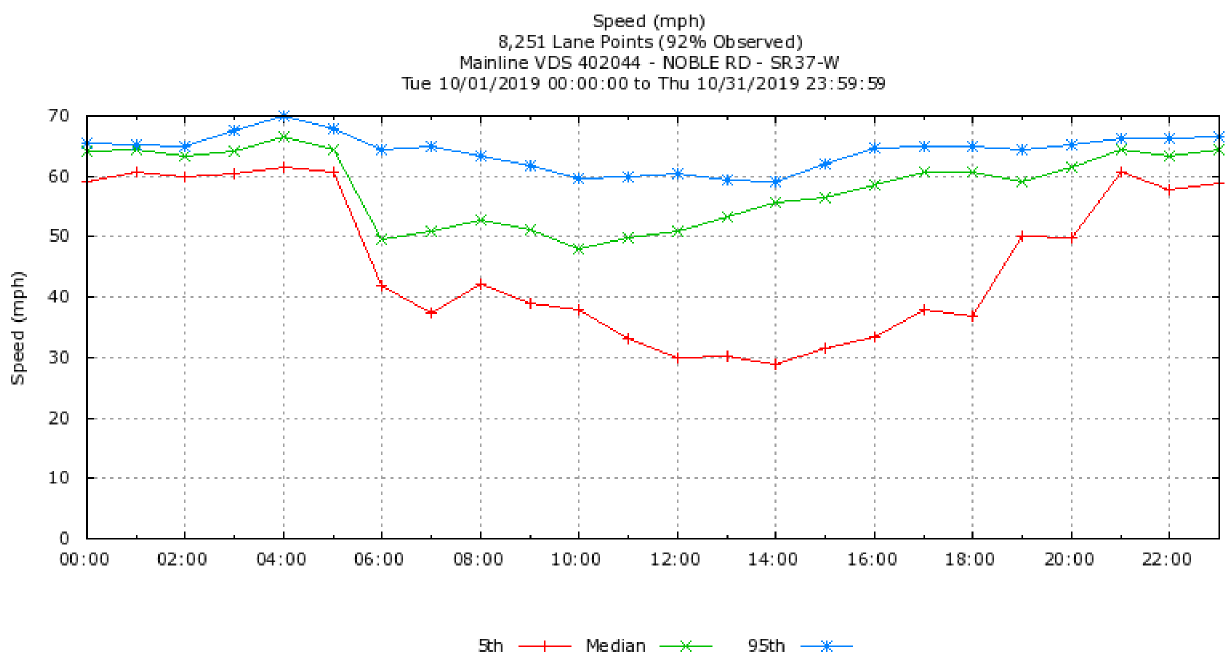
SR 37 Westbound Speed Distribution by Time of Day at Petaluma River Bridge, 1.5 miles west of Lakeville Rd (October 2019)



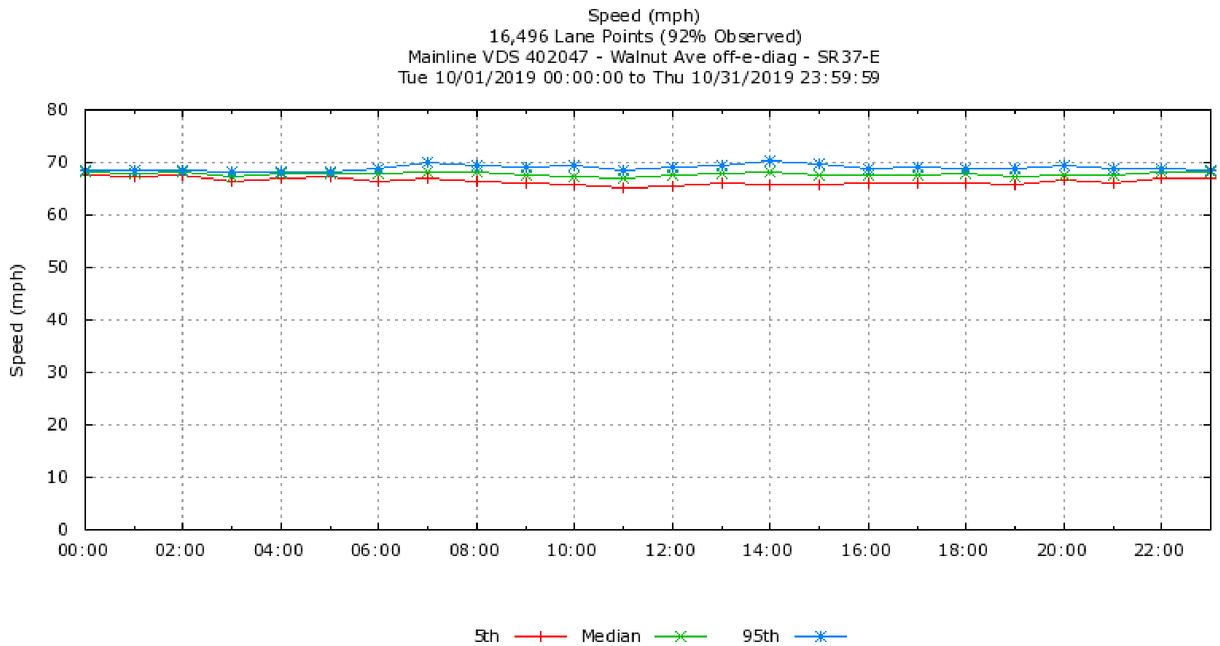
SR 37 Eastbound Speed Distribution by Time of Day at Noble Rd., 1.5 Miles East of SR 121 (October 2019)



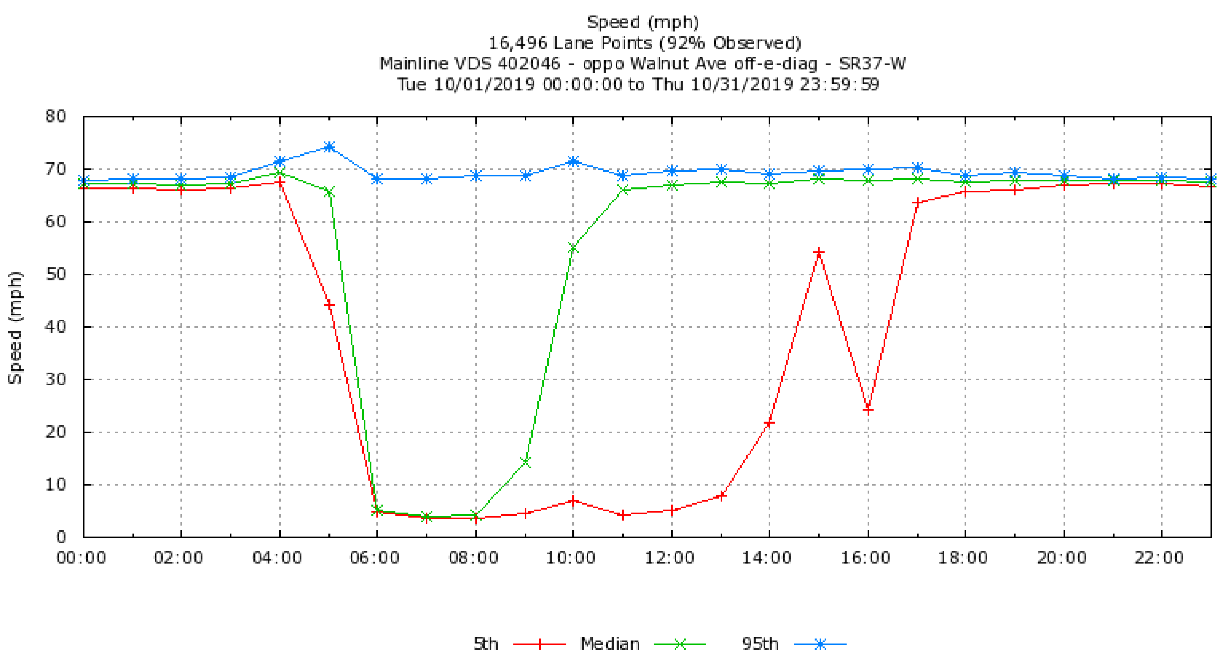
SR 37 Westbound Speed Distribution by Time of Day at Noble Rd., 1.5 Miles East of SR 121 (October 2019)



SR 37 Eastbound Speed Distribution by Time of Day at Mare Island, Walnut Ave./Railroad Ave. Interchange (October 2019)



SR 37 Westbound Speed Distribution by Time of Day at Mare Island, Walnut Ave./Railroad Ave. Interchange (October 2019)



Chapter 21
Equity

This chapter describes equity considerations for the State Route (SR) 37 Planning and Environmental Linkages (PEL) Study Area.

21.1 Methodology

Analysts prepared this chapter based on the 2022 California Department of Transportation (Caltrans) Considering Equity in Community Impact Analysis for Projects guidance to environmental planners and generalists when conducting community impact assessments under CEQA and NEPA. For this SR 37 PEL existing conditions assessment, the analysis is focused on the first two steps of the five-step framework:

- Equity Analysis Step 1: Develop an understanding of the nature of the transportation plan or project and identify communities that could potentially be affected by the project. The identification process can draw upon resources such as CalEnviroScreen, EJScreen, and U.S. Census Bureau data to conduct this analysis.
- Equity Analysis Step 2: Create a profile of the community or communities that may be affected by the project to establish the baseline conditions in the community. As described in the Standard Environmental Reference, Volume 4, Chapter 2.2.4 (Develop a Community Profile), "The community profile should describe the character of the community with respect to geography, demographics, institutions, neighborhood groups and organizations, businesses, access and circulation, and public services and facilities."

The following resources were used in the analysis. Refer to Section 6, *References*, for a complete list of information cited.

- **CalEnviroScreen 4.0:** CalEnviroScreen is an online interactive mapping tool published by the California Office of Environmental Health Hazard Assessment. It helps analysts to identify communities in California that are affected by many sources of pollution, and locations where people are especially vulnerable to the effects of pollution. CalEnviroScreen uses environmental, health, and socioeconomic information to produce scores for every census tract in the state. CalEnviroScreen scores are based on relative concentrations of two overarching indicators within each census tract: population characteristics and pollution burden.

  The population characteristics score reflects the average components of sensitive populations (asthma, cardiovascular disease, and low birth weight infants) and socioeconomic factors (educational attainment, housing burdened low-income households, linguistic isolation, poverty, and unemployment).

  The pollution burden score reflects the average components of environmental effects (solid waste sites and facilities, groundwater threats, hazardous waste, impaired water bodies, and cleanup sites) and exposures (ozone concentrations, particulate matter 2.5 microns or less in diameter concentrations, children's lead risk from housing, diesel particulate matter emissions, drinking water contaminants, pesticide use, toxic releases from facilities, and traffic density).

- **Center for Neighborhood Technology (CNT) Housing + Transportation Affordability Index (H+T Index):** CNT's H+T Index measures the affordability of housing by calculating the transportation costs associated with a home's location. Planners, lenders, and most consumers traditionally consider housing affordable if the cost is 30% or less of household income. The H+T Index expands the definition of housing affordability to include transportation costs at a home's location to better reflect the true cost of households' location choices. Based on research in metro areas ranging from large cities with extensive transit to small metro areas with extremely limited transit options, CNT has found 15% of income to be an attainable goal for transportation affordability. By combining this 15% level with the 30% housing affordability standard, the H+T Index recommends a new view of affordability defined as combined housing and transportation costs consuming no more than 45% of household income. Additional notes about H+T Index data sources and algorithms are included in the report within the discussion of housing and transportation cost burdens.
- **MTC Equity Priority Communities (EPC):** This data set is shown in Table EQ-1 and represents census tract information compiled by MTC from American Community Survey (ACS) 2014–2018 data[1] for eight variables. An EPC is defined in one of two ways: (1) a tract that exceeds concentration threshold values for percentages of households classified as low income and as people of color, or (2) a tract that exceeds the threshold value for low income and exceeds the threshold values for three or more other variables.

[1] As far as was possible, analysts referred to the latest ACS 5-year dataset (2016–2020) when describing EPC characteristics for this report.

Table EQ-1. MTC Equity Priority Communities Demographic Factors

Demographic Factor	Demographic Factor Definition	Concentration Threshold
People of Color	People of color populations include persons who identify as any of the following groups as defined by the U.S. Census Bureau in accordance with guidelines provided by the U.S. Office of Management and Budget: American Indian or Alaska Native Alone (non-Hispanic/non-Latino); Asian Alone (non-Hispanic/non-Latino); Pacific Islander Alone (non-Hispanic/non-Latino); Black or African-American Alone (non-Hispanic/non-Latino); and Other (Some Other Race, Two or More Races, non-Hispanic/non-Latino); and all Hispanic/Latino persons.	70%
Low Income (< 200% Federal Poverty Level)	Person living in a household with incomes less than 200% of the federal poverty level established by the U.S. Census Bureau.	28%
Limited English Proficiency	Person above the age of 5 years, who do not speak English at least "well" as their primary language or had a limited ability to read, speak, write, or understand English at least "well", as defined by the U.S. Census Bureau.	12%
Zero-Vehicle Household	Households that do not own a personal vehicle.	15%
Seniors 75 Years and Over	Self-explanatory.	8%
People with Disability	The U.S. Census Bureau defines disabilities of different types as follows: Hearing —deaf or having serious difficulty hearing; Vision—blind or having serious difficulty seeing; Cognitive—difficulty remembering, concentrating, or making decisions; Ambulatory—serious difficulty walking or climbing stairs; Self-care—difficulty bathing or dressing; Independent living—because of a physical, mental, or emotional problem, having difficulty doing errands alone such as visiting a doctor's office or shopping.	12%
Single-Parent Family	Families consisting of one parent and at least one child. To determine whether or not single-parent families exceed tract concentration thresholds, the share of single-parent families is calculated as a share of all families regardless of whether or not they have any children.	18%
Severely Rent-Burdened Household	Renters paying more than 50% of income in rent. To determine whether or not severely rent-burdened households exceed tract concentration thresholds, the share of severely rent-burdened households is calculated as a share of all households regardless of occupancy status (renter or owner).	14%

- **EJScreen:** *EJScreen* is an environmental justice mapping and screening tool that provides the U.S. Environmental Protection Agency (EPA) with a nationally consistent dataset and approach for combining environmental and demographic indicators. EJScreen users choose a geographic area; the tool then provides demographic and environmental information for that area.
- **Local and regional plans** including county general plans, municipal plans, the regional Plan Bay Area transportation plan, and previous SR 37 studies.

- **Caltrans Resilient SR 37 project website** material, including equity-related data and public comments.
- **Sonoma County Transportation Authority SR 37 project website** material.
- **U.S. Census Bureau**: The U.S. Census Bureau is a principal agency of the U.S. Federal Statistical System, responsible for producing data about the American people and economy. It publishes census data at various geographic levels such as state, county, and census tract. Products consulted for this report include the Decennial Censuses for 2010 and 2020; ACS data for 2012–2016 and 2016–2020; and data compiled by MTC from the 2020 Census Transportation Planning Package.
- **Walk Score® and Bike Score®**: Walk Score and Bike Score are published by a private company called Walk Score. Data sources include Google, Factual, Great Schools, Open Street Map, the U.S. Census, Localeze, and places added by the Walk Score user community.

  Walk Score measures the level of pedestrian accessibility for any address using a patented system (Figure EQ-1).[2] For each address, Walk Score analyzes hundreds of walking routes to nearby amenities. Points are awarded based on the distance to amenities in each category. Amenities within a 5-minute walk (0.25 mile) are given maximum points. A decay function is used to deduct the value of points based on travel time, with no points achievable beyond a 30-minute walk. Walk Score also incorporates measures related to pedestrian friendliness such as population density, block length, and intersection density.

  Bike Score, using similar data sources as Walk Score, measures the level to which a location is bicycle-friendly on a scale from 0 to 100 (Figure EQ-1). Four equally weighted components are incorporated into the score: presence of bike lanes, topography (hills), connectivity to destinations, and bike commuting mode share.

Walk Score®	Description
90–100	**Walker's Paradise** Daily errands do not require a car.
70–89	**Very Walkable** Most errands can be accomplished on foot.
50–69	**Somewhat Walkable** Some errands can be accomplished on foot.
25–49	**Car-Dependent** Most errands require a car.
0–24	**Car-Dependent** Almost all errands require a car.

Bike Score	Description
90–100	**Biker's Paradise** Daily errands can be accomplished on a bike.
70–89	**Very Bikeable** Biking is convenient for most trips.
50–69	**Bikeable** Some bike infrastructure.
0–49	**Somewhat Bikeable** Minimal bike infrastructure.

Source: Walk Score 2022

Figure EQ-1. Walk Score and Bike Score Rating Systems

[2] Since the Walk Score technology is proprietary, the algorithms used to calculate final scores are not publicly available.

21.2 Study Area Location and Extents

The analysis of this chapter builds in part upon the research conducted by MTC to define the locations of EPCs. For this assessment, the Study Area extends further into each of the four North Bay counties to include EPCs whose residents and businesses may be affected by improvements to the SR 37 corridor (Figure EQ-2). The westernmost segments of the Study Area traverse the Vallejo EPC in southeastern Solano County, and the location of Alignment 8 is close to the Napa EPC in south-central Napa County. Many residents and businesses in EPCs farther from the corridor or the alternative alignments—particularly those in Napa and Solano Counties—may depend upon SR 37 for accessibility to jobs and to customers, along with access to other essential destinations and economic functions.

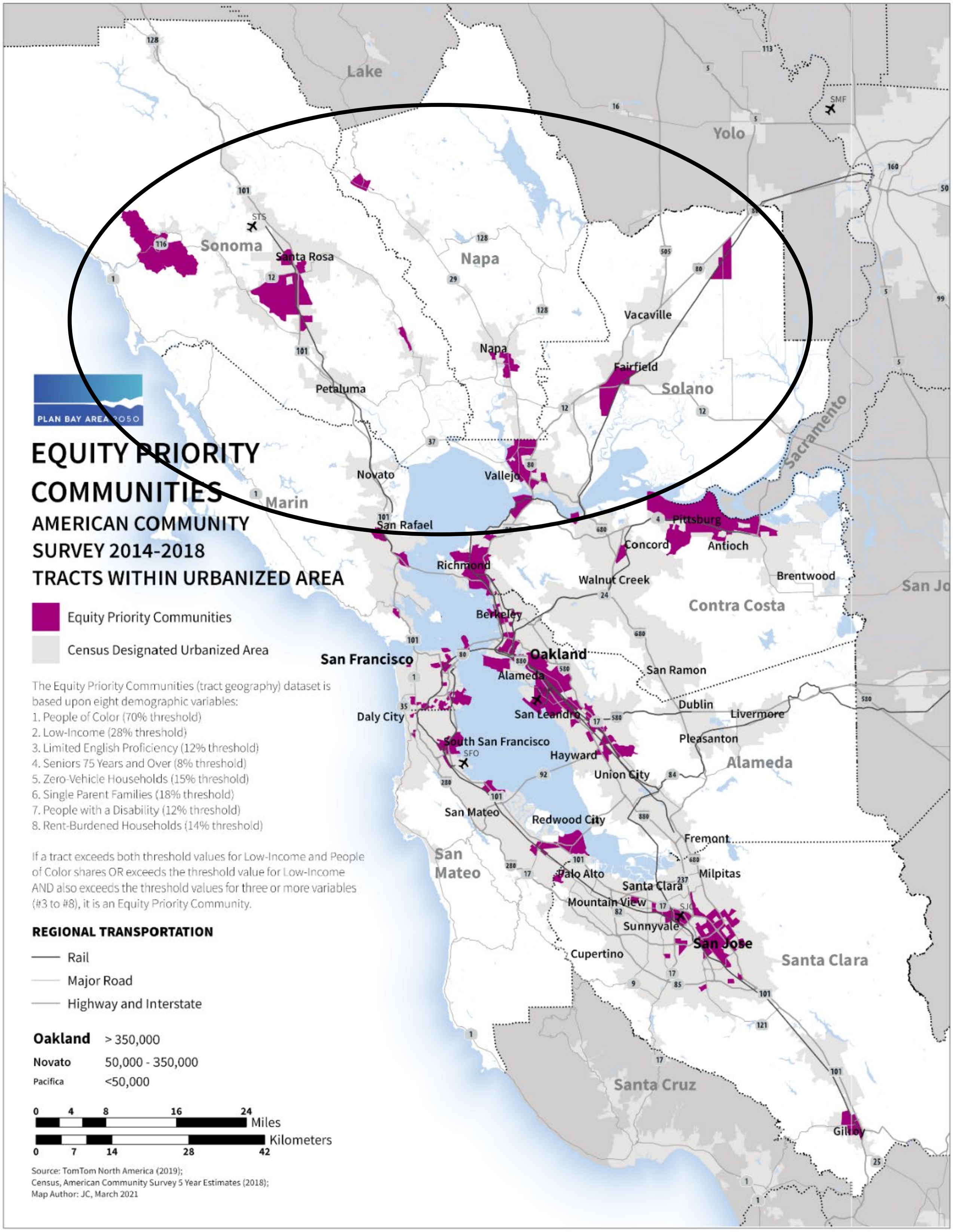


Figure EQ-2. SR 37 PEL Equity Study Area

21.2.1 Definitions of Equity

Caltrans guidance for considering equity in National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) analyses (Caltrans 2022) refers planners and environmental analysts to the following definition of equity from President Biden's Executive Order (EO) 13985 (January 20, 2021), Advancing Racial Equity and Support for Underserved Communities Through the Federal Government:

> The term "equity" means the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.
>
> The term "underserved communities" refers to populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life, as exemplified by the list in the preceding definition of "equity."[3]

The Caltrans guidance goes on to state:

> The CaltransEquity Statement (December 10, 2020) acknowledges that communities of color and underserved communities experienced fewer benefits and a greater share of negative impacts associated with our state's transportation system. Some of these disparities reflect a history of transportation decision-making, policy, processes, planning, design, and construction that quite literally put up barriers, divided communities, and amplified racial inequities, particularly in our Black and Brown neighborhoods.

At a regional level, the Association of Bay Area Governments' (ABAG) and Metropolitan Transportation Commission's (MTC) working definition of equity for Plan Bay Area 2050 is as follows:

> MTC and ABAG's working definition of equity is just inclusion into a Bay Area where everyone can participate, prosper and reach their full potential. The agencies strive to advance equity through careful consideration of investments and policies — referred to in the Plan Bay Area 2050 context as 'strategies' — that affect historically and systemically marginalized, underserved, and excluded groups, including households with low incomes, communities of color, people with disabilities and seniors…. In 2019, MTC and ABAG launched the agency-wide Equity Platform — grounded in four pillars: Define and Measure, Listen and Learn, Focus and Deliver, Train and Grow — with the goal of integrating and being accountable to equity in policy, service delivery and advocacy. More specifically, both agencies acknowledge and seek to repair the historic role government and the planning profession have played in systemically denying opportunities to Black people and other communities of color through redlining, urban highways that uprooted neighborhoods, exclusionary zoning, redevelopment, segregation and discrimination. The Equity Platform emphasizes and drives the agency's commitment to advance equity with a racial justice focus by investing resources for historically underserved groups including low-income and communities of color at a scale to meaningfully reverse the disparities in access that diminish the nine-county Bay Area. Further strengthening this commitment is MTC Resolution No. 443516 that was passed in June 2020, which condemned systemic and structural racism and reaffirmed the agency's commitment to advancing justice, equity, diversity and inclusion in the nine-county Bay Area (ABAG and MTC 2021a).

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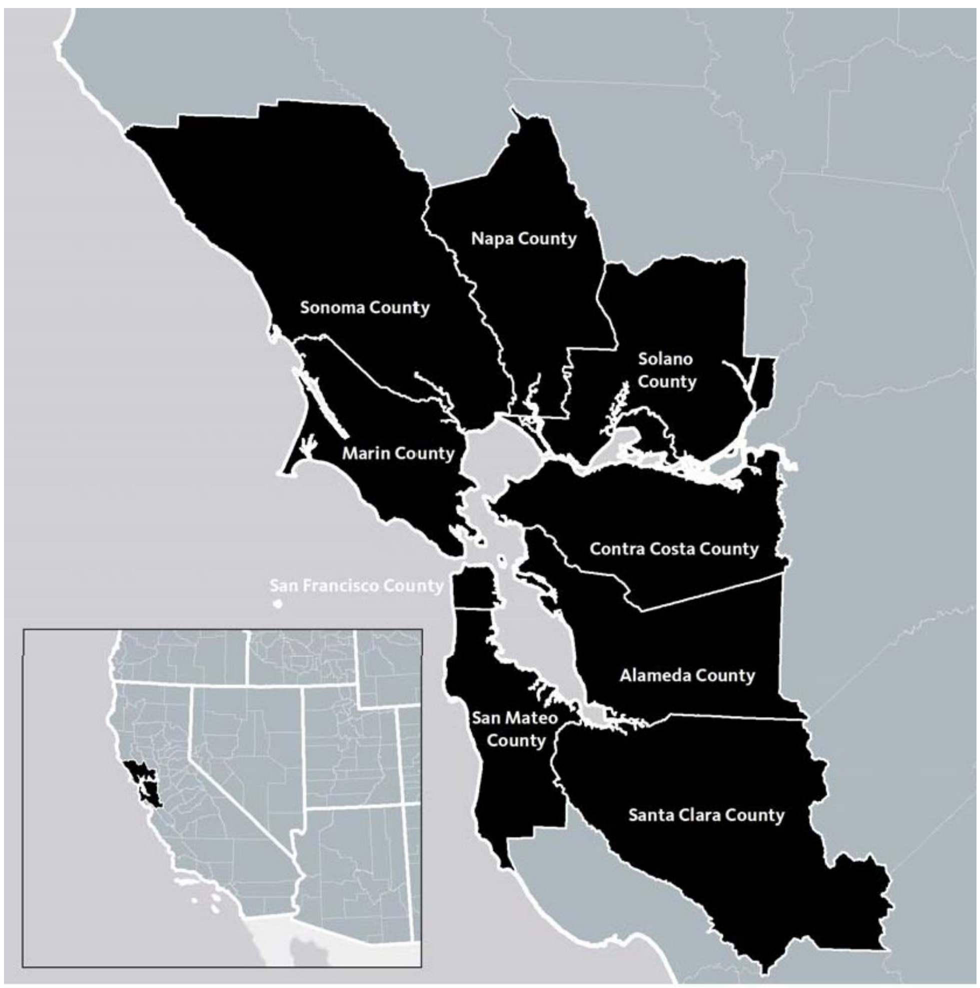
[3] This report uses *Latino* when quoting from a source such as federal policy or census data. Elsewhere, the report uses *Latinx*, which is generally considered to be a more inclusive term.

21.3 Existing Conditions

This section describes the existing conditions in the Study Area as they relate to equity. The section is organized according to the four counties in the Study Area. Emphasis has been placed on creating a profile of underserved communities in these areas based on their demographic data, exposure and sensitivity to pollution, environmental health, and historic impacts on the community.

21.3.1 Regional Context

The SR 37 PEL Study Area is in the North Bay subregion of the nine-county San Francisco Bay Area (Bay Area), a populous and largely prosperous region surrounding the San Francisco, San Pablo, and Suisun Bay estuaries in Northern California (Figure EQ-2, Figure EQ-3). The fourth most populous metropolitan region in the United States, the Bay Area is defined by ABAG to include the nine counties that border the estuaries: Alameda, Contra Costa, Marin, Napa, San Mateo, Santa Clara, Solano, Sonoma, and San Francisco. The region's 7.6 million people occupy 101 cities and various unincorporated communities, the size and density of which vary widely across the 7,000-square-mile region (MTC 2020).



Source: PolicyLink and PERE 2017

Figure EQ-3. Bay Area Nine-County Region

The Bay Area is further divided into five subregions: City and County of San Francisco, East Bay, South Bay, Peninsula, and North Bay.

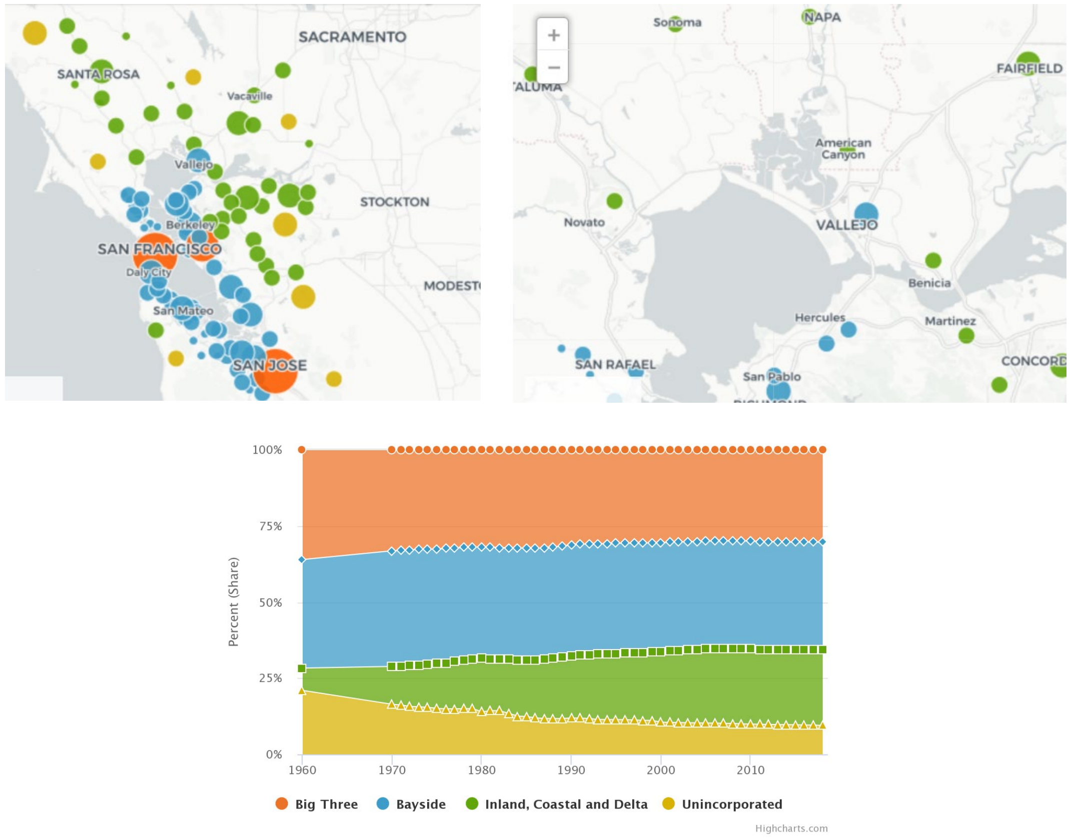
- San Francisco is a major economic center in the Bay Area and is the second densest large city in the United States, after New York City (The Buffalo News 2021).
- The East Bay is the densest region of the Bay Area outside of San Francisco and is centered around the major economic center of Oakland.
- The South Bay is centered around San Jose, the largest city in Northern California, and is roughly synonymous with Silicon Valley due to its high concentration of tech companies.
- The Peninsula region, encompassing San Mateo County and parts of Santa Clara County, lies immediately south of San Francisco, connecting the urban core to Silicon Valley.
- The North Bay, where the Study Area falls, is the least populated subregion. It is comprised of Marin, Sonoma, Napa, and Solano Counties.

21.3.1.1 Regionwide Growth and Development Patterns

Two of the most signification changes in the region's growth patterns in the last few decades have been the rapid growth of the South Bay and the shift in development from San Francisco to counties in the North and East Bay (MTC 2020).

The share of Bay Area residents living in inland, delta, and coastal cities increased by 25% between 1960 and 2018. This growth was concentrated in Contra Costa, Alameda, Sonoma, and Solano Counties, which had plenty of land to develop new neighborhoods and opportunities to acquire unincorporated areas (MTC 2020).

Since the Great Recession (2007–2009), the distribution of residents between center cities and suburban communities seems to have stabilized. The proportion of residents in inland areas has remained constant since 2007, reflecting an overall slowdown in the rate of population growth for these areas compared to historical norms, combined with accelerated population growth in select bayside communities and the "big three" cities: San Francisco, San Jose, and Oakland (Figure EQ-4).

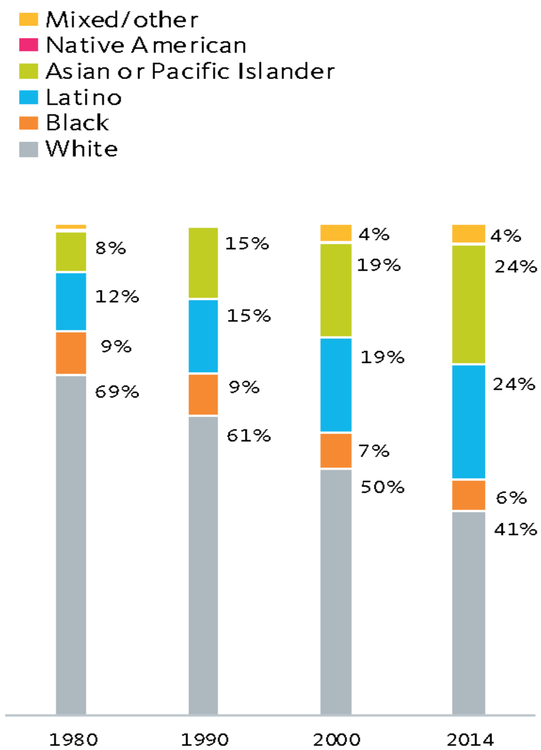


Source: MTC 2020.

Figure EQ-4. Historical Trend for Population Shares by Geographic Area 1960–2018

21.3.1.2 Regionwide Racial and Ethnic Diversity

In addition to the changes in the balances of population and economic centers in urban versus suburban and northern versus southern parts of the nine-county area, there have been significant shifts in the region's demographic makeup. Between 1980 and 2014, the region added more than two million residents, growing 45% from 5.1 million to nearly 7.4 million people. During that period, the percentage of people of color increased from 31% to 59%. People of color have driven much of the region's growth over the past three decades. Today, the nine-county region is the second most diverse of America's top 150 metropolitan areas (Figure EQ-5) (PolicyLink and PERE 2017).



Source: U.S. Census Bureau. Notes: Data for 2014 represent a 2010 through 2014 average. Much of the increase in the Mixed/ Other population between 1990 and 2000 is due to a change in the survey question on race.

Source: PolicyLink and PERE 2017

Figure EQ-5. Bay Area Racial and Ethnic Composition, 1980–2014

21.3.1.3 Regionwide Income and Employment Levels

The Bay Area is one of the wealthiest regions in the country, and home to three of the five counties with the highest median household incomes (2015–2019) in the United States (U.S. News and World Report 2020). A major contributor to the region's prosperity is the flourishing high-tech industry. Since 1990, however, regional poverty rates and percentages of people employed in low-wage jobs (i.e., "working poor") have been consistently higher than the national averages. Moreover, this wealth is not distributed equitably along racial, ethnic, and gender lines. People of color are more likely than White people to be in poverty or among the working poor. Women of color earn significantly less than their counterparts at every level of educational attainment.

High unemployment in urban and suburban areas is more prevalent in communities with high concentrations of people of color. For example, the North Bay's highest concentrations of unemployment are clustered in EPCs in Santa Rosa and East Vallejo (MTC 2020).

21.3.1.4 Regionwide and North Bay Housing and Transportation Cost Burdens

Bay Area low-income populations and renters are heavily burdened by the region's severe shortage of affordable housing, the legacy of discriminatory policies such as redlining, stagnant wages for all but the highest earners, and poor renter protections (The San Francisco Foundation et al. 2022). Cost-feasible housing choices for lower-income people living in or immigrating to the region tend to be in suburban and rural areas far from major job centers in the “big three” cities of San Francisco, Oakland, and San Jose.

Displacement of lower-income and/or non-white residents due to gentrification in transit-accessible areas has contributed to the problem. *Gentrification* is defined as “a process of neighborhood change that includes economic change in a historically disinvested neighborhood—by means of real estate investment and new higher-income residents moving in—as well as demographic change—not only in terms of income level, but also in terms of changes in the education level or racial make-up of residents (Chapple et al. 2021).” *Displacement* is defined as “when a household is forced to move from its place of residence due to conditions beyond its ability to control. These conditions may include unjust-cause eviction, rapid rent increase, or relocation due to repairs or demolition, among others (MTC and ABAG 2017).”

Many communities in the Bay Area and across the nation have fostered partnerships among economic development entities, transit authorities, and private land developers to encourage transit-oriented development (TOD) around existing or new stations. Successful TOD projects often attract high-wage workers seeking walkable, mixed-use communities close to public transit. As the market for higher-priced housing grows, property taxes increase with the rise in property values. Unless policies and regulations are in place and enforced to mitigate gentrification, lower-income existing residents—many of whom are also people of color—are forced to relocate to more affordable and less transit-accessible areas on the urban fringe. Within the nine-county Bay Area, many of the feasible alternatives for people unable to afford living near urban transit stations are in the North Bay subregion (Walker and Schafran 2015).

Although MTC and many communities throughout the region are adopting policies, developing strategies, and making investments to make urban centers more affordable, the “suburbanization of poverty” is evident in MTC’s updated EPCs map developed for the Plan Bay Area 2050 transportation plan. Based on the MTC analysis, which includes consideration of displacement risk due to gentrification,[4] almost all the newly designated EPCs are in rural portions of North Bay counties, far from urban job centers (Figure EQ-6; new EPC locations are marked in green). New and existing EPCs in Napa and Solano Counties, particularly those on Vallejo, depend on SR 37 for access to western metropolitan centers.

Much of the Bay Area housing outside Sonoma, Napa, and Solano Counties is in expensive “high-opportunity areas” or gentrifying communities where less affluent residents are at risk of displacement. Vallejo is one of the few places in the nine-county region where people can find affordable housing barely within a reasonable commuting distance of multiple job centers, including major cities on the western edges of the corridor (Figure EQ-7).

[4] MTC assesses the potential impacts of transportation plan investments, combined with broader trends in economic development and investment activity, on existing low-income and minority communities. When the plan and growth scenarios are projected to invest significantly in these communities, those investments are flagged for their potential to induce displacement. The evaluations are updated annually based on recent changes in housing prices, spending on housing and other real estate dynamics such as numbers of sales. This annual monitoring is designed to define and locate areas under higher risk for displacement and gentrification and to develop mitigation measures where possible (FHWA 2019).

Data from the CNT H+T Index indicates remarkably similar levels of expenditure and environmental impacts associated with household travel throughout the nine counties of the Bay Area. For most households, annual transportation costs are consistently around $15,000–$16,000, the number of vehicle miles traveled (VMT) per year is in the 20,000–25,000 range, which generates greenhouse gas (GHG) emissions ranging from 8.3 to 9.5 tons per household. Only the residents of transit-rich communities such as San Francisco and Oakland have substantively lower annual transportation costs ($9,501 and $12,273 respectively) and generate less VMT and GHG (Figure EQ-8).

The CNT defines affordability as no more than 45% of household income spent on combined transportation and housing costs. This combines the traditional 30% housing cost threshold that has been standard practice in planning and policy realms for decades with a 15% transportation cost threshold based on CNT research. By this definition, average households in all the North Bay counties (and most of the nine-county region) are spending more than the optimal amount. Like people in most automobile-dependent communities of the Bay Area, residents in the North Bay subregion spend, on average, 50–60% of their income on combined housing and transportation.

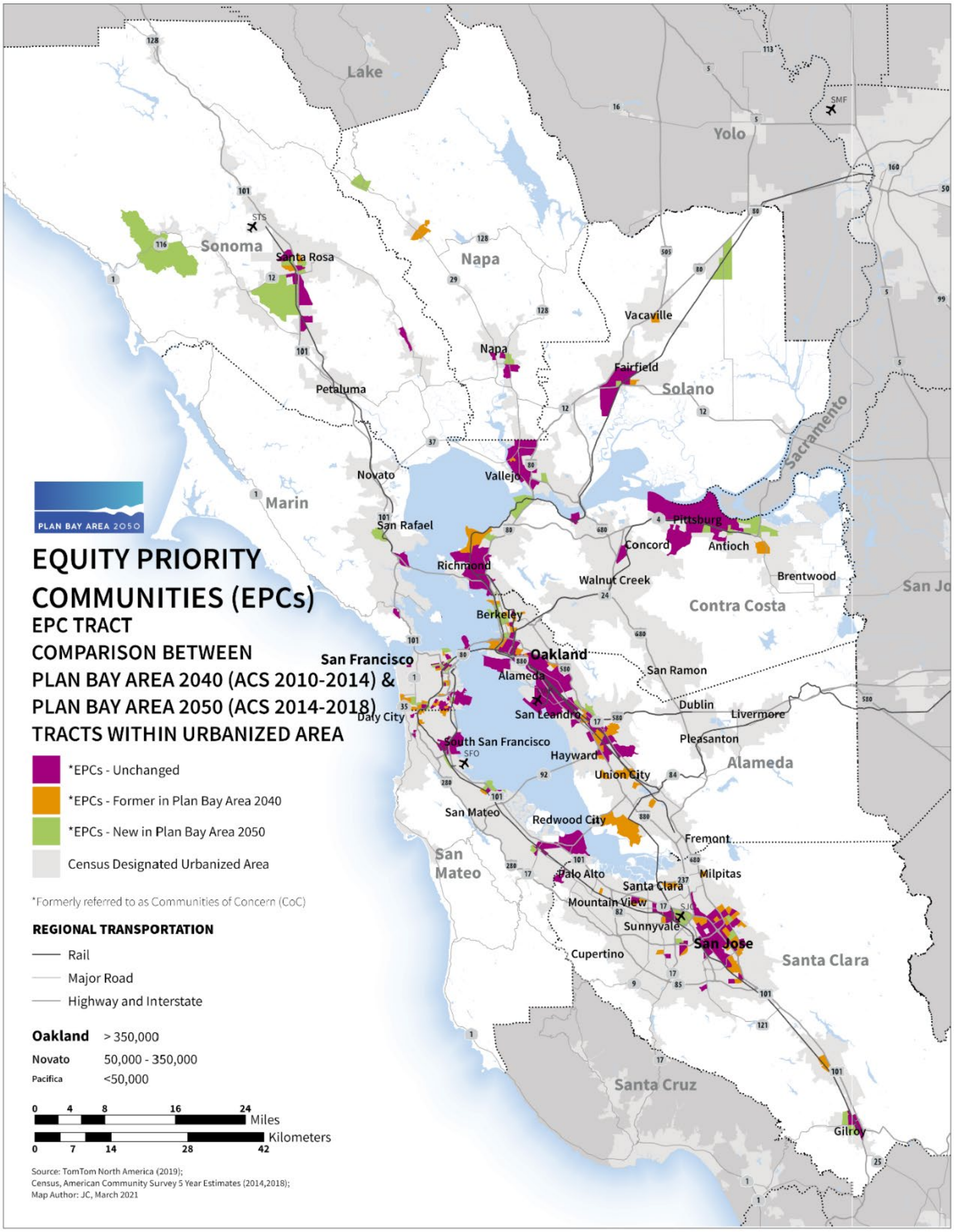
While transportation costs are generally similar for everyone, incomes and housing costs vary widely, ranging from a median income of about $100,000 and median housing cost of about $31,000 in Marin County to a median income of $60,000 and housing cost of $18,600 in Vallejo. Annual incomes for residents of Napa, Sonoma, and Solano Counties (including Vallejo) are between $67,000 and $75,000, while annual housing costs range from $20,000 to $24,000 (Figure EQ-8).[5]

Even though the combined housing and transportation cost levels are less in in Vallejo (49%) than Marin County (56%) most people in Vallejo have far less money left over for food, clothing, and other necessities than typical Marin County residents. Savings gained by paying less for housing in suburban communities such as Vallejo can be eaten up quickly by the cost of driving long distances to work from locations where public transit is nonexistent or limited, ridesharing can be impractical, and walking or cycling is infeasible.

This is evident in the data indicating the average Vallejo household spends 28% of its income on housing (just below the 30% affordability threshold) but spends 22% of its resources on transportation. The pattern is similar across Solano, Napa, and Sonoma Counties: housing costs are less than 35% of income, but transportation costs push the overall combined expenditures far above the ideal 45% threshold. Meanwhile, in Marin County where incomes are higher and commute travel distances are lower, average households spend 18% of income on transportation (much closer to the CNT ideal of 15%) but 38% on housing.

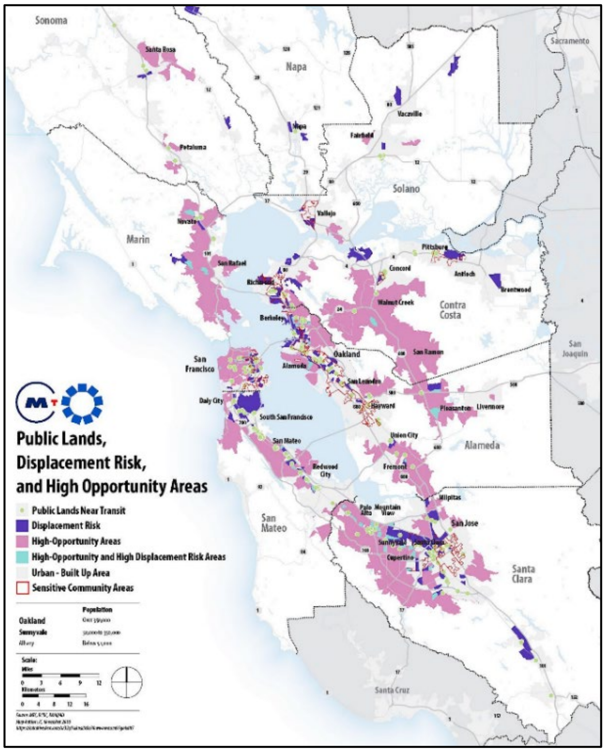
The opportunity cost of living in less accessible suburban and rural areas is also high. Fewer jobs can be reached within a reasonable amount of travel time in far-flung locations than urban centers. In addition, lower-wage workers that rely on personally owned automobiles to reach service jobs—for which reliability and punctuality are essential expectations—can all too easily lose a hard-won job due to persistent mechanical breakdowns, or because of tardiness due to unreliable travel times on congested highways such as SR 37.

[5] The H+T Index calculations of city- and county-wide household incomes and costs represent the average of median household incomes and costs for the census block groups in the jurisdiction, with costs additionally weighted by the areawide ratio of owners to renters. Data sources for housing costs and income are from the 2015 ACS. The numeric values differ from jurisdiction-level data reported in more recent decennial census and ACS, but the findings are useful for considering the general implications and impacts of housing and transportation costs related to location and income levels.

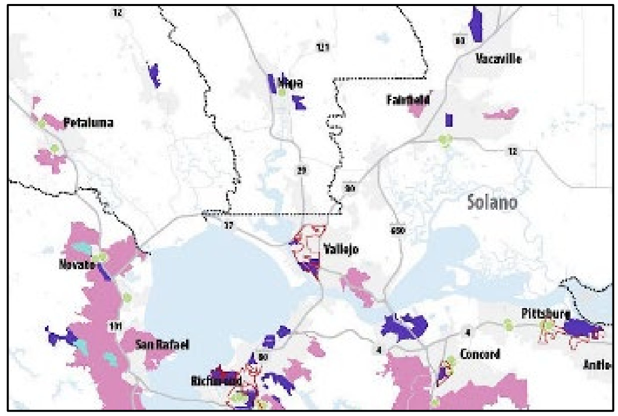


Source: ABAG and MTC 2021a

Figure EQ-6. Equity Priority Communities: Change Between Play Bay Area 2040 and Plan Bay Area 2050 Designations



Source: MTC 2018

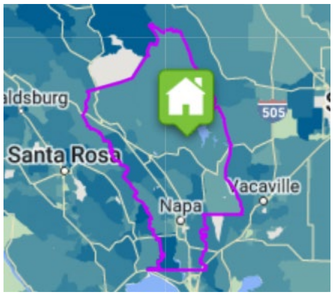


Public Lands encompass approximately 700 acres of public agency-owned land suitable for housing near transit, including two large tracts owned by transit agencies.

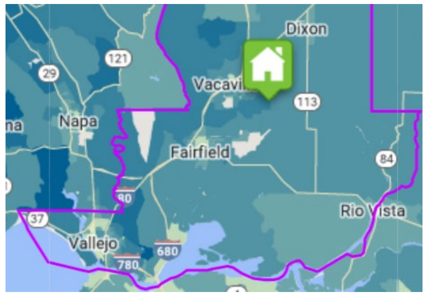
High-Opportunity Areas (aka High Resource Areas) are locations with low access to affordable housing but high access to quality education, well-paying jobs, community amenities, safe homes, and a healthy living environment.

Displacement Risk communities are currently undergoing

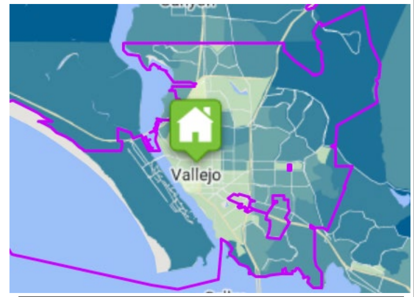
Figure EQ-7. 2016 Areas of High Opportunity and Displacement Risk



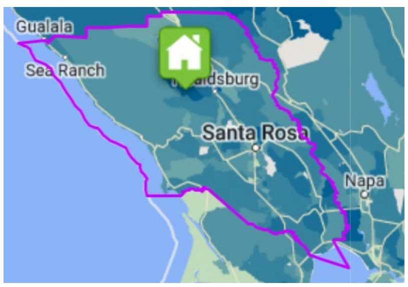
Napa County
Avg Housing $ Pct of Income: 33%
Avg Trans $ Pct of Income: 22%
Avg H+T $ Pct of Income: 56%
Avg Median HH Income: $74,584*
Avg Ann Housing Cost: $23,808**
Avg Ann Trans Cost: $15,895
Avg Ann HH VMT: 22,919
Avg Ann HH GHG: 9.43 tonnes



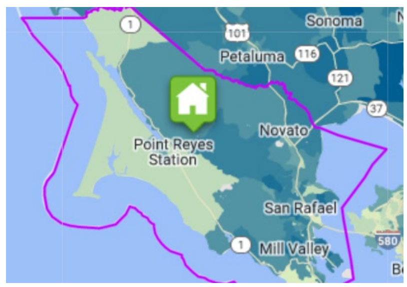
Solano County
Avg Housing $ Pct of Income: 31%
Avg Trans $ Pct of Income: 23%
Avg H+T $ Pct of Income: 53%
Avg Median HH Income: $70,976*
Avg Ann Housing Cost: $20,472**
Avg Ann Trans Cost: $15,198
Avg Ann HH VMT: 22,122
Avg Ann HH GHG: 9.10 tonnes



Vallejo
Avg Housing $ Pct of Income: 28%
Avg Trans $ Pct of Income: 22%
Avg H+T $ Pct of Income: 49%
Avg Med HH Income: $60,174*
Avg Ann Housing Cost: $18,576**
Avg Ann Trans Cost: $14,428
Avg Ann HH VMT: 20,783
Avg Ann HH GHG: 8.41 tonnes



Sonoma County
Avg Housing $ Pct of Income: 34%
Avg Trans $ Pct of Income: 24%
Avg H+T $ Pct of Income: 57%
Avg Median HH Income: $67,125*
Avg Ann Housing Cost: $21,936**
Avg Ann Trans Cost: $15,328
Avg Ann HH VMT: 22,123
Avg Ann HH GHG: 8.89 tonnes



Marin County
Avg Housing $ Pct of Income: 38%
Avg Trans $ Pct of Income: 18%
Avg H+T $ Pct of Income: 56%
Avg Median HH Income: $101,727*
Avg Ann Housing Cost: $30,948**
Avg Ann Trans Cost: $14,896
Avg Ann HH VMT: 21,304
Avg Ann HH GHG: 8.27 tonnes

Annual Housing + Transportation Costs as a Percentage of Income

< 24% | 24-36% | 36-45% | 45-54% | 54-66% | 66-78% | 78-87% | 87%+

* Average median household income is calculated by averaging the median income of all Census block groups in the jurisdiction.
** Average annual housing cost was calculated for this report by multiplying the H+T Index average monthly housing cost by 12. The H+T cost is derived from 2015 American Community Survey selected median monthly owner costs and gross rent, weighted by the ratio of owner-occupied to rental units.

Comparative housing + transportation cost and associated data in major urban centers

San Francisco
Avg Housing $ Pct of Income: 30%
Avg Trans $ Pct of Income: 12%
Avg H+T $ Pct of Income: 41%
Avg Median HH Income: $86,335*
Avg Ann Housing Cost: $24,432**
Avg Ann Trans Cost: $9,501
Avg Ann HH VMT: 10,301
Avg Ann HH GHG: 3.91 tonnes

Oakland
Avg Housing $ Pct of Income: 24%
Avg Trans $ Pct of Income: 15%
Avg H+T $ Pct of Income: 39%
Avg Median HH Income: $63,300*
Avg Ann Housing Cost: $19,920**
Avg Ann Trans Cost: $12,273
Avg Ann HH VMT: 14,648
Avg Ann HH GHG: 5.59 tonnes

San Jose
Avg Housing $ Pct of Income: 28%
Avg Trans $ Pct of Income: 16%
Avg H+T $ Pct of Income: 44%
Avg Median HH Income: $89,616*
Avg Ann Housing Cost: $26,880**
Avg Ann Trans Cost: $15,265
Avg Ann HH VMT: 20,018
Avg Ann HH GHG: 8.36 tonnes

Source: CNT 2021

Figure EQ-8. North Bay Housing and Transportation Costs, VMT, and GHG

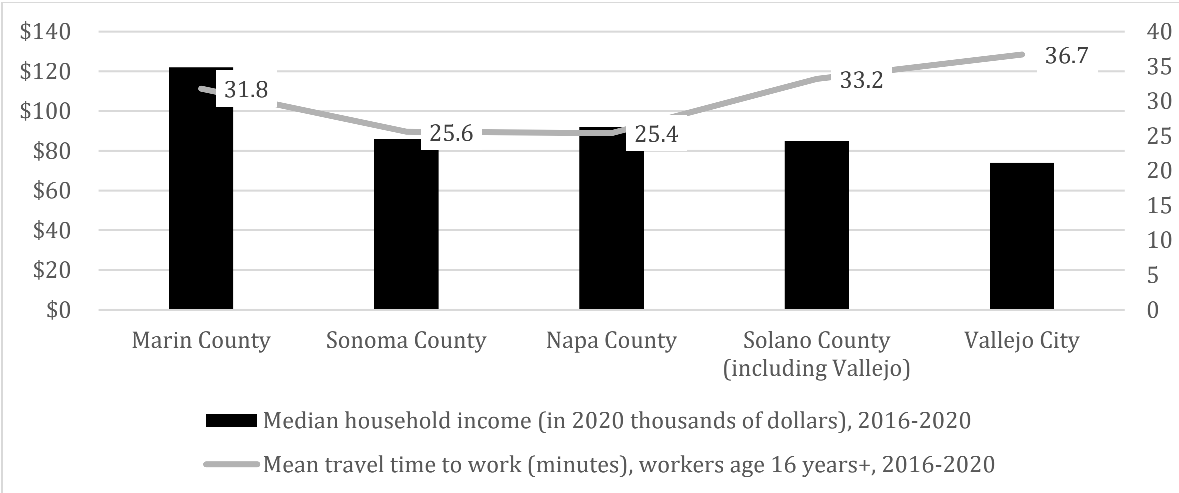
21.3.1.5 North Bay Commuting Patterns

The corridor's role as a lifeline for moderate and low-income commuters is expected to grow given anticipated residential growth in relatively affordable Solano County, coupled with increased job growth in Marin County where housing prices are consistently high (Figure EQ-9) (Bay Area Regional Collaborative and MTC 2020).

Source: Bay Area Regional Collaborative and MTC 2020

Figure EQ-9. SR 37's Growing Role as a Critical Commuter Corridor

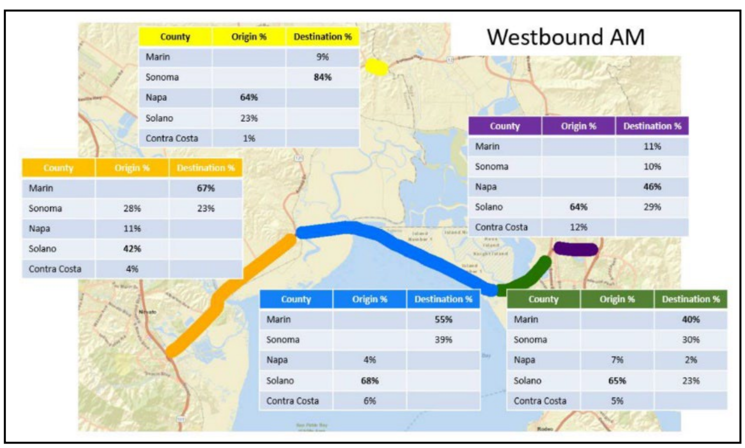
SR 37 connects Solano and Marin Counties, with a substantial portion of daily trips beginning or ending in those two counties (Figure EQ-10). An estimated two-thirds of all trips on the corridor are made by people earning less than the regional median income of $100,000 (NVTA et al. 2019). Commute times correlate primarily to distances from major job centers, and secondarily to household income levels. Residents of moderate-income Sonoma and Napa Counties have the shortest commutes, about 25 minutes. This makes intuitive sense, since Sonoma County is the largest job center in the North Bay. Residents of wealthy Marin County have the best accessibility to high-paying local jobs and to the metropolitan San Francisco area. Their 32-minute average commutes are longer than those of neighboring Sonoma and Napa County workers, but slightly shorter than the 33-minute commutes made by Solano County residents, and much shorter than 37-minute commutes made by Vallejo workers (Figure EQ-10).

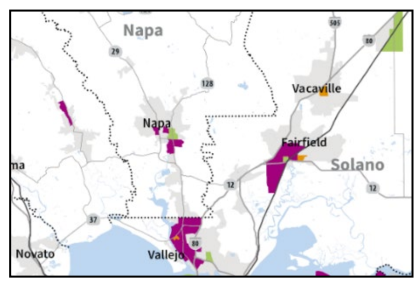


Source: U.S. Census Bureau 2022a

Figure EQ-10. North Bay Commute Times and Median Household Incomes 2016–2020

Most of the traffic is westbound in the mornings and eastbound in the evenings. About two-thirds of the morning traffic on the eastern half of the corridor originates in Solano County. Napa County travelers typically join this group at the junction with SR 121. Almost all the morning travelers on SR 37 are heading to destinations in Marin County (primarily) or to Sonoma County (secondarily). Residents in more than half a dozen North Bay EPCs in Solano and Napa Counties, particularly in Vallejo, Fairfield, Vacaville, and Napa, may be using SR 37 to reach jobs and services in the western part of the Study Area (Figure EQ-11).





Purple and green locations indicate eastern North Bay EPCs whose residents would likely use SR37 to reach jobs and services in Marin, Sonoma, and the San Francisco area.

Sources: NVTA et al. 2019; ABAG and MTC 2021b

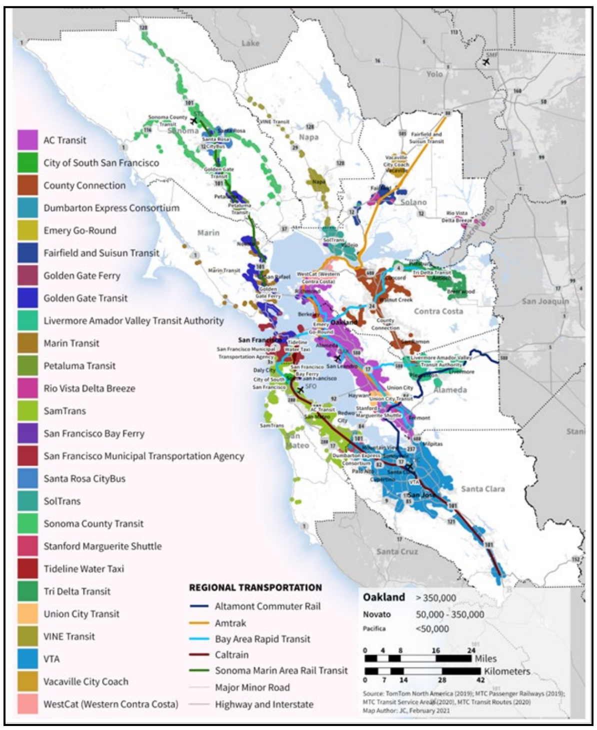
Figure EQ-11. SR 37 Westbound Morning Commuter Origins and Destinations with Inset of Equity Priority Communities

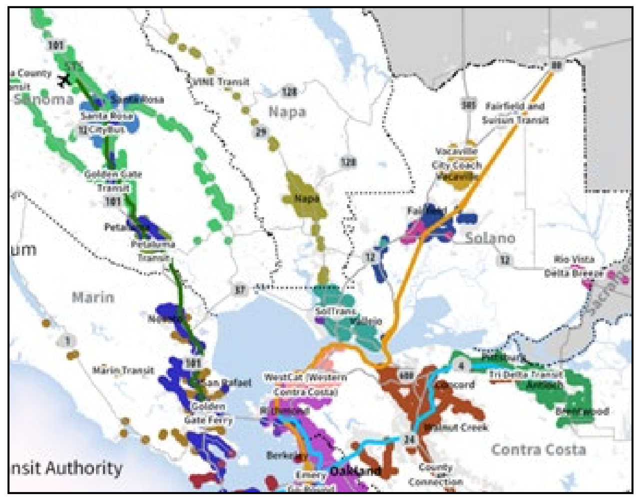
21.3.1.6 North Bay Transit and Ridesharing Options

The only major east-west public transit connection in the Bay Area is Bay Area Rapid Transit (BART). A variety of local transit services circulate within the North Bay region, some of which provide direct or indirect connections to east-side BART stations south of the Bay Area. There is no straightforward transit connection along the SR 37 corridor by which eastern residents of the North Bay can reach jobs and services in western counties (Figure EQ-12).

As is evident from the comparison of combined housing and transportation costs in transit-rich areas such as San Francisco and Oakland to automobile-dependent communities such as San Jose and the North Bay, access to transit can play a critical role in reducing overall costs for homeowners and renters. Given the consistently high costs of driving and the levels of displacement risk in many of the Solano and Napa County EPCs (Figure EQ-10), the provision of low-cost transit along SR 37 may be one of the only ways to make a significant dent in the housing and transportation cost burden and to reduce the potential for displacement among low-income households in the eastern North Bay area.

Although ridesharing can be very challenging in suburban and rural areas where commute trip locations and schedules are widely dispersed, results of focus group discussions with low- and moderate-income SR 37 corridor users indicated a surprisingly high 19% of participants carpooled and 29% said they would be willing to use transit. The discussions revealed a strong need and desire for options other than single-occupant vehicle travel (TAM et al. 2018).





Westbound transit commuters from Fairfield and Vacaville take long trips on local services, then transfer to BART to reach jobs in major cities such as Oakland and San Francisco. Napa Vine Transit riders can reach Vallejo, but neither they nor Vallejo residents have direct transit linkages to BART.

Source: ABAG and MTC 2021b

Figure EQ-12. Bay Area Local and Regional Transit Services

21.3.2 North Bay Community Profiles

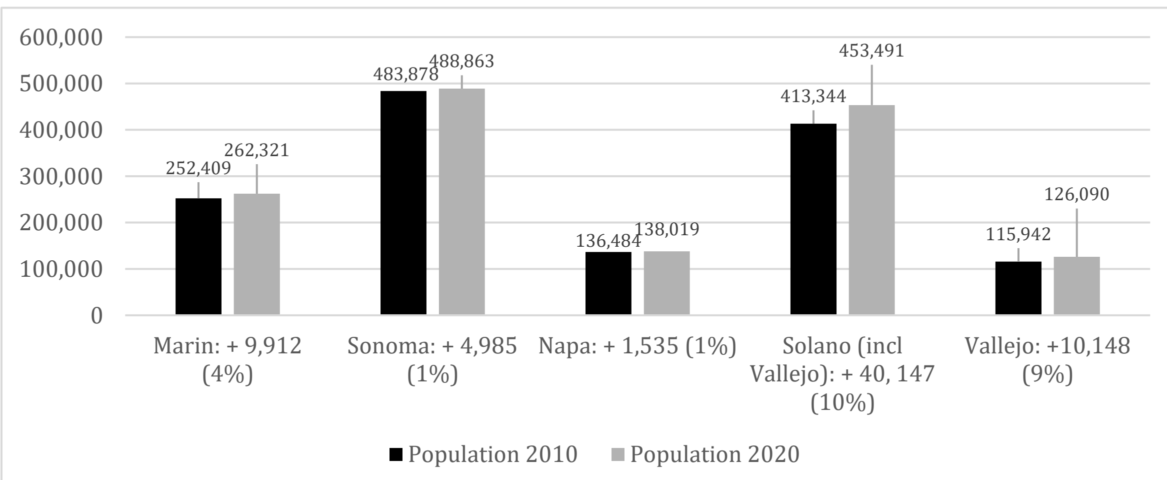
The four counties that comprise the North Bay subregion are all represented in the SR 37 Study Area, along with a specific focus on Vallejo due to the presence of several EPCs in this city as well as its centrality to the SR 37 project. Vallejo and the western bayside communities around San Rafael are the urban centers bracketing the existing SR 37 corridor.

Vallejo residents, including those who live in the city's 16 EPCs, are heavily dependent on the SR 37 corridor to reach jobs and services in Sonoma, Marin, and the San Francisco metropolitan area. Some of the residents of Solano County inland EPCs (e.g., Fairfield) as well as those in Napa and Sonoma Counties also rely on SR 37 to access western urban centers.

21.3.2.1 North Bay Region

As of 2020, the four-county North Bay housed 1,342,694 people. During the 10-year period between 2010 and 2020, the region added 56,579 residents, a 4% increase. Solano County's 40,147 new residents (of whom 10,148 settled in Vallejo) accounted for 71% of the North Bay's growth. Marin County's 9,912 new residents accounted for 18% of the North Bay total, followed by the addition of 4,985 Sonoma County residents, which contributed 9% to the North Bay's growth, and 1,535 Napa County residents, accounting for the remaining 3% of the total (U.S. Census Bureau 2022b).

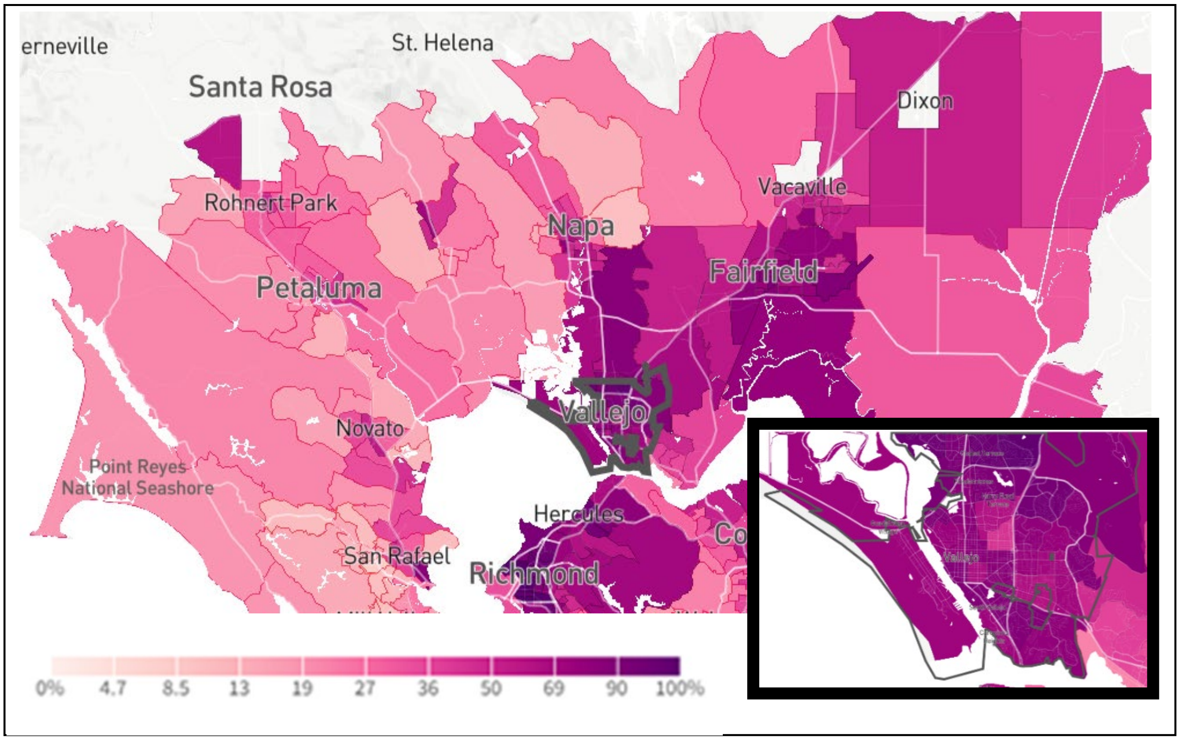
Solano County and the city of Vallejo experienced robust growth rates of 10% and 9% over the 10-year period. Marin's population grew by a more modest 4%, while Sonoma and Napa Counties changed very little, each increasing by only 1% during the decade. Sonoma County (population 488,864) retained its status as the most populous in the North Bay, with Solano County (population 453,491) in second place. Solano County's growth, however, cut the gap in size between the two counties in half, from 15% in 2010 to 7% in 2020 (Figure EQ-13).



Source: U.S. Census Bureau 2022b

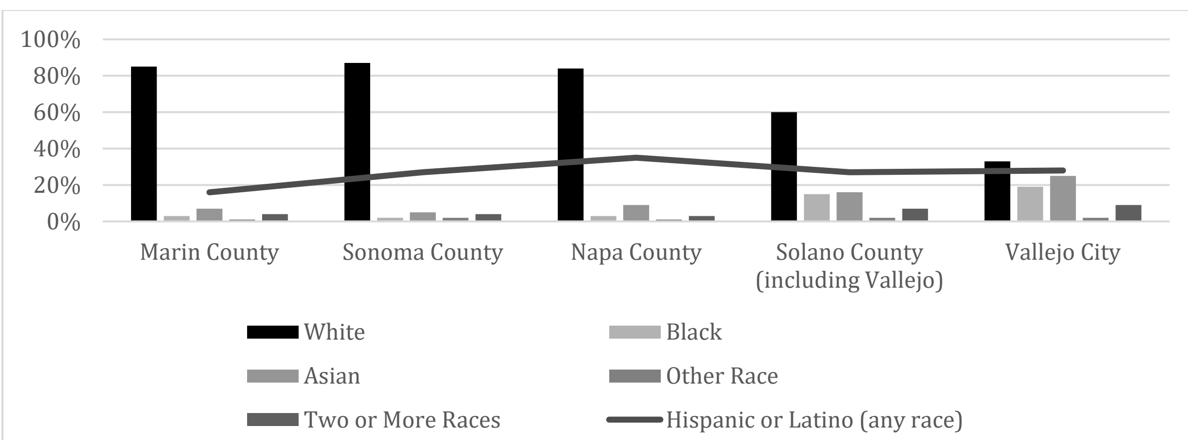
Figure EQ-13. North Bay Population Growth, 2010–2020

There are marked differences in diversity levels between the western and eastern localities of the North Bay region (Figure EQ-14). More than 80% of residents in Marin, Sonoma, and Napa Counties are White, including those of Hispanic or Latino origin. Compared to these three counties, Solano County has a smaller proportion of White residents (60%) and about twice as many people that identify as Black, Asian, or multiracial. The city of Vallejo houses about 28% of Solano County's population and is one of the most diverse cities in the North Bay (Figure EQ-15).



Source: U.S. Census Bureau 2022c

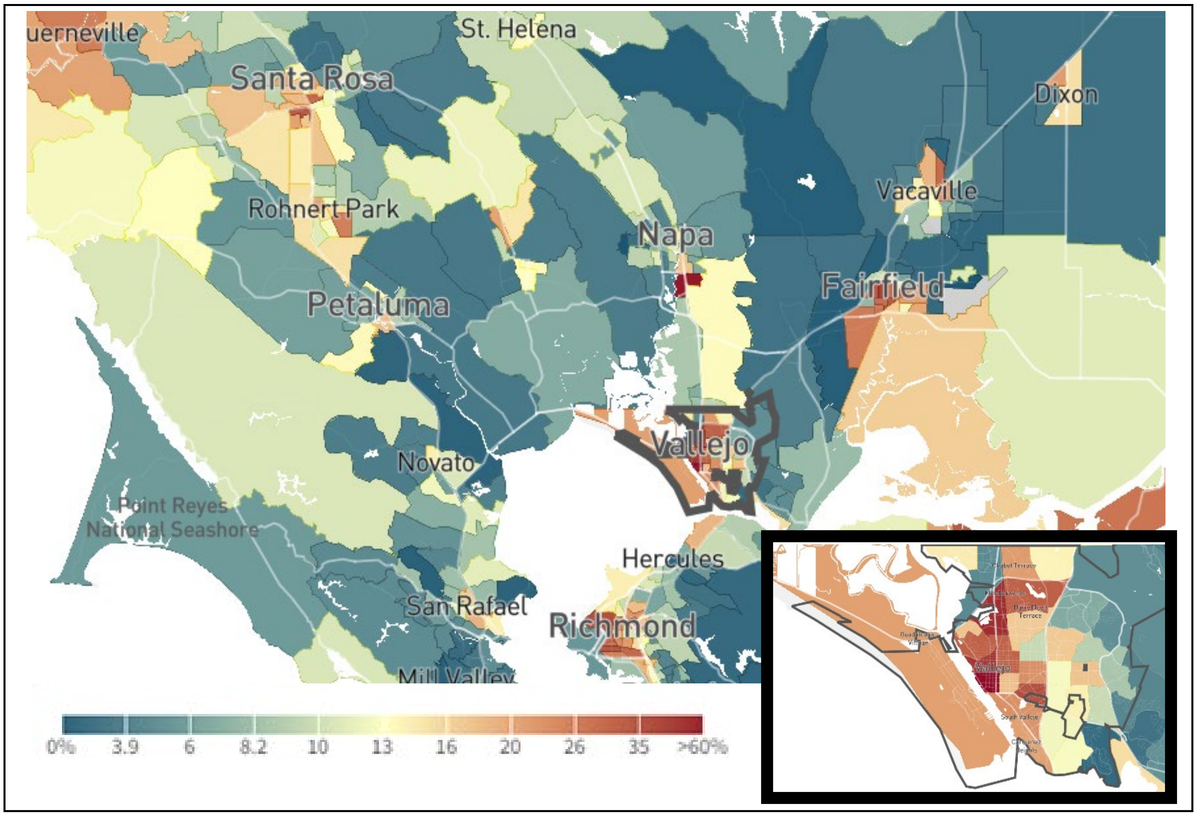
Figure EQ-14. North Bay Percent Non-White Population, 2010



Source: U.S. Census Bureau 2022b

Figure EQ-15. North Bay Racial and Ethnic Diversity, 2020

The North Bay's patterns of wealth and employment characteristics are similar to those of racial and ethnic diversity. People experiencing poverty are more commonly found in Vallejo, as well as parts of Napa, Fairfield, Santa Rosa, Petaluma, and Dixon (Figure EQ-16 compared to Figure EQ-14).



Source: U.S. Census Bureau 2022c

Figure EQ-16. North Bay Area Poverty Rates 2012–2016

Across the board, income levels correlate directly to education and inversely to poverty rates. Marin County's percentage of college-educated residents (60%) is more than double the percentage in Vallejo (27%) and its poverty rate (6%) is half as high (12%). However, the numbers of persons in poverty are quite similar in the two communities. Marin County's population of persons in poverty (15,739) is slightly higher than that of Vallejo (15,131) (Table EQ-2).

Table EQ-2. North Bay Income, Poverty, and Education Levels, 2020

	Marin County	Sonoma County	Napa County	Solano County (including Vallejo)	City of Vallejo
Median household income (in 2020 dollars), 2016–2020	$121,671	$86,173	$92,219	$84,638	$73,869
Persons in poverty, number	15,739	39,109	11,042	40,814	15,131
Persons in poverty, percent	6%	8%	8%	9%	12%
High school graduate or higher, percent of persons age 25 years+, 2016–2020	94%	89%	86%	89%	88%
Bachelor's degree or higher, percent of persons age 25 years+, 2016–2020	60%	36%	37%	27%	27%

Source: U.S. Census Bureau 2022b

Data on the numbers of local employers in each county correlates to the predominant pattern of westbound morning commutes on SR 37. The western half of the North Bay subregion has more employers and higher wages than the eastern half. Sonoma County has by far the highest number of employers (14,242) and attracts the most workers (177,333). Solano County has the second highest number of workers (118,253) but the third highest number of employers (7,267). There are 10,025 employers in Marin County, and far fewer workers (103,990). Marin County's average pay per employee ($74,903) is as much as $20,000 higher than that of employees in the other three localities, which ranges from $53,690 in Solano County to $57,756 in Sonoma County (Table EQ-3). This may partly be explained by a larger presence of high-paying corporations in Marin County compared to other North Bay counties. Given the high cost of housing in Marin County, it is possible that the county's comparatively high average pay per employee is skewed upward by the presence of extremely high salaries among county residents who would not depend heavily on SR 37 for their commutes. Workers in Marin County's many service jobs are likely to commute into the county on SR 37 from points east where housing is more affordable.

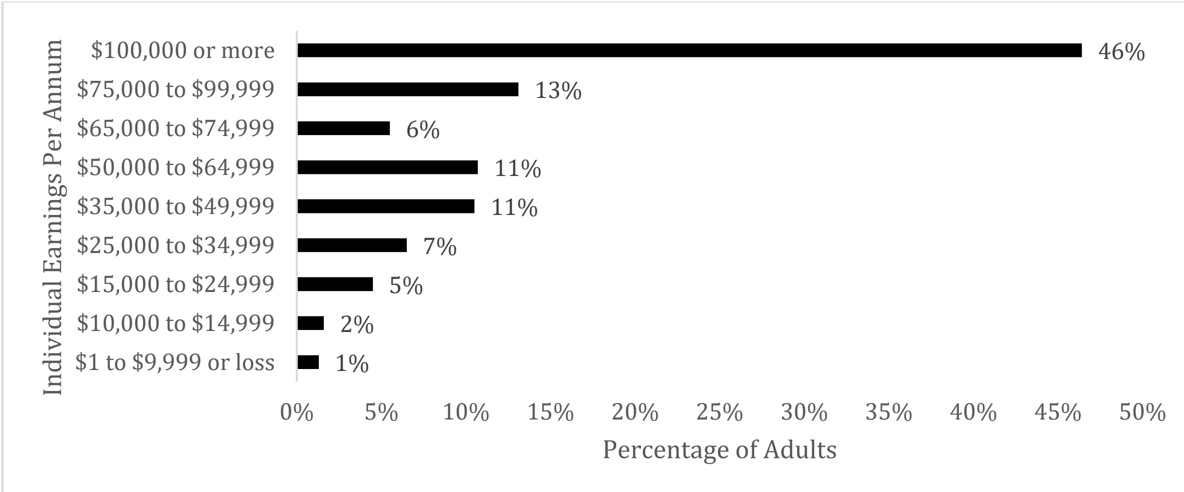
Table EQ-3. North Bay Employers, 2020

	Marin County	Sonoma County	Napa County	Solano County
Total employer establishments	10,025	14,242	4,350	7,267
Total employment	103,990	177,333	64,556	118,253
Total annual payroll	$7,789,182,000	$10,242,117,000	$3,515,488,000	$6,348,978,000
Average pay per employee	$74,903	$57,756	$54,456	$53,690

Source: U.S. Census Bureau 2022b

21.3.2.2 Marin County

Marin County is the most prosperous county in the North Bay. It has the highest median household income, $121, 671 (2016–2020), and the highest per capita income, $74, 446 (2016–2020), in the North Bay. Until 2010, Marin County had the highest per capita income of any county in California. In 2012, Marin County was home to 39,815 firms, out of which only 5,813 (15%) were minority owned (the lowest percentage in the North Bay). The top types of industries in which local residents are employed include professional services, followed by health care and retail. Unlike the other North Bay localities, almost half (46%) of the adult population earns more than $100,000 per year (Figure EQ-17). Like its neighbors, Marin County demonstrates a marked disparity in earnings when it comes to race (Table EQ-4).



Source: U.S. Census Bureau 2022a

Figure EQ-17. Marin County Distribution of Individual Earnings, 2020

Table EQ-4. Marin County Per Capita Income by Race and Hispanic or Latino Origin

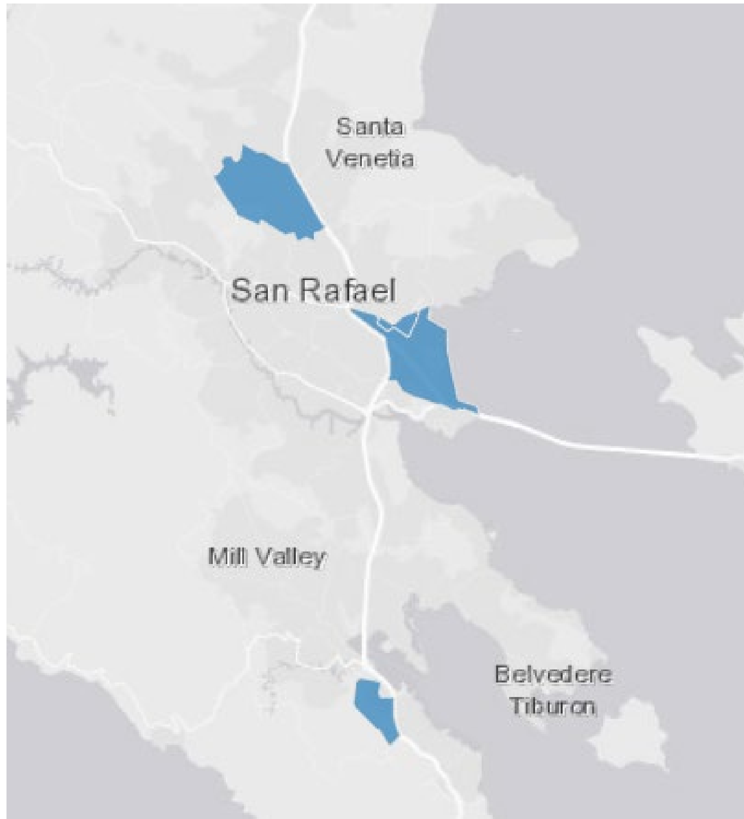
	Solano County, California		
	Number	**Percent Distribution**	**Mean income (dollars)**
	Estimate	**Estimate**	**Estimate**
Per Capita Income by Race and Hispanic or Latino Origin			
Total Population	259,441	259,441	74,446
One Race			
White	199,068	76.7%	84,619
Black or African American	**6,001**	**2.3%**	**28,442**
American Indian and Alaska Native	**673**	**0.3%**	**21,037**
Asian	15,060	5.8%	71,516
Native Hawaiian and Other Pacific Islander	**361**	**0.1%**	**19,484**
Some other race	20,845	8.0%	20,615
Two or more races	17,433	6.7%	44,217
Hispanic or Latino origin (of any race)	41,737	16.1%	33,783
White alone, not Hispanic or Latino	**183,259**	**70.6%**	**87,577**

Source: U.S. Census Bureau 2022a: Table S1902

Marin County is the least diverse of the nine counties in the Bay Area, but since 2000 the population of people of color has grown more than eight times as fast as the total population. While growth among non-White persons of all ages is occurring, there is an increasing racial and generational gap between the region's mainly White senior population and its increasingly diverse youth population (PolicyLink and PERE 2017).

The largest universities in Marin County are Dominican University of California (481 degrees awarded in 2020) and College of Marin (469 degrees awarded in 2020).

Four EPCs have been identified in Marin County, all located in south Marin along US 101 (Figure EQ-18). The EPCs in San Rafael and the city of Marin are in the highest EPC category, indicating the most pressing problems.



Source: ABAG and MTC 2021b

Figure EQ-18. Marin County Equity Priority Communities

In 2021, civil rights organization Advancement California ranked Marin County the second highest county statewide in terms of racial disparity. Disparities in homeownership rates and housing costs between Whites and Blacks and Latinos were a predominant factor in the ranking. Access to high-quality housing is also split along racial and ethnic lines: Pacific Islander households are 14 times more likely and Latino households are three times more likely to live in low-quality housing than White households. The county also rated high in racial disparity with regard to household proximity to hazardous waste sites (Dillon 2018).

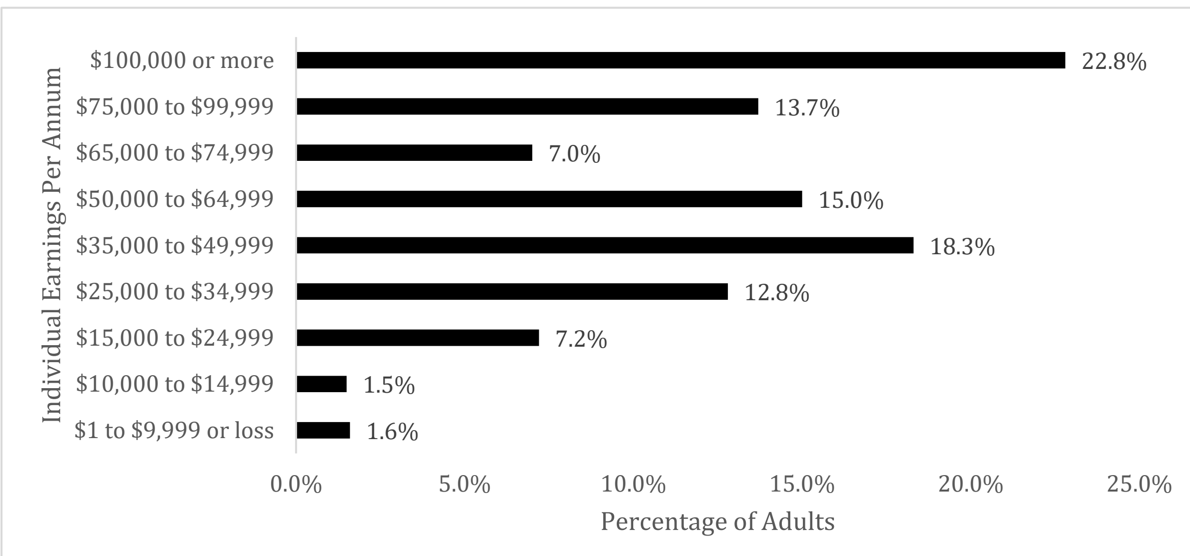
The present-day racial disparity in Marin County reflects the federal government's racist housing policies in the 1930s and 1940s, such as the New Deal's National Housing Act of 1934, which limited financial assistance to White buyers and stymied the development of housing for Black buyers (Little 2020). When Congress outlawed housing segregation in the late 1960s, activists in Marin County pushed to curb growth in the name of environmentalism. Their efforts were successful, and the County soon denied new housing development, highway construction, and access to water sources. This anti-development stance is reflected in the fact that about 85% of Marin County is off limits to development (Dillon 2018).

There has been some effort to remedy this disparity in recent years. The Marin County Office of Equity adopted a Race Equity Action Plan (REAP) in 2022 and allocated $2.5 million to a participatory budgeting program geared towards advancing racial equity in Marin County. Limited transportation access to health care was identified as a key racial equity issue in the 2022 REAP (County of Marin 2022).

21.3.2.3 Sonoma County

Sonoma County is the most populous in the North Bay, both in terms of residents and employers. Santa Rosa and Petaluma are major cities in Sonoma County and are the closest to the Study Area. In 2012, it was home to the highest number of firms in the North Bay at 52,975 firms—out of which 9,178 (17%) were minority owned. The biggest employers in these cities are hospitals, hotels, wineries, and manufacturers. The largest universities in Sonoma County are Santa Rosa Junior College (7,044 degrees awarded in 2020), Sonoma State University (2,483 degrees awarded in 2020), and Empire College (190 degrees awarded in 2020). Several tribes have lands in Sonoma County, including Graton Rancheria (which houses a large casino and resort), Dry Creek Rancheria (which includes a casino near Geyserville), Stewarts Point Rancheria, and Cloverdale Rancheria. With the exception of the Graton Rancheria near Rohnert Park, these lands are generally located in northern Sonoma County. SR 37 may serve some of the visitor traffic to the Graton Rancheria casino.

Less than a quarter of the population earns more than $100,000 per capita (Figure EQ-19) and there is a marked disparity in earnings when it comes to race (Table EQ-5).



Source: U.S. Census Bureau 2022a

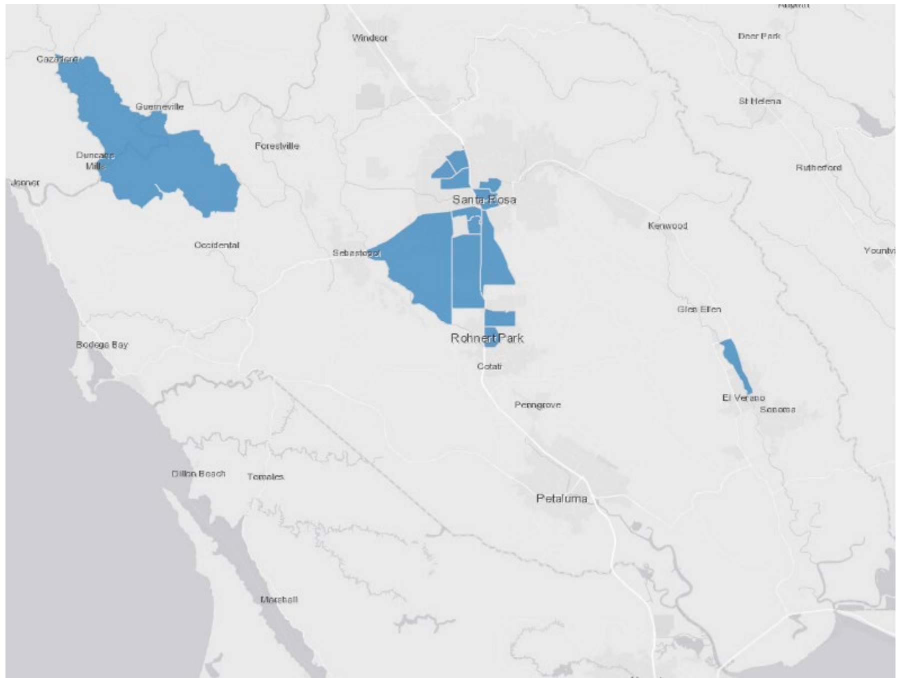
Figure EQ-19. Sonoma County Distribution of Individual Earnings, 2020

Table EQ-5. Sonoma County Population and Income By Race and Ethnicity

	Solano County, California		
	Number	Percent Distribution	Mean income (dollars)
	Estimate	Estimate	Estimate
Per Capita Income by Race and Hispanic or Latino Origin			
Total Population	496,801	496,801	44,071
One Race			
White	360,200	72.5%	50,654
Black or African American	**8,266**	**1.7%**	**34,937**
American Indian and Alaska Native	**4,441**	**0.9%**	**31,593**
Asian	21,239	4.3%	42,304
Native Hawaiian and Other Pacific Islander	**1,614**	**0.3%**	**29,729**
Some other race	66,089	13.3%	20.272
Two or more races	34,952	7.0%	26,718
Hispanic or Latino origin (of any race)	134,024	27.0%	23,350
White alone, not Hispanic or Latino	**310,607**	**62.5%**	**54,418**

Source: U.S. Census Bureau 2022a: Table S1902

There are 15 EPCs in Sonoma County, all of them outside the SR 37 Study Area (Figure EQ-20). Some of the EPCs in Santa Rosa are in the 70th percentile of CalEnviroScreen overall scores. The EPCs in Santa Rosa and the El Verano area near the city of Sonoma are the closest to the Study Area and may be affected by modifications to SR 37. Commuters in both these cities must use SR 37 to get to Vallejo, which is an economic center of regional importance due to its proximity to both San Francisco and Sacramento. Even though there is no EPC present in Petaluma, it is in the 50th percentile of CalEnviroScreen overall scores, indicating it is moderately affected by environmental burdens.



Source: ABAG and MTC 2021b

Figure EQ-20. Sonoma County Equity Priority Communities

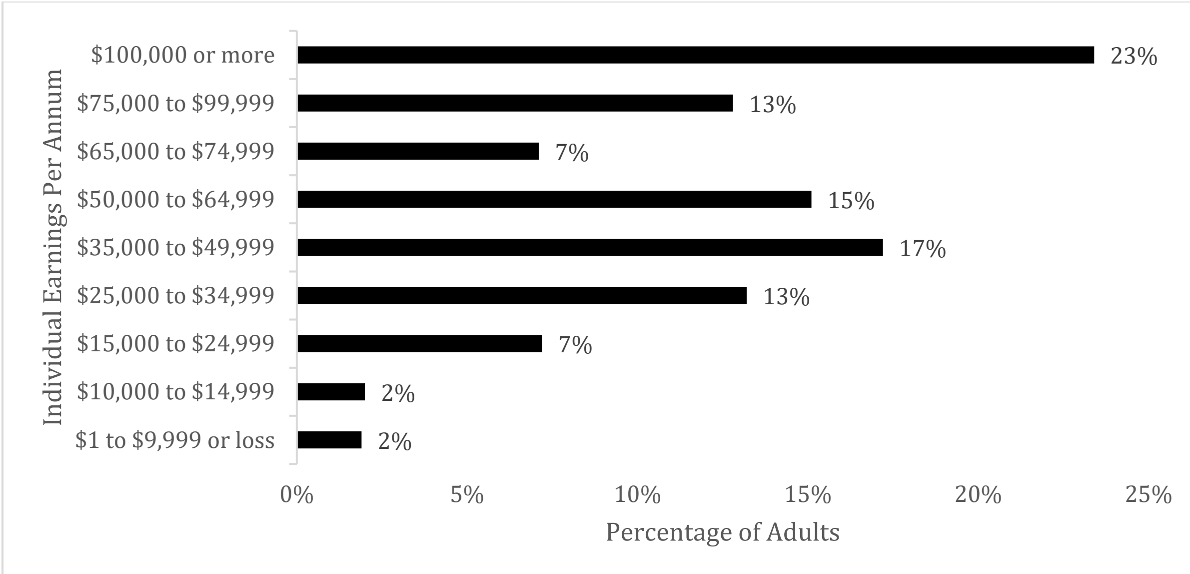
In 2018, Sonoma County joined the Government Alliance on Race and Equity (GARE), and participants from 12 County departments created Sonoma County Racial Equity Alliance and Leadership (SoCoREAL). Additionally, County Latinx employees have formed the Sonoma County Latinx Employee Resource Network. In July 2020, the Board of Supervisors approved the creation of a new Office of Equity and appointed a permanent Director of the Office of Equity in September 2020 (County of Sonoma 2021).

21.3.2.4 Napa County

Napa County is the least populous county in the North Bay. Napa County is known for its wine industry, as well as related commercial and recreational establishments. The largest employers in this county are wineries, winery tour companies, resorts, vineyards, hotels, and resorts. In 2012, Napa County was home to the lowest number of firms in the North Bay at 14,236 firms—out of which 3,192 (22%) were minority owned.

The largest universities in Napa County are Napa Valley College (1,095 degrees awarded in 2020) and Pacific Union College (263 degrees). No tribal lands are in Napa County.

Nearly three quarters of the adult population earns less than $100,000 per capita (Figure EQ-21), and there is a marked income disparity when it comes to race and ethnicity (Table EQ-6).



Source: U.S. Census Bureau 2022a

Figure EQ-21. Napa County Distribution of Annual Individual Earnings, 2020

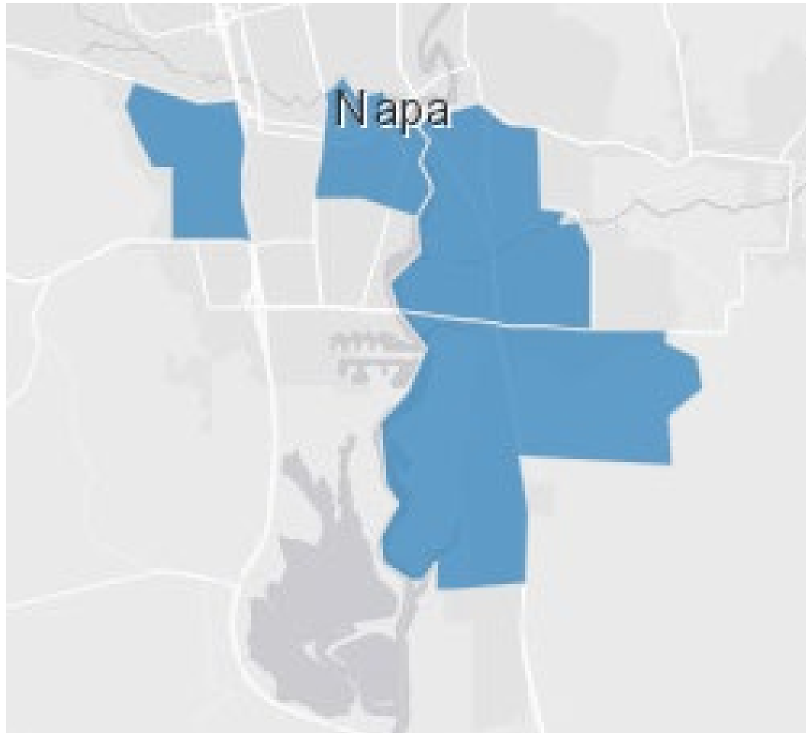
Table EQ-6. Napa County Population and Income By Race

	Solano County, California		
	Number	Percent Distribution	Mean income (dollars)
	Estimate	Estimate	Estimate
Per Capita Income by Race and Hispanic or Latino Origin			
Total Population	138,572	138,572	46,912
One Race			
White	98,614	71.2%	53,253
Black or African American	**2,862**	**2.1%**	**37,164**
American Indian and Alaska Native	**961**	**0.7%**	**37,951**
Asian	10,485	7.6%	43,224
Native Hawaiian and Other Pacific Islander	**261**	**0.2%**	**32,156**
Some other race	15,647	11.3%	23,413
Two or more races	9,742	7.0%	28,580
Hispanic or Latino origin (of any race)	47,300	34.1%	24,027
White alone, not Hispanic or Latino	**71,817**	**51.8%**	**63,897**

Source: U.S. Census Bureau 2022a

There are four EPCs in Napa County, all of which are located in the city of Napa (Figure EQ-22). The EPCs include parts of Rocktram, the Napa Valley College community, Kennedy Park, and a cluster of schools including Blue Oak School, Napa Valley Language Academy, and Veritas Christian Academy. The EPC centered around Napa Valley College has the highest EPC score, meaning it is the most affected by equity-related disparities.

While the Napa EPCs are not within the SR 37 PEL Study Area, their residents could be affected by modifications to SR 37. Notably, Napa's only public transit (Vine Transit) runs to Vallejo.



Source: ABAG and MTC 2021b

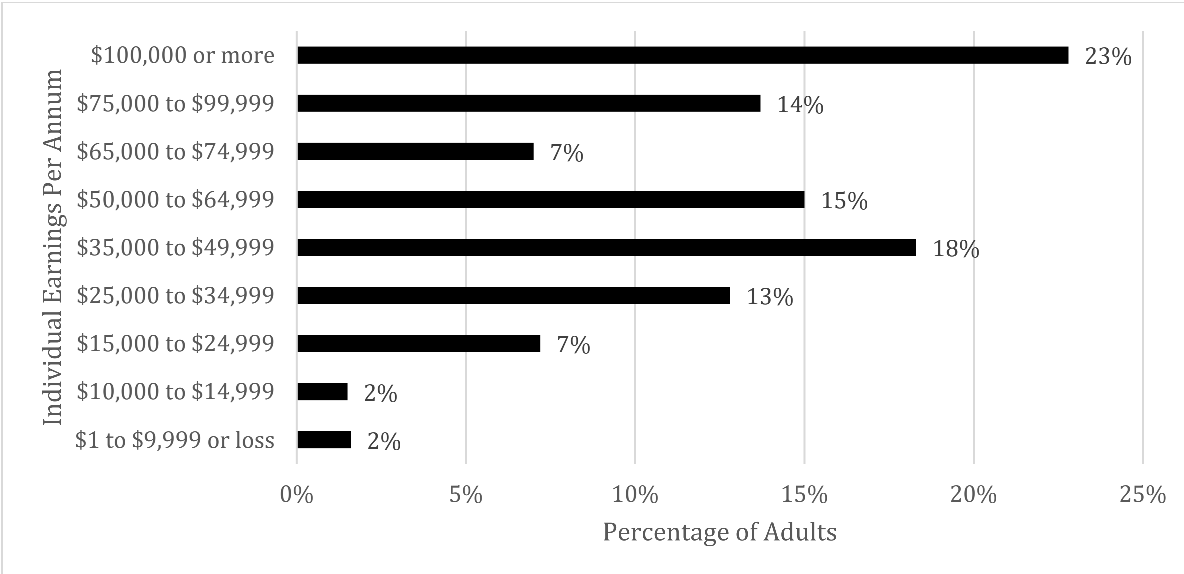
Figure EQ-22. Napa County Equity Priority Communities

21.3.2.5 Solano County

21.3.2.6 Countywide

Situated between the Bay Area and Sacramento, Solano County has strong economic ties to the two largest Metropolitan Statistical Areas in Northern California. It is attractive to businesses, particularly since its three largest cities—Vallejo, Fairfield, and Vacaville—are positioned along the Interstate (I-) 80 freeway corridor (California Employment Development Department 2022). In 2012, Solano County was home to 25,724 firms, out of which 11,202 (44%) were minority owned, the largest percentage of minority-owned firms in the North Bay. There are no tribal lands in Solano County.

Solano County is the second most populous, densest, most diverse, and fastest growing of the four North Bay counties. It is also the least prosperous. Of the adult population, 77% earn less than $100,000 per capita (Figure EQ-23), and there is a marked income disparity when it comes to race and ethnicity (Table EQ-7).



Source: U.S. Census Bureau 2022a

Figure EQ-23. Solano County Distribution of Annual Earnings, 2020

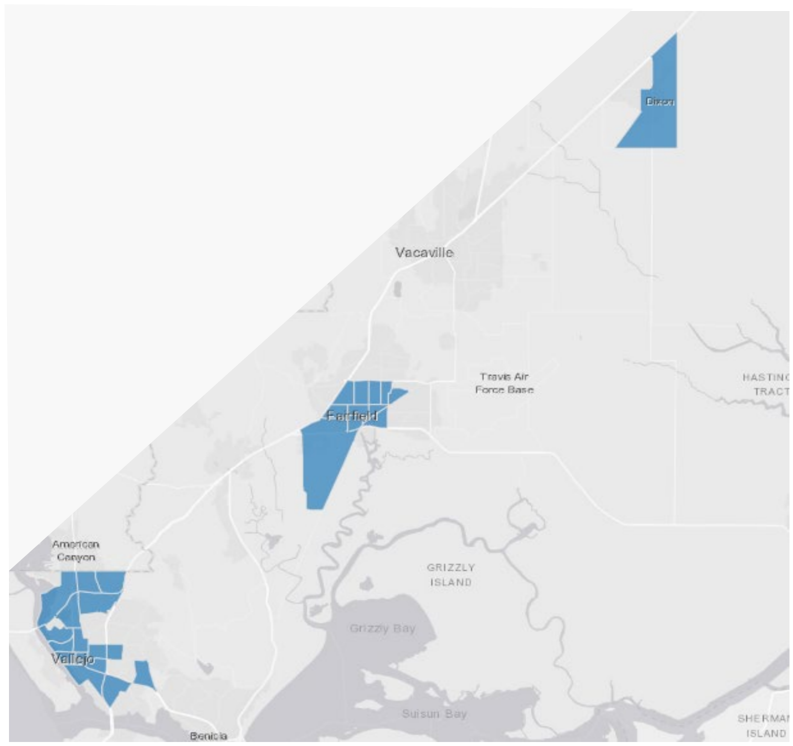
Table EQ-7. Solano County Population and Per Capita Income by Race, 2020

	Solano County, California		
	Number	**Percent Distribution**	**Mean income (dollars)**
	Estimate	**Estimate**	**Estimate**
Per Capita Income by Race and Hispanic or Latino Origin			
Total Population	444,538	444,538	36,685
One Race			
White	225,258	50.7%	42,008
Black or African American	**60,991**	**13.7%**	**33,318**
American Indian and Alaska Native	**2,531**	**0.6%**	**27,165**
Asian	69,169	15.6%	37,658
Native Hawaiian and Other Pacific Islander	**4,212**	**0.9%**	**30,985**
Some other race	41,038	9.2%	23,413
Two or more races	41,339	9.3%	25,353
Hispanic or Latino origin (of any race)	119,294	26.8%	24,489
White alone, not Hispanic or Latino	**165,326**	**37.2%**	**47,631**

Source: U.S. Census Bureau 2022a: Table S1902

Compared to other North Bay counties, Solano County has the highest number of minority-owned businesses (approximately 11,202 as of 2012) and the smallest proportion (16.3%) of persons over the age of 65 (U.S. Census Bureau 2016). The median age of 38.5 indicates a relatively high proportion of the population is either currently or will soon be in the workforce (Data USA 2019a).

Solano County has the highest number of EPCs in the North Bay, with 27 communities concentrated around Vallejo and Fairfield (Figure EQ-24). The 16 Vallejo EPCs are discussed in the *Vallejo* subsection. The other 11 EPCs are in and around Fairfield. Many residents in these communities connect through Vallejo to access the rest of the Bay Area via public transit and/or SR 37.

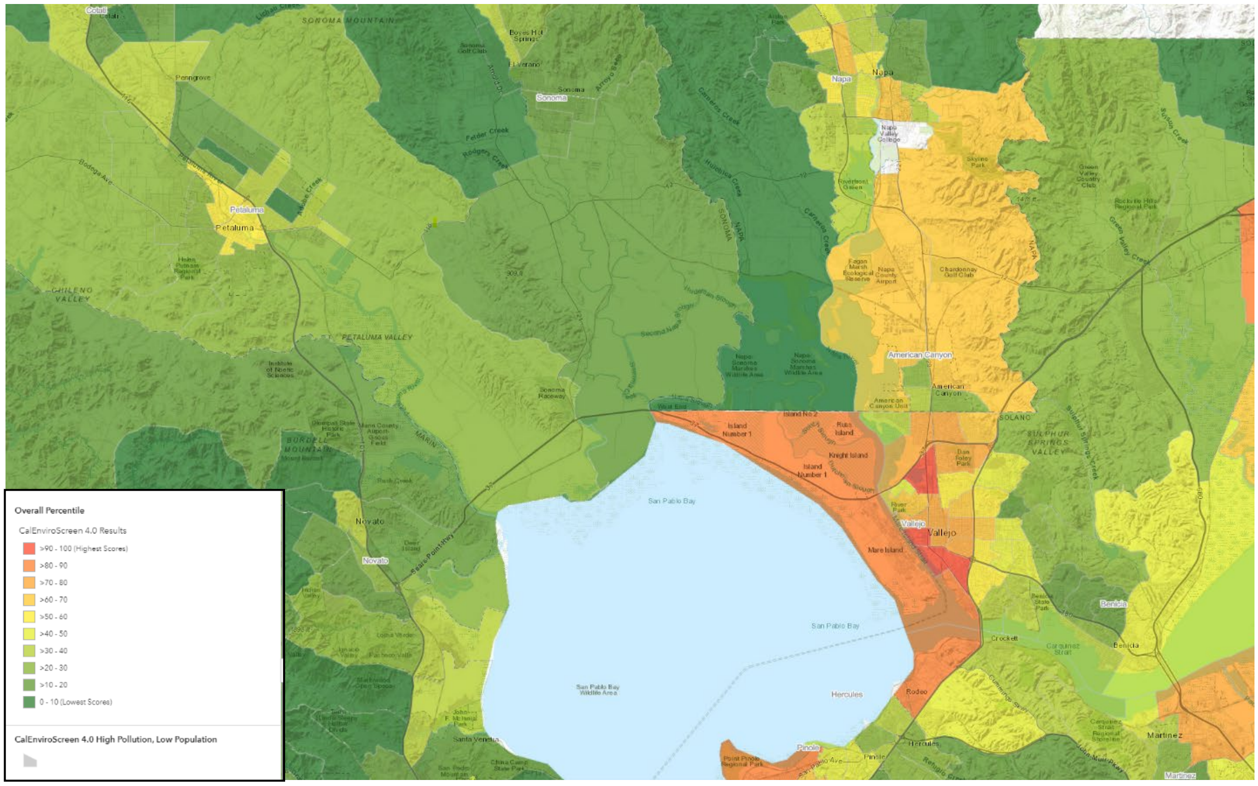


Source: ABAG and MTC 2021b

Figure EQ-24. Solano County Equity Priority Communities

Solano County has the highest percentile CalEnviroScreen scores (Section 2, *Methodology*) in the North Bay, with north and southwest Vallejo having the highest score at the 90th percentile and above. Moderate scores in the 70th and 80th percentiles are also found in Vallejo, specifically in Mare Island and all along the eastern Baylands along SR 37 (Figure EQ-25). While several factors contribute to this score, Solano County is characterized by a high pollution burden and a high number of cleanup sites,[6] especially on Mare Island (part of Vallejo), which is in the 90th percentile of cleanup sites in California.

[6] California Office of Environmental Health Hazard Assessment defines cleanup sites as "places that are contaminated with harmful chemicals and need to be cleaned up by the property owners or government." For more information regarding cleanup sites and how they are measured, please visit https://oehha.ca.gov/calenviroscreen/indicator/cleanup-sites.



Accessed May 2022

Figure EQ-25. North Bay Area CalEnviroScreen Scores

Of the four counties, Solano County is generally the most proactive in terms of having equity-focused plans at the county level. In 2022, the Solano Transportation Authority (STA) Board approved a new Equity Chapter to be incorporated into the county's 2020 Comprehensive Transportation Plan.

21.3.2.7 Vallejo

Significant Events in National Racial Justice History

Vallejo has a long nautical history, which contributed to its diversity and density. It was home to the Mare Island Navy Base, which was active from the 1850s to 1996 (Naval History and Heritage Command 2022). Vallejo's population boomed in the 1950s and 1980s when the population increased by over 100% and by 36%, respectively (Bay Area Census n.d.). These were periods when the population became more racially diverse first with an influx of a Black population and then with Asians and Pacific Islanders. Today, Vallejo is home to some of the country's most diverse ZIP codes (Elligon 2017) and is one of the most diverse cities in California (STA 2020a).

Besides playing a role in building the diversity of Vallejo, Mare Island was also influential at a national level in both racial desegregation in the 1940s (Wollenberg 1979) and the Civil Rights Movement in the 1960s (Sloan 2017). In 1944, a blast at Port Chicago in nearby Contra Costa County killed 320 men—of which 200 were Black stevedores—and injured hundreds more (NPS 2022). The surviving 328 Black stevedores were sent to Mare Island a couple of weeks after the blast and told to load ammunition, an activity that had led to the blast at Port Chicago. Fearing for their safety, the workers protested dangerous working conditions. Threatened at gunpoint, 258 workers held their ground and were made to stand on a barge for three days as punishment. All but 50 of them returned to work. The 50 stevedores who continued the protest were tried for mutiny and sentenced to 15 years of imprisonment. News of their protest sent ripples through the nation and sparked similar protests at other segregated naval bases. The defiance of the Mutiny 50 or the Port Chicago 50, as they were later called, led to the Navy's 1946 decision to desegregate, paving the way for the other wings of the American armed forces (Wollenberg 1979; Sloan 2017). Despite the new policy, the poor working conditions for the nearly all-Black workforce at Mare Island continued. In the early 1960s, Willie Long and 20 more of the station's 1,000 employees initiated a new effort to demand change. The 21ers, as they were later dubbed, became instrumental in the Civil Rights Movement which led to the passing of the Civil Rights Act of 1964 (Sloan 2017).

Mare Island has a small memorial to the 21ers at Alden Park, but no publicly displayed tribute to the legacy of the Mutiny 50. Given the national upsurge in recognition of significant events in Black history and symbols of the racial justice movement, however, community interest in documenting these cultural resources may be growing and should be considered during the SR 37 study.

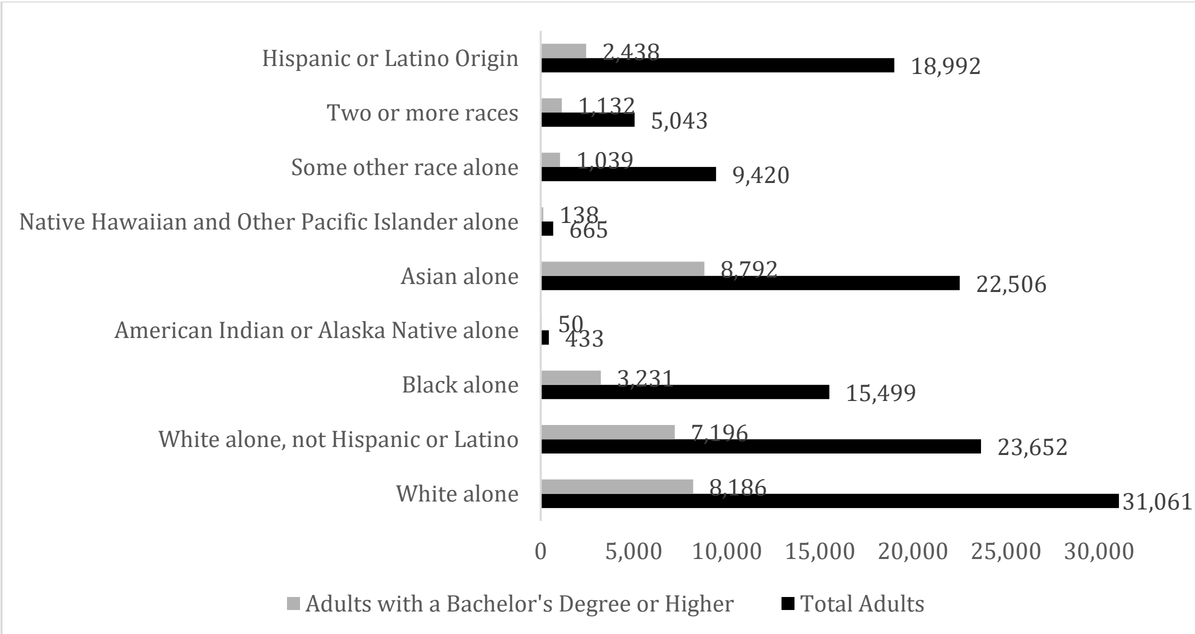
Economy

Although Vallejo's economy was historically dominated by the naval base, its employment has since diversified. In 2019, the most common industries for jobs in Vallejo were health care & social assistance (10,278 people), retail trade (6,619 people), and construction (4,530 people) (Data USA 2019b). In 2012, Vallejo was home to 6,703 firms, of which 4,194 (63%) were minority owned—the highest proportion in the North Bay and higher than the county statistic of 44% minority-owned firms.

In 2012, the Vallejo City Council established the first city-wide participatory budgeting process in the United States, where residents directly engaged with their local government to develop and recommend projects as part of the annual budget. Over the past five cycles, the City of Vallejo has allocated over $8.3 million to 47 projects, while engaging over 20,000 residents in the decision-making process. In the 2019–2021 cycle, high-priority projects centered around providing services for homeless persons, including the "Reroute Transportation Services" initiative to provide transportation for homeless persons to access healthcare, housing, jobs, and rehabilitation services (City of Vallejo 2022).

Education

The California State University Maritime Academy, a Solano Community College campus, and Touro University are in Vallejo. Of Vallejo's adult population over 25, 26.7% have a bachelor's degree or higher. However, there is a disparity in educational attainment when it comes to race (Figure EQ-26).



Source: U.S. Census Bureau 2022a: Table S1501

Figure EQ-26. Adults with a Bachelor's Degree or Higher by Race, Vallejo, 2020

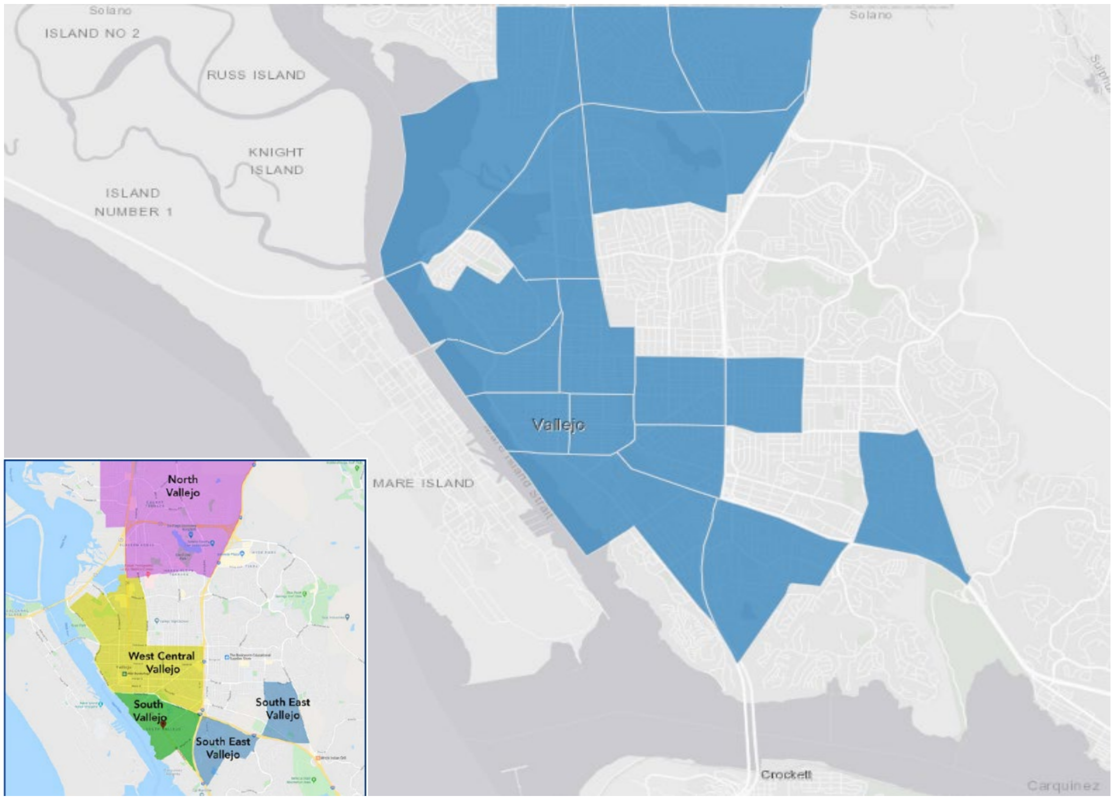
Transportation and Safety

Vallejo is largely a car-dependent city with Walk Scores ranging from the high 70s to low 80s in the downtown/St. Vincent Hill area to the low 20s in portions of southeast Vallejo. About 3% of workers in Vallejo own no vehicles. Approximately 71 percent drive either a car, truck, or van to get to work, and 8% use city public transportation, taxicabs, motorcycles, bikes, and walking. According to an STA survey conducted in 2020, driving is the most common means of transportation, followed by walking, taking the bus, and using ride-hail services. The survey also found that the top five most difficult-to-reach destinations, in priority order, were medical/health care, grocery shopping, job/job seeking, recreation, and school/daycare (STA 2020b).

Safety on Vallejo's streets is a major concern. Solano County is ranked 12th statewide in vehicle-pedestrian collisions and second involving pedestrians under 15 years old. Crashes in Vallejo account for 30% of all Solano County collisions. Over a 5-year period between 2012 and 2017, 4,250 collisions in Vallejo resulted in 142 severe injuries and 28 deaths. Approximately 5 percent (215) of the collisions involved pedestrians and 2% (92) involved bicyclists. Bicycle collision hot spots are pronounced along Sonoma Boulevard from SR 37 to the I-80 interchange. Improvements to the SR 37 corridor have the potential to make a positive difference in the safety of the surrounding network of Vallejo's streets, bicycle routes, and pedestrian paths (STA 2020b).

Equity Priority Communities

The 16 EPCs in Vallejo are concentrated in the following four areas of Vallejo: north Vallejo, central Vallejo, south Vallejo, and southeast Vallejo (Figure EQ-27). Of these four areas, two areas are also considered to be home to environmentally disadvantaged communities per Senate Bill 535 and are in the 90th percentile of the CalEnviroScreen scoring system.



Source: ABAG and MTC 2021b

Figure EQ-27. Vallejo Equity Priority Communities

North Vallejo: The 31,000 residents in the 94589 ZIP code are 37% White, 30% Hispanic, 25% Asian, 24% Black, and 1% Native American. While 53% of households speak English at home, 23% speak an Asian language, and 21% speak Spanish at home (MTC 2021a). There are limited retail or other services, and the area lacks a full-service grocery store.

SR 37 runs right through the center of north Vallejo's hilly terrain. Constructed in 1957 for access to the naval base on Mare Island, the segment is four lanes wide and constitutes a physical barrier between the largely residential community and the rest of the city due to limited connections under or across the highway (STA 2020b). Homeless encampments under SR 37 are not uncommon (STA 2020b; Morris 2021). The Walk Score for north Vallejo is 29 out of 100 points, indicating that most errands require a car. North Vallejo's Bike Score is also low, with a score of 35 out of 100.

Portions of north Vallejo, south of SR 37 and north of Sereno Drive, have a high CalEnviroScreen score, implying they bear several environmental burdens. It is estimated that somewhere between 10,000 and 15,000 trucks travel along SR 37 daily, contributing to poor air quality and environmental concerns. Residents are exposed to high levels of diesel particulate matter, which can have adverse health consequences. A greater number of people may be potentially exposed to these mobile sources of emissions due to the presence of important outdoor recreational resources such as Lake Chabot[7] and Six Flags Discovery Kingdom. Sensitive groups may also be exposed due to the proximity of educational institutions including Elite Public School, Loma Vista Elementary School, Widenmann Elementary School, Solano Middle School, and Dan Mini Elementary School.

[7] Not to be confused with Lake Chabot Regional Park near Castro Valley (Alameda County).

West Central Vallejo: The 35,000 residents in the 94590 ZIP code are 53% White, 31% Hispanic, 22% Black, 13% Asian, and 1% Native American. While 58% of households speak English at home, 17% speak Spanish at home, and 11% speak an Asian language. More than half of the occupied housing units are rentals. Approximately 15 percent of households lack a vehicle. The median household income is $41,000, compared to $65,241 citywide (STA 2020b).

Like north Vallejo, west central Vallejo has several recreational and educational facilities and a high CalEnviroScreen score. There is a strong presence of transit service in this area of Vallejo. There is some bike infrastructure throughout this EPC (Bike Score 58), and local plans indicate needs for improvements (STA 2020b).

South Vallejo: The area includes portions of Vallejo that are south of Curtola Parkway and immediately west of I-80, just north of the Carquinez Bridge. South Vallejo is a little over 0.5 square mile in area and has a population of 2,494. Residents are primarily Hispanic or Latino (43.8%), followed by 22.6% Black, 16% White, 9.2% two or more races, 7.7% Asian, and 0.6% American Indian. The median household income in 2016 was $42,337 for south Vallejo, compared to $65,241 citywide (STA 2020b).

South Vallejo is primarily residential and has no grocery stores within a 1.5-mile radius. Few amenities are easily accessible. The walkability of this EPC is low (score 37). Bike-ability is also poor (score 25) and there is little bike infrastructure (STA 2020b).

Like the other EPCs, south Vallejo has a high CalEnviroScreen score. Residents living in this area are exposed to higher levels of particulate matter from industrial processes, and exposure to large volumes of daily car and truck traffic along I-80. Roughly 10,000 to 15,000 diesel trucks travel along I-80 daily (STA 2020b).

Southeast Vallejo: There are two EPCs in southeast Vallejo, both primarily residential with hilly terrain. The first community is east of I-80, south of I-780, and west of Glen Cove Parkway. Vallejo Regional Educational Center is located here. There are no schools in the area, though Glen Cove Elementary School is close by. School students must commute out of the area. With the exception of residences located north of Fulton and along Old Glen Parkway, the area is considered a food desert with the nearest grocery store being more than more than 0.5 mile away with poor transit access. The Walk Score for this area is 48 and it has very little bike infrastructure (Bike Score is 25).

The second EPC in southeast Vallejo lies north of I-780, south of Georgia Street, east of Rollingwood, and west of Columbus Parkway. It includes a large cemetery. Saint Patrick/Saint Vincent High School is located off Benicia Road. There are no other schools in the defined EPC area, although Annie Pennycook Elementary School is near the northwest portion of this community. This area has the lowest Walk Score (22 out of 100) among the EPCs, and the lowest Bike Score (17).

21.4 Next Steps: Equity-Related Considerations for the SR 37 PEL Study

21.4.1 Regionwide

Despite efforts of local and regional agencies, the affordable housing crisis across the nine-county Bay Area is unlikely to be resolved quickly. Patterns of racial disparity across various measures such as income and educational attainment are also likely to continue for some time, even as national, state, and local entities work to create a more equitable and just society. Given these continuing patterns, Solano County, Vallejo, and to a lesser degree Napa and Sonoma Counties, are likely to continue attracting moderate- and low-income residents and people of color for years to come. At the same time, prosperity in Marin County, San Francisco, and other western metropolitan centers is likely to continue generating high-paying jobs and excellent services.

This growth pattern will continue to put pressure on SR 37 to serve as an east-west connector with particular importance to low- and moderate-income residents and people of color. Rising property values and housing prices are often an outcome of continued growth. If gentrification begins to occur in Solano County and Vallejo, the existing population of lower-income residents would be at risk for displacement.

Reducing the cost of travel and improving multimodal connections is and will be essential to ensure people of all income levels, ages, and abilities can afford to live in decent housing and get to living-wage jobs, health services, and other essential destinations. Seeking opportunities to improve regional and local multimodal connectivity for lower-income residents and people of color is perhaps the most critical equity consideration for the SR 37 study.

21.4.2 Solano County and Vallejo City

Eleven EPCs are located in and around Fairfield. While these fall outside the SR 37 Study Area boundary, they depend on Vallejo for public transit to access the rest of the Bay Area. Adding transit to the SR 37 corridor could substantively improve access to the Bay Area for residents of these northeastern EPCs.

Vallejo is largely a car-dependent city with poor pedestrian and biking facilities. These issues are widely recognized by the City of Vallejo, and several of its participatory budgeting programs relate to better transportation and access to amenities in the city. This could be a potential partnership opportunity for the ultimate SR 37 project.

21.4.3 Napa County

There are four EPCs in Napa County, all located in city of Napa, several miles north of the SR 37 corridor. While the Napa EPCs are not within the SR 37 Study Area, their residents could be affected by modifications to SR37. Napa's only public transit (Vine Transit) runs to Vallejo. Adding transit services to SR 37 could significantly increase accessibility for Napa EPC residents to the entire Bay Area.

21.4.4 Sonoma County

The are 15 EPCs in Sonoma County, all beyond the Study Area. The EPCs in Santa Rosa and El Verano are the closest to the Study Area and may be affected by modifications to SR 37. In 2018, the County joined GARE and created SoCoREAL. In July 2020, the Board of Supervisors approved the creation of a new Office of Equity. These could be potential partnership opportunities for the redevelopment of SR 37.

21.4.5 Marin County

Four EPCs have been identified in Marin County, none of which fall into the SR 37 Study Area. They may, however, use SR 37 to access Vallejo, and hence might be affected by its redevelopment. The Marin County Office of Equity adopted an REAP in 2022 and allocated $2.5 million to a participatory budgeting program geared towards advancing racial equity in Marin County. Limited transportation access to health care was identified as a key racial equity issue in the 2022 REAP. This could be a potential partnership opportunity for the development of SR 37.

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Chapter 22
Visual Resources

This chapter describes the existing visual resources located within the SR 37 PEL Study Area. Visual resources located directly along the proposed alignments are also considered to be part of the SR 37 PEL Study Area. These resources are described in more detail below and organized by jurisdictional entity.

22.1 Methodology

This chapter was drafted based on review of local planning documents and publicly available information pertinent to visual resources. Refer to Section 4, *References*, for a complete list of information cited herein.

22.2 Existing Conditions

Identifying a study area's visual resources involves understanding the area's existing visual setting, affected viewer groups, and protected visual resources within the study area. Once those parameters are understood, a study area's visual resources are further defined by documenting its visual character of the natural and built environments. The affected population, or viewers, are defined by their relationship to the study area, their visual preferences, and their sensitivity to changes that could be associated with future proposed improvements.

22.2.1 Visual Setting

The existing SR 37 project corridor, which corresponds to Alignments 5/6 and portions of the remaining corridors, serves as a connection between US 101 in Novato and Interstate (I-) 80 in Vallejo. This low-lying highway travels mostly through rural, agricultural lands and baylands bordering the San Pablo Bay until it reaches Vallejo and travels through urbanized development. Although SR 37 is constructed mostly on a raised berm that travels through the landscape, the terrain of the SR 37 corridor is mostly flat, except near Black Point, Sears Point, and through Vallejo where it travels over gently rolling terrain. Even though the terrain is flat, there are few visual obstructions along the highway, so views range from foreground to background views of the surrounding landscape depending on intervening hillsides and mountains that frame views of the surrounding agricultural lands, baylands, and the San Pablo Bay. The lack of visual obstructions also allows expansive views of the sky that can range from clear blue, blue with white clouds, to overcast and grey during the day. Views of the sunrises, sunsets, and the night sky are also notable. Views of the agricultural fields and grassy hillsides vary by season from green in the winter and spring to tannish brown in the summer and fall. Hillsides covered with oak woodlands provide views of darker green hillsides that contrast against the lighter greens and tans of grasslands and agricultural lands. Views of the baylands include views of tidal flats and marshes, laced with sinuous channels of open water, in addition to diked wetlands and old salt ponds. Views of these lands change when tides are lower and mud flats are visible to when tides are higher and cover the mudflats. Views of the expansive waters of the bay are available from the Petaluma River, Sonoma Creek, and Napa

River bridges and portions of the roadway that cross over Black Point and Sears Point that offer elevated scenic vista views out and over the surrounding landscape. During high water events, waters of the bay can expand to the edge of the highway or flood the highway, closing it down.

Developed portions of the corridor within Vallejo are well lit. However, lighting along rural portions of the corridor is mostly associated with major intersections and on- and off-ramps such as for Black Point, SR 121, and the exit for Mare Island. The remainder of the corridor is mostly unlit. Although there are few lights along SR 37, resulting in lower lighting conditions at night, glare tends to be somewhat high during the day due to the presence of water and lack of vegetation and development to provide shading along the corridor.

Visible elements along rural portions of SR 37 include highway signage; fencing; a rail line roughly parallels the roadway from Novato to Tolay Creek, where it heads north; and intermittent agricultural buildings and structures. Large tubular and lattice steel transmission lines and smaller, wooden-poled transmission lines are also common visual elements seen from the highway along rural portions of the corridor.

Through Vallejo, SR 37 is separated from development by sound walls, retaining walls, and vegetated slopes along the highway. Rides associated with Six Flags, mature trees associated with adjacent development, highway signage, and the highway corridor dominate views from much of this portion of SR 37. Views along this segment of SR 37 are more confined due to the surrounding development, but channelized views of the surrounding hillsides are available down the open corridor that SR 37 provides. Views open up just east of the SR 29 interchange, where views toward the developed hillsides of Vallejo and the nearby baylands become available.

The greater Study Area covers a large area, due to the number of alignments being considered and their location within the landscape. The visual character of the Study Area is defined by a variety of landscape types, both natural and built, that are summarized in Table VQ-1.

Table VQ-1. Summary of Study Area Landscapes and Defining Visual Features

Landscape Type	Summary/Defining Visual Features
Natural Landscapes	
Agricultural Lands	Agricultural lands, including vineyards for wine production, orchards, row crops, and pasturelands, account for the primary land use in the Study Area and shape its visual character. Pastoral landscapes are comprised of a variety of colors, textures, and views that vary with distance and by season. Vineyards, orchards, and row crops share certain visual attributes, such as repeating patterns, uniform height forms, horizontal linear features, and seasonal variation in colors and textures. However, while row crops are generally low to the ground and allow open views to the surrounding landscape year-round and the dense foliage of orchards limits the field of vision during the spring, summer, and fall; the heights of vineyards tend to fall in between the heights of row crops and orchards and can either block or allow views to the surrounding landscape, based on terrain. In all cases, color changes seasonally so that winter views are dominated by gray-brown hues, brown to black soil, and skeletal vines and trees. Spring and summer views are dominated by bright green grasses and budding leaves, wildflowers, pale-colored flowers on fruit or nut trees, the yellow of mustard plants, and lush green of fully developed foliage and crops.

Landscape Type	Summary/Defining Visual Features
	Fall colors can include golden browns of waning crops and reds, oranges, and yellows of the turning leaves within orchards and vineyards. By summer, certain row crops may obstruct views as high as 10–12 feet. During harvest, agricultural practices provide movement that is in contrast to the otherwise static landscape due to the heavy machinery and work crews used to harvest the crops. Pasturelands are characterized primarily by broad expanses of open space, sometimes with rolling hills and sparsely scattered oak trees, and generally afford broad vistas. During the rainy season, these pastures are verdant green, contrasted with dark-colored oak tree trunks and twisting branches. In the summer and fall, the grasses turn golden brown, and the foliage of the oaks creates dome forms with uniform texture and gray-green color. These grasslands provide movement that can be seen from waves in the grasses during breezy or windy days and through the movement of grazing livestock. Artificial lighting tends to be very low or absent; these are dark landscapes at night, except for occasional views of farmsteads dispersed through the landscape. Similarly, sources of glare are minimal and include watering ponds or small waterways that traverse the landscape.
Waterway Landscapes	Expansive views of San Pablo Bay and miles of levees and associated waterways traverse the Study Area, making them a defining and dominant feature of the landscape. Waterway features include the bay, Petaluma River, Napa River, Novato Creek, Sonoma Creek, numerous channels and sloughs, and baylands. Views to these waterways are most often provided by local roadways, recreational areas, and trails, and from water-based vantages (e.g., boats, kayaks). The bay and surrounding baylands include a large expanse of water that is bounded by baylands. The baylands are comprised of tidal flats and marshes, in addition to diked wetlands and old salt ponds. Expansive views of the bay and baylands are currently provided by SR 37. This landscape type consists of intermixed open water and wetland vegetation. It is characterized by fluctuating water levels and seasonal flooding from tidal action, rain, and management actions. The predominant visual characteristic of the bayland marshes is the large, flat, open expanse without prominent vertical features or human-made structures. The landscape has strong horizontality in form because of the plane of the water and the uniform height of marsh vegetation. The presence of islands in a marsh, which may have riparian forest, adds the primary vertical element to the landscape and generates visual interest. In these landscapes, views may change by season, and activity and movement of waterfowl contribute strongly to the character of the visual landscape. The open river landscape is dominated by a singular, expansive waterway. Study Area rivers are meandering, are wider near the bay, and tend to narrow within a short distance upstream of the bay. Because of the length of the rivers and their meandering forms, they are constantly moving in and out of the field of vision, particularly as viewed from the local roadways. When rivers are present, the visual field is dominated by a linear expanse of water that contrasts strongly with adjacent lands and serves as a focal point in the landscape. Open water exhibits strongly horizontal features in form, especially as distance increases from a given vantage point. Visually dominant features associated with open river views include bridges constructed over the numerous river and waterway crossings, earthen levees covered with riparian vegetation, water access in the form of docks or marinas, and the ever-changing movement of the water itself, with the colors, textures, and patterns that result.

Landscape Type	Summary/Defining Visual Features
	Creeks and sloughs meander through the landscape in a curvilinear fashion, while engineered waterways that have been channelized and diverted for agriculture and water conveyance tend to carve straighter paths. These smaller waterways intersect and contrast with the larger landscape, and although they serve as a focal point in the landscape, they are less dominant in the visual field than waterways classified under the open river landscape type. Channels tend to appear less natural than waterways in the open river landscape type, with riprap or banks of earthen or hard materials. Creeks and sloughs may be vegetated with trees and shrubs down to the waterline, which varies in color, texture, and pattern by season, just as riparian vegetation does. However, irrigation canals tend to have grassy banks. Water levels along tidally influenced rivers, creeks, and sloughs fluctuate seasonally and daily, which is most visually dominant at low tide when more of the adjacent shoreline is exposed. Activity and movement are also important components of the visual landscapes of rivers, creeks, and sloughs and, depending on the amount of recreational boating, commercial shipping, and waterfowl activity, there is a constantly changing level of activity on these waterways. Lighting is generally absent; these are dark landscapes at night, except for occasional views of residences and structures dispersed along the banks and traffic headlights on roadways. Boat and ship movements generate ephemeral lighting. Natural glare is related to the waters' reflective quality. Most nonnatural sources of glare in this area are temporary and related to boats and ships. In marshes, due to a lack of passing boats or nearby residences, lighting and artificial glare are absent and natural glare is provided only by the waters' reflective quality.
Hillsides and Undeveloped Open Space Landscapes	The bay, baylands, agricultural, and developed landscapes are backdropped by the peaks and foothills of the Coast Range, Mount Tamalpais, Sonoma Mountains, Mayacamas Mountains, Mt. Diablo, and the Vaca Mountains that surround the bay and valleys within the Study Area. Undeveloped open space landscapes in the Study Area can include uncultivated lands, such as grasslands, interspersed among agricultural fields, lands that are no longer in agricultural production, and the rolling terrain within the Study Area. Many of these uncultivated lands are naturally recolonizing after agricultural production and various stages of the successional process are visible, adding variety and visual interest, making these lands suitable for wildlife and habitat. Colors of vegetation vary by season, and rolling hills, when present, contrast against the other low-lying lands in the Study Area and provide a unique visual focal point. Lighting is generally low or absent; these are dark landscapes at night, except for occasional views of residences and structures dispersed in the distance and traffic headlights on roadways. Similarly, sources of natural and artificial glare are generally contributed to small ponds or waterways.
Cultural Landscapes	
Rural Development	Most of the Study Area is rural. Rural development is characterized by the low-density development and scattered rural residences that are located throughout the Study Area. Rural areas lack well-defined edges that provide a clear sense of entry and departure. Vertical features are present, but buildings are generally no taller than one or two stories. Ornamental landscaping creates varied forms, colors, and textures, and building materials of brick, concrete, corrugated steel, and wood produce wide ranges of colors that dominate the visual field and contrast with the colors of the surrounding natural environment. Building forms and textural elements are highly varied by type of structure and use. The rural visual landscape is characterized by moderate levels of human activity and movement, often to support agricultural production and travel on local roadways, although these are largely confined to the daytime and early evening

Landscape Type	Summary/Defining Visual Features
	hours. Lighting is related to the varied building sources (interior and exterior lighting and signage). Street lighting may be present but often is limited in extent. Some buildings may create sources of glare.
Urbanized Development	Large, more urban development tends to occur only on the edges of the Study Area/termini of the alignments, such as Petaluma, Novato, American Canyon, and Vallejo. These communities also include areas that have a general suburban visual character with single-family homes and strip commercial developments lining major streets and highways. Although prominent vertical features may be present in mid-rise buildings, horizontal corridors of one or two stories that can span several miles are the dominant form. Color may vary, particularly where agricultural vistas may alternate with the built environment, but a similarity in built form may produce a texture that is monotonous. This is notably true for new residential subdivisions in which repetition of building forms, patterns, textures, and color palette generate visually uniform landscapes. In most instances, the presence of urbanized development hinders views or vistas. Urban centers are sprawling and have weakly defined edges, providing little visual sense of entry and departure, and visual connection with the surrounding natural environment of the Study Area is largely absent. Building materials are highly varied and façades have wide ranges of color and texture, but seasonal variation in forms, patterns, colors, and textures is generally absent in urbanized development landscapes. The visual landscape is characterized by considerable human activity throughout the day and night, year-round. Lighting systems are extensive and are associated with the varied building sources (interior and exterior lighting and signage), street and highway lighting, and other sources. Many buildings may create sources of glare.
Industrial Development	The industrial visual landscape type is scattered throughout the Study Area and includes water conveyance infrastructure, transmission lines, substations, and buildings with industrial uses, such as warehouses and storage silos. The industrial landscape may occur in conjunction with other landscape types, such as grazing lands and channels and sloughs. Although elements of nature, such as grasslands and water, may be present, this landscape type contains built elements that dominate and contrast greatly with the surrounding landscape. Verticality, mass, and form of industrial features are often strong visual elements. Color, pattern, and texture in industrial landscapes may vary by the type of industrial facilities that are present, but these facilities typically contrast strongly with the greater landscape. As a result, the surrounding natural landscape tends to recede to the background of the visual environment, often to such an extent that the overall character of an area is wholly changed. Only certain industrial uses generate much activity and movement (e.g., warehouses, industrial uses), lighting and glare in the environment can vary by the type of industrial structure that is present and can be a strong element in the nighttime landscape.

22.2.2 Viewer Groups and Visual Sensitivity

The Study Area consists of both developed and undeveloped areas, and viewer groups include recreational, residential, and business (i.e., retail, commercial, institutional, civic, industrial, and agricultural) and travelers on local roadways and passenger rail lines. The primary viewer groups within the Study Area are categorized as people living or conducting business in developed areas; travelers using the freeways, arterial roads, and smaller local roads; and recreationists (boaters, swimmers, and anglers using local waterways; trail users; equestrians; bicyclists; joggers; and others). This analysis evaluates the sensitivity of each viewer group and describes it using five ratings: *Low*, *Moderately Low*, *Moderate*, *Moderately High*, and *High*. Affected viewer groups and their associated sensitivities are identified in Table VQ-2.

Two overarching groups of viewers are affected by a project: neighbors and users. *Neighbors* are those people who have views *of* a project feature because they are adjacent to it. *Users* are those people who are within project boundaries and have views *from* a project feature. Table VQ-2 describes the types of neighbors and users that can be affected by a project.

Table VQ-2. Affected Viewer Groups and Associated Sensitivities for the Project

Viewer Group	Sensitivity	Reasoning
Recreational Viewers	High	Recreational viewers provide or participate in active and passive recreational uses, such as organized sporting events, indoor and outdoor leisure activities, and cultural events. Recreational viewers using parks/recreational facilities, waterways, roadways, trails, and levees are likely to seek out natural areas and scenic views that could be affected by project features for both shorter and longer durations. Recreationists are more likely to value the natural environment, appreciate the visual experience, and have a strong sense of ownership over the waterways and corridors they use for recreation and that are highly valued throughout the Study Area. Recreational viewers encompass a diverse group, including those that live in or frequent the Study Area and are therefore familiar with their surroundings, as well as tourists who visit less frequently and would be less attuned to changes in the environment. Tourists travel individually or in groups through an area for enjoyment on trips that are generally more adventurous and cover longer distances; therefore, their focus is typically on the Study Area scenery as a whole, rather than on expected visual details at specific locations. Recreational viewers are often focused on their recreational activity, and although they tend to be unsupportive of visual changes that would negatively affect the recreational setting, they tend to be supportive of visual improvements that enhance their recreational experience. Recreational services provided for visitors can be permanent, while the visitors are more transitory.
Roadway Travelers	Moderately Low to Moderately High	Travelers include pedestrians, cyclists, motorists, and rail users that use various modes of transportation for commuting, touring, and shipping. • Pedestrians use their feet, a wheelchair, or other mobility devices, most often on a sidewalk or trail. • Cyclists use bicycles at greater speeds than pedestrian travel, and may use trails, traffic lanes, and sidewalks. • Motorists use vehicles with engines (e.g., cars, trucks, buses, motorcycles, mopeds, or any other technology that is not self-propelled, regardless of fuel source).

Viewer Group	Sensitivity	Reasoning
		Motorists move at higher speeds than other groups. By necessity, the driver of a motor vehicle focuses less on the view outside the vehicle. The driver's primary interest is in coherence of the transportation corridor, although natural and built elements also provide resources used for wayfinding. Higher levels of visual character and quality can increase driver attentiveness. Passengers within vehicles move at high rates of speed and may be focused on views outside the vehicle or rail car or on activities within the vehicle or rail car such as talking, reading, working, eating, people watching, or napping. Passengers prefer evidence of higher visual character and quality. Commuters travel the same route regularly, have a repeated routine, and are often single drivers, but they may also be passengers; trips can include commuting to work or to a favorite or frequent destination (e.g., campground, cabin, sports arena, or relative's home). Tourists travel individually or in groups through an area for enjoyment, often with a set destination, on trips that are generally more adventurous, cover longer distances, and take more time than commuting trips. Shippers are generally single drivers moving goods on routine routes of varying distances. Travelers on local roadways pass areas that would be affected by project features. Travelers use roadways in the Study Area at varying speeds; normal highway and roadway speeds differ based on the traveler's familiarity with the route and roadway conditions (e.g., rain, curvature, or slope of the road). Single views are typically of short duration, except on straighter stretches where views last slightly longer. The passing landscape becomes familiar to viewers who travel routes frequently, and their attention typically is not focused on the passing views but on the roadway, roadway signs, and surrounding traffic. Viewers who travel local routes for their scenic quality generally possess a higher visual sensitivity to their surroundings because they are likely to respond to the natural environment with high regard and as a holistic visual experience.
Rail Travelers	Moderate	Rail travel also provides passengers with views of the westernmost portion of the Study Area along US 101 (Sonoma-Marin Area Rail Transit corridor). Most rail passengers are commuters that are likely to enjoy the scenic qualities of the views from the train; however, their views are fleeting and temporary because they pass at high speed.
Residential Viewers	High to Very High	Residential viewers can be owners or renters that live within viewing distance of a proposed project or within project boundaries. Suburban and rural residents in the Study Area have potential longer-term exposure to views that would be affected by project features. Residential viewers tend to have an invested interest and sense of ownership over nearby visual resources and generally desire to maintain the existing landscape as-is because how their neighborhood looks is a contributing factor for residents choosing to live there. Therefore, residential viewers tend to be uninterested in change unless they have been able to participate in defining the change.
Business/ Institutional Viewers	Moderate	Viewers from businesses, including industrial, retail, commercial, civic, agricultural, and institutional facilities situated throughout the Study Area, have semipermanent views of areas that would be affected by project features. Business workers are present as viewers for longer durations, while patrons tend to be more transitory. Workers and

Viewer Group	Sensitivity	Reasoning
		patrons are often focused on tasks at hand (i.e., working or shopping), but some may be focused on wayfinding signage, landscaping, and public image as well. Of business viewers, those associated with agricultural work or land ownership are most exposed to, and therefore have the highest expectations for, order and harmony between the built environment and natural landscape. **Industrial viewers**. Industrial viewers mine or harvest raw materials; manufacture goods and services; or transport goods, services, and people; and often require large amounts of land that has limited exposure to the public. Industrial viewers' visual preference is generally utilitarian unless they want to enhance the public presentation and views of their facility. Industrial viewers tend to be primarily workers with few transitory visitors. **Retail viewers**. Retail viewers include merchants that sell goods and services and the shoppers that buy them. Merchants generally want heightened visibility, free of competing visual intrusions, while shoppers need to be able to easily find their destination and, once there, concentrate on the shopping experience. Merchants tend to be more permanent than shoppers, although shoppers often frequent the same stores repeatedly, giving them a sense of permanence. **Commercial viewers**. Commercial viewers are those occupying or using office buildings, warehouses, and other commercial structures. Commercial viewers' visual preferences vary depending on the business and may be more aligned with retail, institutional, or industrial viewers' visual preferences than those of residential viewers. Workers are often permanent, while visitors and customers are transitory. **Civic viewers**. Civic viewers provide or receive services from a government organization, such as a military reservation or a federal, state, or local agency. Views of government facilities may or may not be desired, depending on the organization and work being performed. Workers and employees of the government facilities are present for longer durations, while visitors are more transitory. **Agricultural viewers**. Agricultural viewers are agricultural landowners and workers in fields and pastures maintaining crops or herd animals. Some agricultural viewers are permanent, but many are transient, although they may return to the same area seasonally. **Institutional viewers**. Institutional viewers provide or receive services from such places as schools or hospitals that serve the community. Consequently, institutions often promote a public image to adjacent viewers, and the presentation of their buildings and grounds are important and tend to be well maintained. Signage or orientation and wayfinding are commonly associated with institutional facilities. Workers and employees of the institution are present for longer durations, while visitors are more transitory.

22.2.3 Protected Resources

22.2.3.1 Federal Resources

The San Pablo Bay National Wildlife Refuge (National Wildlife Refuge) is located north and south of SR 37 (USFWS 2022a). The National Wildlife Refuge was established in 1974 to protect migratory birds, wetland habitat, and endangered species. The 19,000-acre National Wildlife Refuge provides critical migratory and wintering habitat for shorebirds and waterfowl, particularly diving ducks, and provides year-round habitat for endangered, threatened, and sensitive species. The protected wildlife habitat areas are high in visual quality (i.e., the value that viewers place upon the visual landscape) and offer nature and wildlife viewing opportunities. The existing SR 37 traverses through the southern area of the National Wildlife Refuge. Alignments 1, 5/6, 7, 9, and 10 would pass by or intersect refuge lands.

However, there are no federally designated National Wild and Scenic Rivers (USFWS 2022b) or National Scenic Byways (FHWA 2022) in the Study Area. No lands administered by the Bureau of Land Management would be affected (BLM 2022). No national parks, monuments, or historic trails are in the Study Area (NPS 2022).

National Historic Preservation Act

The National Historic Preservation Act (NHPA) establishes the federal government policy on historic preservation. Section 106 of the NHPA requires federal agencies to consider the effects of their undertakings on historic properties. Potential adverse effects include changes in the physical features of the property’s setting that contribute to its historic significance, or introduction of visual elements that diminish the integrity of the property’s significant historic features (16 United States Code 470 et seq.).

22.2.3.2 State Resources

The Olompali State Historic Park is located west of US 101, at the western terminus of Alignment 2 (California State Parks 2022). The location of the park is shown on Figure REC-2 in the Parks and Recreation Existing Conditions Report (Caltrans 2022b). Views from the park toward the alignment are partially screened by mature trees. However, the western termini of Alignments 2 and 3 may be visible from the park where there are breaks in vegetation and from along the park entry drive, where there is little vegetation to screen views.

Three state-owned wildlife areas are present in the Study Area:

- The Petaluma Marsh Wildlife Area is located north and south of SR 37.
- The San Pablo Bay Wildlife Area is located south of SR 37.
- The Napa-Sonoma Marshes Wildlife Area is located north and south of SR 37 (CDFW 2022).

These state wildlife areas contain protected wildlife habitat areas that are high in visual quality and offer nature and wildlife viewing opportunities from land for viewers recreating within these natural areas and driving by these areas on roadways and from water for viewers boating within and near these wildlife areas. Alignments 1, 5/6, 7, 9, and 10 would pass by the Petaluma Marsh Wildlife Area. Alignments 1, 5/6, 7, 9, and 10 would pass by or intersect the San Pablo Bay Wildlife

Area. Alignments 1, 2, 3, 4, 5/6, 7, 9, and 10 would pass by or intersect the Napa-Sonoma Marshes Wildlife Area.

There are no state-designated Wild and Scenic Rivers in the Study Area (California Public Resources Code 5093.54).

State Scenic Highways and Classified Landscaped Freeways

The California Department of Transportation (Caltrans) defines a scenic corridor as the "land that is visible from, adjacent to, and outside the highway right-of-way, and is comprised primarily of scenic and natural features. Topography, vegetation, viewing distance, and/or jurisdictional lines determine the corridor boundaries" (Caltrans 2008). Designated scenic corridors are subject to protection, including regulations regarding land use, site planning, advertising, earthmoving, landscaping, and the design and appearance of structures and equipment.

As described in Caltrans' *Scenic Highway Guidelines*, highways can be nominated to be an eligible State Scenic Highway under Streets and Highways Code Section 263 when they are believed to have outstanding scenic values (Caltrans 2008). Becoming an eligible State Scenic Highway does not require any legislative action. The following conditions must be met to nominate a route:

- The state or county highway is a scenic corridor with a memorable landscape that showcases the natural scenic beauty or agriculture of California.
- Existing visual intrusions do not significantly affect the scenic corridor.
- There is demonstration of strong local support for the proposed scenic highway designation.
- The length of the proposed scenic highway is not less than 1 mile and is not segmented.

Once a State Route is identified as eligible under Streets and Highways Code Section 263, it may be nominated for official designation by the local governing body with jurisdiction over lands adjacent to the proposed scenic highway. Division 1, Chapter 2, Article 2.5, Sections 260 through 284 of the California State Streets and Highway Code establishes the following.

> The standards for official scenic highways shall also require that local governmental agencies have taken such action as may be necessary to protect the scenic appearance of the scenic corridor, the band of land generally adjacent to the highway right-of-way, including, but not limited to, (1) regulation of land use and intensity (density) of development, (2) detailed land and site planning, (3) control of outdoor advertising, (4) careful attention to and control of earthmoving and landscaping, and (5) the design and appearance of structures and equipment.

A route may be removed for consideration as a scenic route or taken out of the State Scenic Highways program when there has been significant degradation of scenic quality due to visual intrusions and changes in visual character. Examples of visual intrusions that would degrade scenic corridors, as stipulated by Caltrans, and would apply to the alignments being considered under the SR 37 PEL Study include extensive cut and fill, scarred hillsides and landscapes, steep slopes with little or no vegetation, exposed and unvegetated earth, and a scale and appearance for the roadway that would be incompatible with the landscape. Unsightly land uses would include actions that would result in these conditions (Caltrans 2008).

There are no officially designated State Scenic Highways within three miles of the Study Area. However, eligible State Scenic Highways that are within three miles of the Study Area are included in Table VQ-3.

Table VQ-3. Eligible State Scenic Routes within 3 Miles of the Study Area

Route	Extents
Marin County	
SR 37	US 101 to Marin/Sonoma County Line
US 101	SR 37 to Franklin Avenue, near SMART Train Tracks
Sonoma County	
SR 12	SR 121 to north of Serres Drive in Agua Caliente
SR 37	Marin/Sonoma County Line to Sonoma/Napa County Line
SR 116	US 101 to PM 35.5, east of Marina Avenue
SR 121	SR 37 to SR 12
Solano County	
SR 29	SR 37 to Solano/Napa County Line
SR 37	Sonoma/Napa/Solano County Line to SR 29
Napa County	
SR 12	SR 29 to SR 221
SR 29	Solano/Napa County Line to SR 221
SR 221	SR 12 to SR 121

Source: Caltrans 2019
E=Eligible; I = Interstate; SR = State Route

In addition to eligible State Scenic Highways in the Study Area, there are several segments of classified landscaped freeways that are located along the proposed alignments, as indicated in Table VQ-4. Caltrans defines a classified landscaped freeway as "a section of freeway with ornamental vegetation planting that meets the criteria established by the California Code of Regulations (Cal. Code Regs.), Outdoor Advertising Regulations, Title 4, Division 6. This designation is used in the control and regulation of outdoor advertising displays." As identified in Cal. Code Regs., Title 4, Sections 2507 and 2508, a classified landscaped freeway must have planting areas that are at least 1,000 feet in length, with healthy plantings that improve the aesthetic appearance of the highway. Functional plantings (i.e., plantings for erosion control, traffic safety, reducing fire hazards, traffic noise abatement, other nonornamental purposes) do not qualify. The placement of advertising is prohibited within 660 feet of the edge of the right-of-way of a landscaped freeway (Caltrans 2020).

Table VQ-4. Classified Landscaped Freeway Segments within the Study Area

County	Freeway	Freeway Segment (Post Mile Limits)
Sonoma	US 101	3.62/3.86
Solano	SR 37	8.00/8.45
		9.24/9.62
		9.95/11.92
	I-80	5.35/6.11

Sources: Caltrans 2020, 2022c
I- = Interstate; SR = State Route; US = U.S. Highway

22.2.3.3 County Visual Resources

The SR 37 PEL Study Area for visual resources includes County-designated scenic routes and other resources idented for protection for their scenic values by the Counties of Marin, Sonoma, Napa, and Solano. In addition, county parks and wildlife areas offer opportunities for high-quality scenic views and access to nature and wildlife viewing. County parks and recreational features located in the Study Area are detailed in the Parks and Recreation Existing Conditions Report (Caltrans 2022b). Many of the counties have county-designated scenic routes established by county general plan policies that protect these resources, which are reviewed in greater detail for each county below. County-designated scenic routes that are within 3 miles of the Study Area are summarized in Table VQ-5.

Table VQ-5. County-Designated Scenic Routes within 3 Miles of the Study Area

Route	Extents
Marin County	
None	
Sonoma County	
SR 12	Sonoma City Limits to Sonoma/Napa County Line
SR 37	Marin/Sonoma County Line to Sonoma/Napa County Line
SR 116	Petaluma City Limits to SR 121
SR 121	SR 37 to SR 12
US 101	Marin/Sonoma County Line to Petaluma City Limits
Lakeview Highway	SR 37 to SR 116
Adobe Road	SR 116 to Petaluma Hill Road
Arnold Drove	SR 116 to Petaluma Drive
Napa Road	SR 12 to Sonoma City Limits
Solano County	
SR 12	Napa County Line to I-80
SR 37	Sonoma/Napa/Solano County Line to SR 29
I-80	Contra Costa County Line to Yolo County Line
Napa County	
SR 12	Solano/Napa County Line to Sonoma/Napa County Line, excluding City of Napa
SR 29	American Canyon City Limits to Lake/Napa County Line, excluding City of Napa
American Canyon Road	American Canyon City Limits to Solano/Napa County Line

Sources: County of Sonoma 2016; County of Solano 2008; County of Napa 2007, 2013; Hade pers. comm.
I = Interstate; SR = State Route

Marin County

The Marin County General Plan identifies that the scenic quality and views of the natural environment including ridgelines and upland greenbelts, hillsides, water, and trees should be protected from adverse impacts related to development (Policies DES-4.1, DES-4.d, and DES-4.e); that riparian vegetation be protected for aesthetic reasons (Policy BIO-4.7); and that agricultural land preservation is important to reinforce the aesthetic qualities that distinguish the local landscape (Policies AG-1.1 through AG-1.13). In addition, the proposed alignments fall within the Baylands Corridor identified by the general plan. This open space area is identified for protection for its unique environmental characteristics and important resources, including for the enjoyment and appreciation of bayfront lands (Policies BIO 5.1 through BIO 5.10).

Although there are no Marin County–designated scenic routes, the general plan acknowledges that the County should identify and protect important view corridors and consider participation in the Scenic Highway Program (Policies DES-4.a and DES-4.f) (County of Marin 2013). Alignments 1, 2, 3, 5/6, 7, 9, and 10 would pass through Marin County.

Sonoma County

The *Sonoma County General Plan 2020*, *Open Space and Resource Conservation Element* (OSRCE), identifies county-designated scenic routes (Table VQ-5) and that the lands surrounding SR 12, SR 37, SR 116, SR 121, and Lakeview Highway are designated as the Sonoma Mountains Scenic Landscape Unit between Petaluma and Sonoma; Sonoma Valley/Mayacamas Mountains Scenic Landscape Unit that includes the mountains between Sonoma and Napa; and the South Sonoma Mountains Scenic Landscape Unit that includes the southernmost portion of the Sonoma Mountains and the areas along the SR 37 corridor, which are included to preserve views of the San Pablo Bay within the Petaluma and Environs and Sonoma Valley Planning Areas. In addition, the OSRCE identifies the Petaluma River as a waterway trail and views of the nighttime landscape and sky as a valued resource. The OSRCE contains several goals, policies, and design guidance to protect visual resources associated with scenic corridors, Scenic Landscape Units, trails, and for the night sky (County of Sonoma 2016). All alignments would pass through Sonoma County and have access to these visual resources.

In addition to resources protected under the county general plan, the Sonoma Land Trust has preserves, conservation easements, and project lands within the Study Area. The Sonoma Land Trust's mission is to "protect the scenic, natural, agricultural and open landscapes of Sonoma County for the benefit of the community and future generations" (Sonoma Land Trust 2022a). Their lands offer opportunities for high-quality scenic views and access to nature, agricultural landscapes, and wildlife viewing. The proposed alignments would pass by or potentially intersect Sonoma Land Trust lands, as identified in Table VQ-6, and shown on Figure REC-4 in the Parks and Recreation Existing Conditions Report.

Table VQ-6. Sonoma Land Trust Lands within the Study Area

Type	Name	Landscape Type
Preserve	Sears Point Ranch	Grasslands, Tidal Wetlands, Seasonal Creeks, Flat Terrain
	Leonard Ranch	Agricultural Lands, Seasonal Wetlands, Tidal Marsh, Flat Terrain
Conservation Easement	Lower Ranch	Agricultural Lands, Flat Terrain
	Tolay Creek Riparian	Riparian Habitat, Rolling Terrain
Project Lands	Cloudy Bend	Agricultural Lands, Flat to Gently Rolling Terrain
	Gravely Lake	Grasslands, Oak Woodlands, Rolling Terrain
	Tolay Creek Ranch/Tolay Lake Regional Park	Agricultural Lands, Grasslands, Rolling Terrain
	San Pablo National Wildlife Refuge	Baylands, Flat Terrain
	Petaluma River Marsh	Tidal Marsh, Flat Terrain
	Halperin Baylands	Seasonal Wetlands, Tidal Marsh, Flat Terrain

Source: Sonoma Land Trust 2022b.

Napa County

The *Napa County General Plan*, *Community Character Element*, identifies county-designated scenic routes (Table VQ-5) and identifies measures to protect the county's unique scenic quality and prevent impacts of light and glare. In particular, county policies seek to preserve and retain open space, significant natural features, trees along roadways, and the appearance natural landforms (Policies CC-1, CC-4, CC-5, CC-6, and CC-8). In addition, county policies seek to ensure visual compatibility of projects with their surroundings and that roadway projects enhance the attractiveness of all roadways (Policy CC-12 and CC-13). The Conservation Element also contains policies to protect open space for its natural beauty (Policy CON-1) and contains many policies to protect natural habitats including oak woodlands, riparian areas, and the Napa River Marshes and shoreline areas, which are high in visual quality and offer nature and wildlife viewing opportunities (County of Napa 2013). Alignments 1, 2, 3, 4, and 8 would pass through Napa County and have access to these visual resources.

Solano County

The *Solano County General Plan*, *Resources Element* identifies county-designated scenic routes (Table VQ-5) and identifies that visual resources and the visual character of open space lands between communities be preserved (Policies RS.G-4 and RS.G-6). The Resources Element identifies that the intersection of the San Francisco Bay and the Sacramento–San Joaquin Delta and its oak woodlands, including Heritage Trees, fulfill cultural, spiritual, and intellectual needs and are important scenic resources and provides measures to protect these resources (Policies RS.P-1 through RS.P-9 and RS.P-30 through RS.P-32). The Resources Element further identifies that agricultural landscapes, marshlands, and oak woodlands and hills "offer an abundance of scenic vistas," that "this scenery is an important factor in sustaining a high quality of life for the county's residents," and provides policies to protect the county's unique scenic features, reduce light pollution, and protect the visual character of scenic roadways (Policies RS.P-35 through RS.P-37). In addition, the county provides measures to protect valued open space lands to create a physical and visual separation between adjacent developed areas and to protect the scenic resources associated with these open space community separators (Policies RS.P-60 through RS-P.63) (County of Solano 2008). All alignments would pass through Solano County and have access to these visual resources.

22.2.3.4 City Visual Resources

The SR 37 PEL Study Area for visual resources includes city-designated scenic routes and other resources identified for protection for their scenic values by the Cities of Petaluma, Novato, American Canyon, and Vallejo. City parks and recreational features located in the Study Area are detailed in the Parks and Recreation Existing Conditions Report (Caltrans 2022b). These parks often offer views of areas that are high in visual quality and that offer natural and/or landscaped viewing opportunities.

City of Petaluma

The *City of Petaluma General Plan 2025* does not identify any city-designated scenic routes within Petaluma. Alignments 4 and 8 fall within the city limits but would not go through hillside areas, which are protected by the general plan. The Southgate urban separator and open space along Adobe Creek abuts Alignments 4 and 8, in addition to open space that is adjacent to the US 101/SR 116 interchange. Urban separators and open space areas are identified by the general plan as being important for providing buffers between developed and agricultural lands and for preserving natural resources, outdoor recreation, and public health. These areas offer views of areas that are high in visual quality and offer nature and wildlife viewing opportunities. The general plan also identifies trees as a community asset and should be protected and that Lakeview Highway/SR 116 is a city gateway that provides a sense of entry into the city that should be enhanced (Policies 1-P-49, 2-P-6, and 2-P-26) (City of Petaluma 2021).

City of Novato

The *City of Novato General Plan 2035* identifies that open spaces within the city provide high-quality views of the city and surrounding areas. These open space areas, such as Deer Island, occur along SR 37 and Alignments 1, 5/6, 7, 9, and 10. The general plan identifies that these areas are Scenic Conservation Areas and the general plan contains policies to protect these areas, including views of the San Pablo Bay Shoreline and the Petaluma River (Policies ES 12 and ES 15). In addition, the general plan identifies that trees be protected for their aesthetic benefits (Policies ES 20 through ES 23). The general plan does not identify any City-designated scenic routes within Novato (City of Novato 2020).

City of American Canyon

There are no city-designated scenic routes within American Canyon. However, the *City of American Canyon General Plan* identifies that public view corridors of the eastern foothills and the wetlands along the Napa River are considered scenic resources and the general plan contains Policy 8.18.1 to protect these view corridors (City of American Canyon 1994). Although view corridors to the wetlands along the Napa River are not likely, due to intervening development, terrain, vegetation, and distance, views toward the eastern foothills would be available from Alignments 1, 2, 3, and 4.

City of Vallejo

There are no city-designated scenic routes within Vallejo. However, the *City of Vallejo General Plan 2040* identifies that scenic vistas should be protected, including views from I-80 and SR 37 (Policy

NBE-1.5). In addition, the general plan identifies that "panoramic views from hilltops and elevated roadways, including views of San Pablo Bay, Mare Island Strait, the waterfront…White Slough, the Napa River Wetlands, Sky Valley, and the city itself" are import to the city. In addition, the Mare Island Open Space/Wetlands Area and White Slough Specific Plan Wetlands Area open space areas are identified as having scenic benefits that contribute to the city's visual character and Policy NBE-1.6 seeks to conserve and enhance these areas (City of Vallejo 2018). Alignments 5/6, 7, 9, and 10 would pass through the city and have access to these visual resources.

Alignments 5/6, 7, 9 and 10 pass by the northernmost portion of the *Mare Island Specific Plan*. The areas passed by the alignments is identified as having an Employment (Reuse Areas 1A and 1B) and Open Space–Wetland land use designations. There are no specific plan policies pertaining to visual resources associated with either of these land uses (City of Vallejo 2013). However, the wetlands provide an opportunity for natural and wildlife viewing.

Alignments 5/6 pass through the *White Slough Specific Plan* area. The specific plan identifies that this area provides a "dramatic scenic entrance to the city." The specific plan identifies that improvements to SR 37 are highly desired and desired improvements include improving wetlands in this area (City of Vallejo 2010). These wetlands provide an opportunity for natural and wildlife viewing.

22.2.3.5 Other Regional Visual Resources

The SR 37 PEL Study Area for visual resources includes parks and recreational facilities operated by nonprofit organizations and other entities, such as the Mare Island Shoreline Heritage Preserve, San Francisco Bay Trail, and lands protected and restored under the San Francisco Bay Joint Venture, that provide views of areas that are high in visual quality and that offer nature and wildlife viewing opportunities. These facilities are described in more detail in the Parks and Recreation Existing Conditions Report (Caltrans 2022b).

22.3 Next Steps

As part of the SR 37 PEL Study screening process, participants should consider how the proposed alignments would expand into or intersect with protected visual resources, how proposed features (e.g., bridges, causeways) would protect or damage scenic resources located along the alignments, how proposed features (e.g., bridges, causeways) would create or obscure scenic vista views associated with the alignments, if proposed changes associated with an alignment would affect scenic resources along a state- or locally-designated scenic route, how classified landscaped freeway segments would be affected, if lighting design used for the alignments could introduce or reduce nuisance light and glare, and how project design can improve or degrade views of and from the project corridor. Future coordination with governing agencies/bodies may be required to ensure that project aesthetics meet local design standards and expectations and to ensure that visual impacts are effectively minimized and mitigated.

22.4 References

22.4.1 Printed

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22.4.2 Personal Communication

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