



State Route 37 Alternatives Assessment Report for the Ultimate Project

State Route 37 from SR 121 to the Mare Island Interchange

Metropolitan Transportation Commission

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1. Introduction

This Alternatives Assessment Report (AAR) is a high-level evaluation of long-term project alternatives that could be implemented on State Route (SR) 37 between the intersection of SR 121 and the Mare Island interchange to address traffic congestion and sea level rise, while integrating ecosystem enhancements into project design. The project is a component of the SR 37 corridor, which spans from Vallejo in Solano County to US 101 in Marin County in the north San Francisco Bay.

The Metropolitan Transportation Commission (MTC) and its partners, California Department of Transportation (Caltrans, District 4), Solano Transportation Authority (STA), Sonoma County Transportation Authority (SCTA), Transportation Authority of Marin (TAM), and Napa Valley Transportation Authority (NVTA) (collectively referred to as “MTC and the Project Partners”) conducted a Design Alternatives Assessment (DAA) to consider and assess alternatives for the project. The DAA work is composed of three primary deliverables which are the Corridor Plan, Environmental Stakeholder Outreach Summary, and the AAR. The Corridor Plan proposes Interim (near-term) and Ultimate (long-term) improvements; this AAR focuses on five alternatives for the Ultimate improvements.

In this Alternatives Assessment Report, five conceptual alignment alternatives for the long-term improvements (Ultimate Project) are evaluated. This report describes the criteria used to assess the five alternatives considered and the findings of the evaluation. The purpose of this AAR is to help decision-makers identify which of the alternatives should be further developed and evaluated in the next project phase, and to identify “fatal flaws” that would preclude a given alternative from being feasible.

Background

The SR 37 corridor spans Marin, Sonoma, Napa, and Solano counties. It is an important regional connection linking the north, east, and west San Francisco Bay sub-regions. The highway is a parallel route north of the Richmond-San Rafael Bridge (I-580), functions as a recovery route in the event of emergency/closure of the Richmond-San Rafael Bridge, and is part of the Interregional Roads System (IRRS) between US 101 and I-80. It connects job markets and housing within Marin, Sonoma, Napa, and Solano Counties. It also provides access to the popular wine growing regions of Napa and Sonoma Counties, the Sonoma Raceway in Sonoma County, as well as Six Flags Discovery Kingdom and Mare Island in Solano County. The SR 37 corridor traverses through one of the largest remaining stretches of contiguous marshlands in the Bay Area, and passes through the United States Fish and Wildlife Service (USFWS) San Pablo Bay National Wildlife Refuge (NWR).

The SR 37 corridor is comprised of three segments (Figure 1) summarized below and as outlined in the Caltrans Transportation Concept Report (Caltrans 2015):

- Segment A – extending eastward from the SR 37 and US 101 interchange to the SR 37 and SR 121 interchange. This segment is a 4-lane expressway in Marin County;
- Segment B – comprising the travel corridor between SR 121 and Mare Island. This segment is a 2-lane conventional highway in Sonoma, Napa, and Solano counties; and
- Segment C – beginning at Mare Island and extending eastward toward the SR 37 and I-80 interchange. This segment is a 4- to 5-lane freeway in Solano County.



Figure 1. SR 37 Segments

The commute, freight movement, and recreational functions of SR 37 require efficient traffic management on both weekdays and weekends. Portions of the SR 37 corridor currently experience severe traffic congestion and flooding (during storm events) that require solutions to ensure the roadway is operational for daily users. The corridor is vulnerable to sea level rise, which is expected to result in increased flooding and eventually inundation of portions of the corridor in the long-term. In addition, there is minimal multi-modal and public access along the corridor. MTC and the Project Partners have identified three broad goals for State Route 37 (SR 37):

- Integrate transportation, ecosystem and sea level rise adaptation into one design;
- Improve mobility across all modes and maintain public access; and
- Increase corridor resiliency to storm surges and sea level rise.

MTC and the Project Partners completed *The SR 37 Transportation and Sea Level Rise Corridor Improvement Plan* (Corridor Plan) in June 2018 and identified near-, mid-, and long-term improvements throughout the corridor to help address these goals. Findings from several previously completed studies informed the Corridor Plan, including the Highway 37 Stewardship Study (July 2013), the State Route 37 Integrated Traffic, Infrastructure, and Sea Level Rise Analysis (UC Davis Study, 2015-16), and the Caltrans Transportation Concept Report (2015).

In addition, the vision statement and guiding principles for the San Pablo Baylands developed by the SR 37 – Baylands Group,¹ further helps guide the region as it plans, designs and implements improvement strategies for the corridor, taking into account the rich ecology and evolving landscape, ongoing and future conservation and restoration efforts, and opportunities to pursue ecological enhancements.

¹ The SR 37 — Baylands Group is composed of North Bay wetland land managers, ecological restoration practitioners, and other stakeholders who have a long-term interest in the conservation and restoration of the tidal wetlands at the edge of the North Bay (San Pablo Baylands); the group includes Audubon California, Friends of San Pablo Bay Wildlife Refuge, Marin Audubon, Point Blue Conservation Science, San Francisco Estuary Institute, Sonoma Resource Conservation District, Sonoma Ecology Center, Sonoma Land Trust, and the State Coastal Conservancy.

Segment B

The Corridor Plan identified Segment B between SR 121 (Sears Point) and Mare Island (Vallejo), from 0.25 miles west of the SR 121 intersection (Sonoma County Post Mile (MP) 3.5) to 0.25 miles east of the Mare Island interchange (Solano County MP R7.4), as a priority segment for capacity enhancement. Segment B is comprised of 9.3 miles of highway that traverses the USFWS San Pablo Bay NWR and runs adjacent to the San Pablo Bay. Segment B was identified as the priority segment based on:

- a) The traffic operations need to close the 2-lane gap between the 4-lane highway segments (A and C) and
- b) The sea level rise vulnerability and risk assessment conducted by UC Davis and Caltrans, which found Segment B as high risk².

The Corridor Plan reevaluated the risk and vulnerability assessment, along with impacts on other routes in the event of a SR 37 closures, and concurred with the UC Davis and Caltrans assessment, resulting in Segment B as the priority segment.

More recently, near-term (Interim Project) and long-term (Ultimate Project) improvements have been proposed for Segment B. The Interim Project would be an initial step in addressing traffic congestion. The Interim Project proposes limited improvements at existing roadway elevation and within the existing roadway footprint to provide additional capacity during peak periods to improve traffic flow while minimizing environmental impacts. The Interim Project is needed because the corridor already experiences severe traffic congestion that needs to be addressed in the near-term while the more comprehensive Ultimate Project is advanced through planning, environmental review, and design. The Ultimate Project would serve to further improve traffic flow and provide multimodal use, resiliency of SR 37 to sea level rise and flooding, and ecologic and hydrologic enhancements to facilitate adaptation of the corridor landscape to sea level rise. Five alternatives were developed for the Ultimate Project, as described below, and evaluated as part of the DAA.

² The UC Davis and Caltrans study performed vulnerability and risk assessments related to sea level rise for each study segment (A, B, C) by estimating and aggregating impacts to costs of improvements, recovery time, public safety impacts, economic impact on commuters and goods transport, impacts on transit routes, proximity to Communities of Concern, and impacts on recreational activities. Based on the results of the risk assessment, Segments A and C were assigned moderate risk ratings, while Segment B was assigned a high-risk rating (UC Davis 2015-16, as described in the Corridor Plan).

2. Project Purpose and Need

In this section the purpose and need of the Ultimate Project are described. Whether the proposed five alternatives for the Ultimate Project meet the project purpose and need is assessed in Chapter 3.

Purpose

The purpose of the Ultimate Project is to address the following within the SR 37 corridor from SR 121 to Mare Island:

- 1) Improve traffic flow and peak travel times, and increase vehicle occupancy (the number of people moved per vehicle);
- 2) Provide accommodation for multimodal use;
- 3) Improve resiliency of transportation infrastructure to sea level rise and flooding; and
- 4) Provide ecological and hydrologic enhancements to facilitate adaptation of the corridor landscape to sea level rise.

Need

The Ultimate Project is needed because:

1) Traffic Congestion

SR 37 is four lanes in each direction except where it merges to two lanes between the SR 37/SR 121 intersection and the Mare Island interchange. Weekday traffic congestion forms at these bottleneck locations and occurs for approximately 6 hours in the westbound direction while the eastbound congestion occurs for approximately 7 hours (Figure 2). On weekends, congestion occurs throughout most of the day.

- a. Based on MTC's regional travel demand model, traffic growth is estimated at 0.8 percent per year through 2040 and is expected to result in increased peak period congestion and longer travel times. Westbound AM peak hour travel time is expected to increase from 47 minutes to 58 minutes by 2022. Eastbound PM peak hour travel time is expected to increase from 100 minutes to 139 minutes by 2022.
- b. Maximizing throughput is important for reducing congestion, including high-occupancy vehicle and high-occupancy toll uses, such as carpools and buses. These facilities and services, which are not currently operating in the corridor, can encourage mode shift from single occupant vehicles, thereby reducing traffic demand and decreasing corridor congestion while increasing person throughput.

2) Fragmented Multi-Modal and Public Access

There is minimal multi-modal and public access along the corridor. People can drive to access points along the corridor that allow for wildlife viewing and other shoreline recreation; however, public access is limited and fragmented, and there are no pedestrian or dedicated bicycle facilities to allow for safe travel between the access points. Lack of separation from motor vehicles, rumble strips and debris in the road shoulders cause most cyclists to avoid this route, even though it is the shortest route between Novato and Vallejo and is the access to recreational destinations in the vicinity.

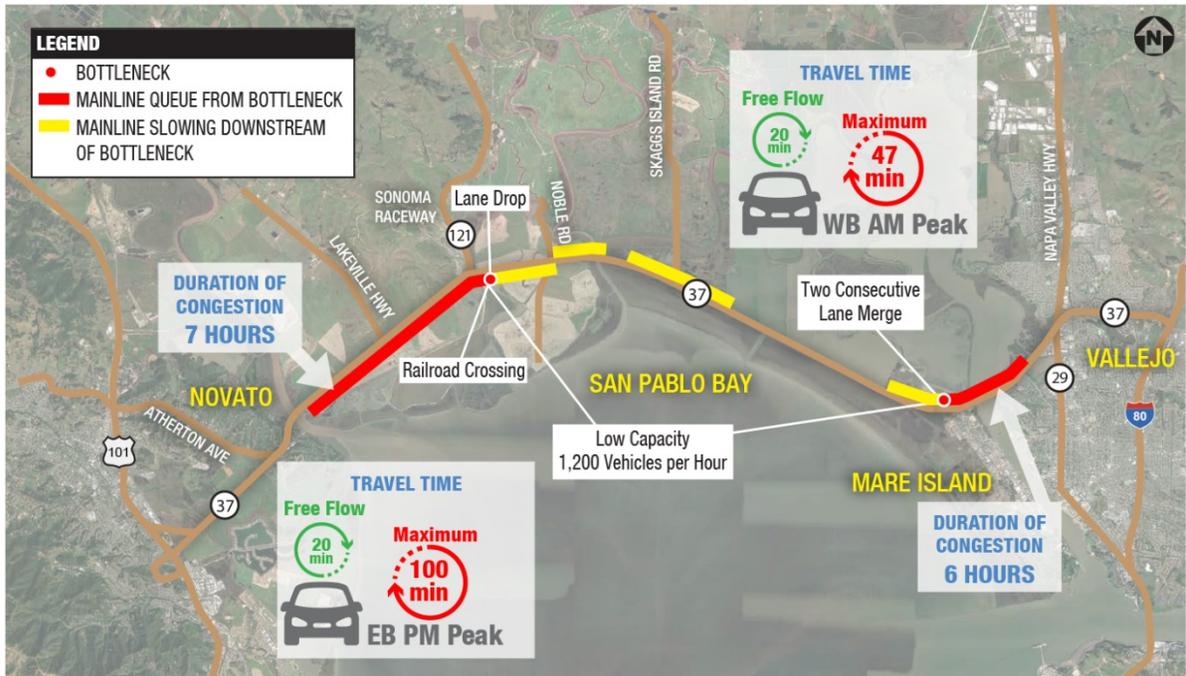


Figure 2. Westbound and Eastbound Peak Travel Times along SR 37

3) Flooding and Sea Level Rise

Highway flooding occurs during winter rain and high tide events, causing delays and closures. Sea level rise is expected to increase the frequency of these events. At its lowest elevations at Mare Island and Tolay Creek, the existing road bed is below typical king tide elevations under current conditions, and the frequency and severity of temporary flooding will increase in the future with even low amounts of sea level rise. Based on recent California state sea level rise guidance (OPC 2018), San Francisco Bay sea levels are likely to rise by 1.6 to 3.4 feet by 2100 under a high emissions scenario, with a high-range projection of 6.9 feet (83 inches). Over time, the existing road could be eroded and eventually permanently inundated, resulting in the loss of a key regional travel corridor which connects the north, east, and west San Francisco Bay sub-regions. In addition, continual settling of the roadway occurs due to unstable soils and heavy truck traffic. The roadway settling is an annual maintenance issue which requires ongoing repairs. This settling could worsen with sea level rise as the road and supporting fill become more water-saturated, making the roadway very susceptible to seismic failure from liquefaction.

4) Wetlands

SR 37 serves as a hydrologic and ecological barrier across San Pablo Bay that limits the ability of corridor wetlands to serve as a buffer to flooding and increased sea levels. Wetlands absorb and slowly release surface water, rain, and flood waters. This combined water storage and braking action lowers flood heights and reduces shoreline erosion. The holding capacity of wetlands also helps prevent the saturation of agricultural and vinicultural lands from flooding. Therefore, the ability of the corridor wetlands to function properly is critical to protection of area land uses from the effects of flooding and sea level rise.

Project Objectives

In addressing the purpose and need, the Ultimate Project aims to:

- Address sea level rise through 2100;

- Be consistent with the Baylands Ecosystem Habitat Goals³ and the recommendations of the SR 37 – Baylands Group⁴ to the extent practicable;
- Be compatible with existing land uses and public access, and to the extent feasible, future land use, planned restoration activities, and adaptive management;
- Minimize impacts on disadvantaged communities; and
- Improve hydrologic and habitat connectivity for federally and state-important habitats.

³ The Baylands Ecosystem Habitat Goals Project, completed in 1999, spurred the restoration and enhancement of tens of thousands of acres of wetlands around the San Francisco Bay. The Goals Project provided environmental policy makers, regulators, resource managers, and nongovernmental advocacy organizations with a scientifically based consensus vision of the kinds, amounts, and distribution of baylands habitats needed to sustain healthy populations of fish and wildlife for the entire region. The 2015 Baylands Goals Science Update advanced the Goals Project by providing new recommendations to address climate change and other key drivers, including sea level rise, freshwater flows, and sediment supply, over the next century. The Baylands Goals Science Update includes the work of more than 100 scientists who represent a cross section of expertise and experience in the San Francisco Bay area. The 2015 Science Update describes actions that can be taken on a regional and subregional basis to ensure that the baylands continue to support the ecosystem functions and services that are vital to the ecological and economic health of the region (Goals Project, 2015).

⁴ The SR 37 – Baylands Group prepared a white paper which includes a set of recommendations, based on resiliency principles, for the SR 37 redesign process intended to protect the ecological and economic values and services of the natural and agricultural lands of the San Pablo Bay to benefit the entire region (SR 37 – Baylands Group, 2017). This white paper incorporated and further built upon ecosystem habitat goals for the San Pablo Baylands identified in the 2015 Baylands Goals Science Update.

3. Alternatives Development

Given the project's location through marshland, sensitive species habitat, and the USFWS San Pablo Bay Wildlife Refuge, it was identified early on that collaboration between MTC and the Project Partners and regional environmental stakeholders would be important to move the project forward. As part of the SR 37 corridor effort, MTC and the Project Partners engaged with the Baylands Group to develop an Environmental Stakeholder Outreach program. The goal was to establish collaboration between the transportation agencies and environmental experts to create an Ultimate Project that would integrate transportation, ecosystem and sea level rise adaptation into one design.

Since 2016, MTC and the Project Partners have been developing a DAA for alternatives along the existing corridor alignment and have been performing stakeholder outreach to further develop these alternatives for Segment B. Technical working group meetings and workshops were held in order to identify constraints and opportunities for environmental benefits associated with future improvements to the SR 37 corridor. The technical working group meetings were comprised of engineers, planners, ecologists and scientists possessing specific knowledge on the project area to facilitate focused dialogue regarding potential design concepts and the goals and objectives of the stakeholders and their respective guiding principles. The workshop participants were comprised of landowners (including state and federal entities), agencies that would ultimately authorize environmental permits for the project, non-governmental organizations, key local representatives, and the technical working group members. The SR 37 environmental stakeholders in attendance at these workshops included (but are not limited to): State Coastal Conservancy, Sonoma Land Trust, San Francisco Estuary Institute, San Francisco Bay Joint Venture, Ducks Unlimited, Point Blue Conservation Science, Marin Audubon Society, Solano Land Trust, California Department of Fish and Wildlife (CDFW), USFWS, The Nature Conservancy, San Francisco Bay Conservation and Development Commission, San Francisco Bay Regional Water Quality Control Board, U.S. Army Corps of Engineers, National Marine Fisheries Service, U.S. Environmental Protection Agency, State Lands Commission, Vallejo Sanitation and Flood Control District, Caltrans, STA, SCTA, TAM, NVTA, MTC, Solano County Resource Management, Alta Planning, and UC Davis. The workshops provided stakeholders the opportunity to facilitate collaboration regarding opportunities and constraints as well as obtain targeted environmental information on the cost and design feasibility of the potential project alternatives. Information gathered in environmental workshops and technical working groups were then incorporated into revised project concepts and design alternatives.

Originally, the DAA was focused on preliminary design components, such as causeway and/or embankment for a hybrid design, along the existing alignment. The original project scope included a review of the hydrological analysis for sea level rise and the 100-year storm event prepared by UC Davis and AECOM as part of the SR 37 Integrated Traffic, Infrastructure and Sea Level Rise Analysis project in order to determine what is relevant to the DAA. Draft design concepts for Interim Project and Ultimate Project alternatives along the existing SR 37 Segment B alignment were presented at the working group meetings and environmental workshops.

During these meetings and workshops, the environmental stakeholders requested that a broader group of alternatives beyond the existing alignment be considered for the Ultimate Project. This was a result of the recognition that the four lane alignment along the existing SR 37 corridor could not be built directly on top of the existing roadway, because (a) the existing roadway would need to be operational throughout construction and (b) the footprint of the new four-lane alignment would be wider than the existing footprint of the two-lane alignment. The upgraded alignment would be required to be built offset from or parallel to the existing alignment, resulting in greater impacts to sensitive marsh species and their wetlands habitat. Given this, the project team considered alternatives that were outside of the existing alignment, further to the north (overland through a retreat approach to avoid coastal wetlands) and further to the south (as an over water causeway).

According to National Environmental Policy Act (NEPA) Guidelines, there must be a reasonable range of alternatives that can accomplish the purpose and need of the proposed action. A range of alternatives for the Ultimate Project were selected from the working group and environmental workshop meetings and evaluated in this alternatives assessment.

Alternatives

A total of five alternatives were evaluated for the Ultimate Project, as summarized in Table 1. Each alternative is described in further detail in the following sections.

Table 1. Alternatives Description

Abbreviation	Alternative	Description	Total Length
A1. Hybrid	Alternative 1 – Hybrid Existing Alignment	Combination of causeway on bridge structure and embankment; constructed offset from existing SR 37 along existing alignment	9.5 miles
A2. Causeway	Alternative 2 – Causeway Existing Alignment	Causeway on bridge structure with embankment at nine intersection locations; constructed offset from existing SR 37 along existing alignment	9.5 miles
A3. Northern	Alternative 3 – Northern Alignment	Elevated on embankment with causeway on bridge structure that span floodplains and Napa River; constructed on new alignment to the north	20.9 miles
A4. Southern 1	Alternative 4 – Southern Alignment 1	Causeway on bridge structure; constructed on new alignment to the south over tidal mudflat, parallel to existing SR 37	9.9 miles
A5. Southern 2	Alternative 5 – Southern Alignment 2	Causeway on bridge structure that would extend between US 101 and Mare Island, with an overwater interchange allowing for traffic to travel north to SR 121; constructed on new alignment to the south	20.1 miles

In addition to these five alternatives, an alternative to construct the new raised roadway entirely on embankment, except for the two existing crossings at Tolay Creek and Sonoma Creek, was initially considered but not further evaluated due to lack of hydrologic and ecologic connectivity, and significantly higher environmental impact.

Alternative Commonalities

All of the Ultimate Project alternatives consist of a four-lane roadway with managed lanes to encourage the use of carpooling, a Class I bicycle facility, and features to maintain or allow for enhanced ecologic and hydrologic connectivity.

All of the alternatives include reconfiguring of both the SR 37/SR 121 intersection and SR 37/Mare Island interchange. The SR 121 intersection would include a grade separation with the Sonoma-Marin Area Rail Transit (SMART) rail line. At the Mare Island interchange, the existing westbound off-ramp would be realigned as a loop off-ramp. The westbound on-ramp would follow a new alignment that meets the new SR 37 alignment as a diagonal on-ramp with standard geometry. In the eastbound direction, SR 37 at Mare Island would have a loop off-ramp and diagonal on-ramp geometry.

To accommodate sea level rise, the proposed alternatives all include a minimum design elevation⁵ based on using 66 inches of sea level rise at year 2100 and includes freeboard and wave run-up, based on the preliminary sea level rise analysis completed as part of the UC Davis Study and the SR 37 Corridor Plan.

All alternatives would serve primary weekday travel between Contra Costa County (I-680 corridor), Solano County (I-80), and Sonoma County (US 101) and between Solano County and Marin and Sonoma counties (US 101 corridor), with a concentration of trip origins/destinations in Vallejo. Potential changes in traffic patterns that could result from a given alternative are noted below, where applicable.

Alternative 1 – Hybrid Existing Alignment (A1)

The Hybrid Existing Alignment Alternative would include a four-lane roadway consisting of a combination of causeway on bridge structure and embankment, raised above the projected sea level rise elevation and constructed offset from the existing roadway (Figure 3). The proposed alignment would run parallel to and north of the existing SR 37 alignment between SR 121 and the Skaggs Island Road intersection, and would run parallel to and south of the existing SR 37 alignment from east of Skaggs Island Road to the eastern project limits before conforming to the western approach of the Napa River Bridge.⁶ The proposed alignment intends to minimize construction impacts on traffic as it would allow for the existing traffic to operate on the existing SR 37 during construction. The causeway/bridge sections would facilitate improved hydrologic connectivity between San Pablo Bay and Napa-Sonoma wetlands. This alternative also includes new bridges constructed at Tolay Creek and Sonoma Creek with longer spans to allow for hydrologic and ecologic connectivity.

The new raised roadway would have a total width of 94 feet including four 12-foot wide lanes, a 12-foot wide median with a 2-foot median barrier, 10-foot wide outside shoulders, and a 12-foot wide barrier-separated Class I bicycle facility. The combined length of causeway/bridge segments would be approximately 4.7 miles, and the combined length of embankment segments would be approximately 4.8 miles. The proposed embankment sections overlap with existing driveway locations to maintain access. The proposed embankment section at the driveways would allow for a wider roadway cross section to provide for safer intersection design.

Under this alternative, the existing SR 37 pavement would be removed.

Alternative 2 – Causeway Existing Alignment (A2)

The Causeway Existing Alignment Alternative would be constructed as a four-lane causeway on bridge structure above the projected sea level rise elevation, with embankments that would occur at driveways in order to maintain current access points (Figure 4). This four-lane causeway would be constructed offset from the existing roadway to allow for the existing traffic to operate on the existing SR 37 during construction. The horizontal and vertical geometry along the corridor would be similar to the Hybrid Existing Alignment Alternative, with the causeway located north of the existing SR 37 alignment between SR 121 and the Skaggs Island Road intersection, and located south of the existing roadway east of this intersection. The causeway/bridge sections would provide improved hydrologic connectivity between San Pablo Bay and Napa-Sonoma wetlands. This alternative also includes new bridges constructed at Tolay Creek and Sonoma Creek with longer spans to allow for hydrologic and ecologic connectivity.

The new raised causeway would have four 12-foot wide lanes, a 12-foot wide median with a 2-foot median barrier, 10-foot outside shoulders, and a 12-foot wide barrier separated Class I bicycle facility. The total roadway width is approximately 94 feet. The combined length of causeway/bridge segments is approximately 8.5 miles and the combined length of embankment segments is approximately 1.0 mile.

Under this alternative, the existing SR 37 pavement would be removed.

⁵ The minimum design elevation relates to the elevation at the edge of the roadway or the lowest element of the structure.

⁶ Based on the environmental sensitivity of the surrounding area, an entire alignment to either the north or the south of the existing roadway would have greater environmental impacts. Based on input received during the technical working group meetings and stakeholder workshops, entire north and south alignment variations were rejected in favor of offsetting partially to the north and partially to the south to minimize environmental impacts.



FIGURE 3
Alternative 1 - Hybrid Existing Alignment



FIGURE 4
Alternative 2 - Causeway Existing Alignment

Alternative 3 – Northern Alignment (A3)

From the existing SR 37 and SR 29 interchange, the Northern Alignment Alternative would run north on the existing SR 29 alignment to Napa Junction, then west on new alignment parallel to the existing SMART tracks to SR 121, then south on existing SR 121 to connect to SR 37 to continue west at the SR 121 intersection (Figure 5). This alternative would be elevated mostly on embankment with causeway on bridge structure that span floodplains, to maintain hydrologic connectivity, and would facilitate the need to construct a new highway and develop system interchanges. The proposed northern alignment would be a total of 20.9 miles long including 6.0 miles of structure and 14.9 miles of fill.

This alternative would require converting the existing SR 29 from a conventional highway to an expressway to accommodate six lanes of traffic with frontage roads on either side for local circulation. This segment of SR 29 would be grade separated at the four existing local roadway intersections. The new alignment section parallel to the SMART rail line would have a four-lane standard highway section with dedicated bicycle lanes at an elevation that would provide for resiliency against anticipated sea level rise. This alternative would involve significant elevated structure sections for crossing over the Napa River, two railroad tracks, and crossings over existing creeks and wetland areas. This alternative would also widen SR 121 from two lanes to six lanes to accommodate SR 37 traffic volume.

This new alignment to the north would likely induce an increase in trip origins/destinations in Solano and Napa counties.

Under this alternative, the existing SR 37 roadway would be converted to a local road, and the bridge at Sonoma Creek would be removed to allow for hydrologic connectivity enhancements. Access would be maintained to the following access roads via the local road: Access Road 1, Noble Road, West Vista Point/Caltrans Public Viewing, East Vista Point, Skaggs Island Road/Skaggs Island Access, Private Road 1, Access Road 2, and Private Road 2.

Alternative 4 – Southern Alignment 1 (A4)

The Southern Alignment 1 Alternative would create a new SR 37 alignment between SR 121 and Mare Island to the south of the existing SR 37. This alignment would be roughly parallel to the existing SR 37 alignment, but located several hundred feet south over the tidal mudflats of the San Pablo Bay. From the Napa River Bridge west approach touchdown, the alignment would cross westward over existing marshland into the San Pablo Bay before turning northwest and running in parallel with the existing SR 37 alignment over the shoreline (Figure 6). The roadway would then cross back onto land at Tubbs Island and tie into the existing SR 37/SR 121 interchange. This alternative would be comprised of a new four-lane elevated causeway structure for its entire length so as not to impede tidal flows. The new alignment would have dedicated bicycle lanes. The proposed Southern Alignment 1 would be a total of 9.9 miles long and would include 9.3 miles of viaduct sections.

Under this alternative, the existing SR 37 roadway would be converted to a local road, and the bridge at Sonoma Creek would be removed to allow for hydrologic connectivity enhancements. Access would be maintained to the following access roads via the local road: Access Road 1, Noble Road, West Vista Point/Caltrans Public Viewing, East Vista Point, Skaggs Island Road/Skaggs Island Access, Private Road 1, Access Road 2, and Private Road 2.

Alternative 5 – Southern Alignment 2 (A5)

The Southern Alignment 2 Alternative would construct a new west-east causeway across San Pablo Bay, providing direct connection from US 101 in Marin County to Mare Island. To address the need to tie in to SR 121, this alternative would include an overwater intersection and north-south leg, connecting the alignment to the SR 121 interchange (Figure 7). From the Napa River Bridge west approach touchdown, the Southern Alignment 2 Alternative would cross westward over existing marshland and continue across San Pablo Bay to an overwater interchange with two segments: an east-west segment (SR 37) that would tie into US 101 in Marin County, and a SR 121 Extension that would extend north from the overwater interchange over Tubbs Island and tie into SR 121 near the existing SR 37/SR 121 intersection. The existing SR 37/SR 121 intersection would be reconstructed as an interchange.

The Southern Alignment 2 Alternative would cross over approximately 11 miles of San Pablo Bay. This alternative would be comprised of a new four-lane elevated viaduct its entire length so as not to impede flows. The new alignment would have dedicated bicycle lanes. The alignment would be a total of 20.1 miles long, including 14.6 miles of the east-west segment (SR 37), 3.5 miles of the north-south SR 121 Extension, and 2.0 miles of ramps. It would include 17 miles of viaduct sections.

Under this alternative, induced travel demand may occur because there would be two routes between US 101 and SR 121, which would encourage more vehicle trips due to improved traffic and travel conditions.

Under this alternative, the existing SR 37 roadway would be converted to a local road, and the bridge at Sonoma Creek would be removed to allow for hydrologic connectivity enhancements. Access would be maintained to the following access roads via the local road: Access Road 1, Noble Road, West Vista Point/Caltrans Public Viewing, East Vista Point, Skaggs Island Road/Skaggs Island Access, Private Road 1, Access Road 2, and Private Road 2.

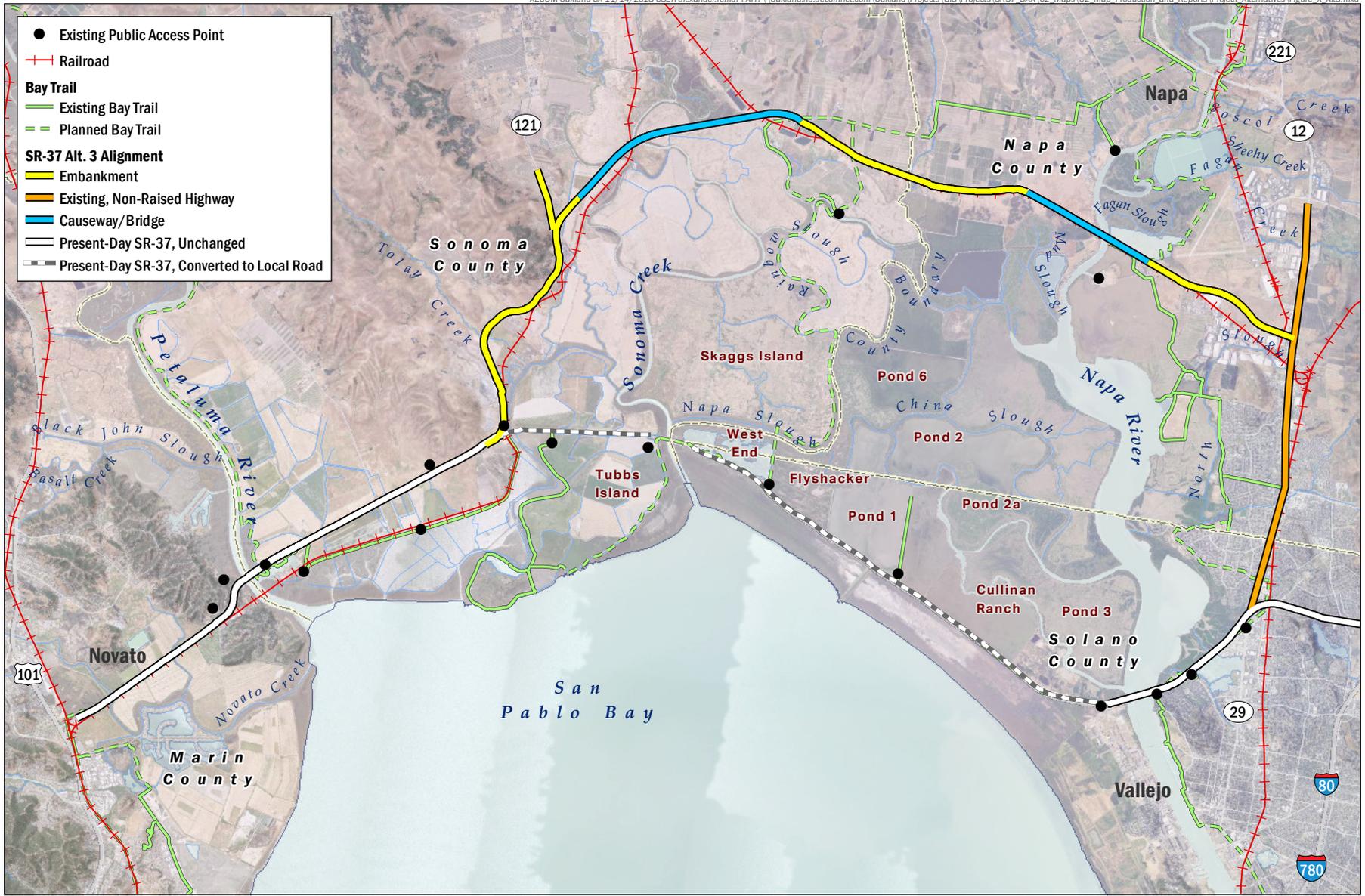


FIGURE 5
Alternative 3 - Northern Alignment



FIGURE 6
Alternative 4 - Southern Alignment 1

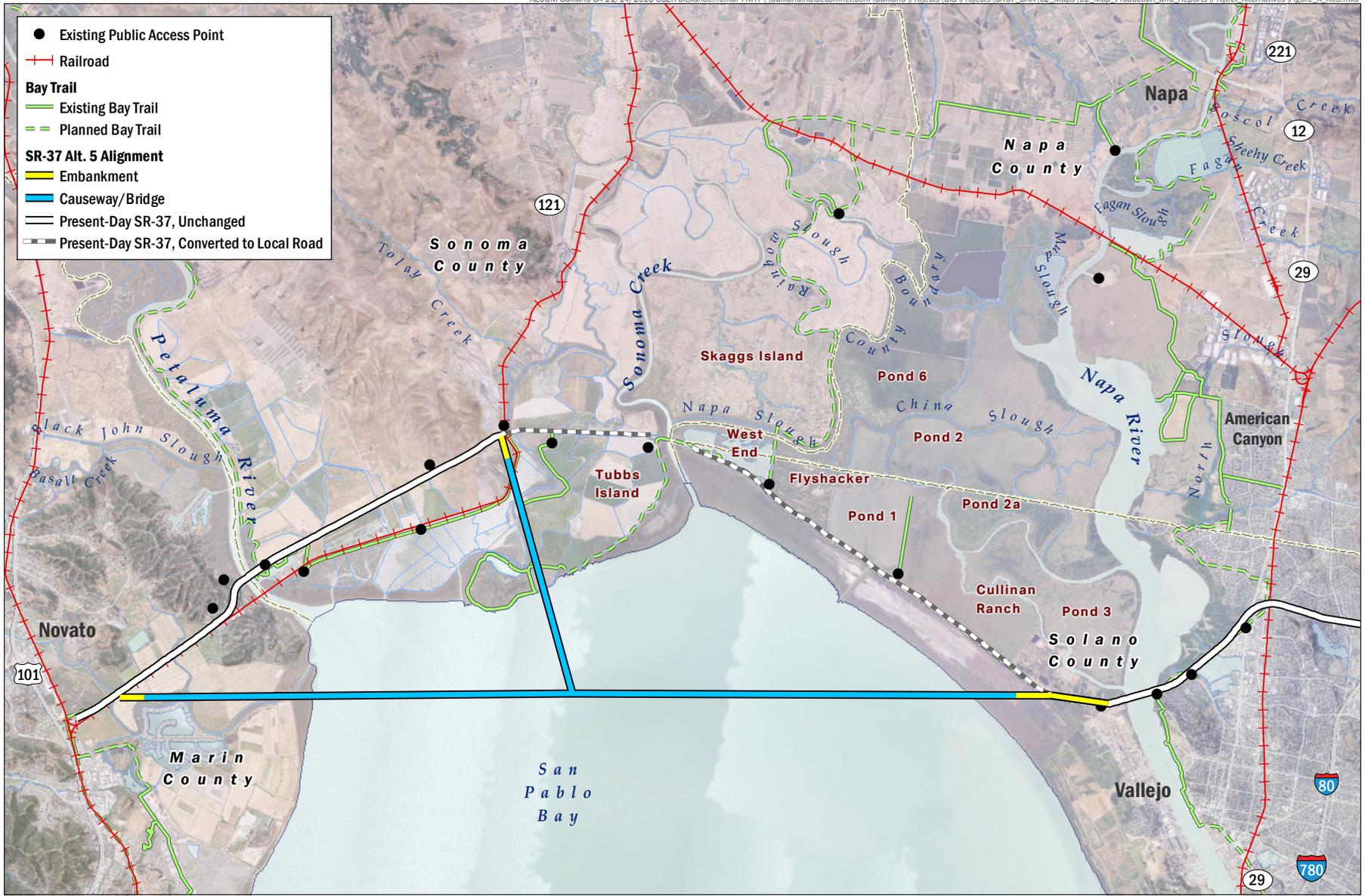


FIGURE 7
Alternative 5 - Southern Alignment 2

4. Methods

The alternatives screening was a high-level assessment that included both quantitative and qualitative measures. The analysis involved a comparative assessment of alternatives focused on traffic and environmental criteria, right-of-way requirements, and consistency with the project purpose and need. It was assumed that all of the evaluated alternatives are feasible from an engineering design perspective. A comparison matrix using a color-coded ranking system (Appendix A) was created to indicate greater and lesser impacts among the alternatives, and to identify any fatal flaws.

Conceptual engineering alignments at 10-15 percent design were developed for each of the five alternatives. Engineering features were identified for each alternative to inform the evaluation of traffic, environmental and right-of-way impacts for each alternative including: preliminary right-of-way alignments; total length of alternative and length of causeway and embankment/fill; alignment tie-in locations; and intersection, railroad, utility, and channel crossings. The establishment of preliminary right-of-ways and alignment design allowed for the spatial evaluation criteria to be analyzed, as described below. Cost estimates were also developed for each conceptual alignment. The engineering features and cost estimates are presented in Section 5.

Criteria

Criteria assessed for each alternative include:

- Project Purpose and Need
- Traffic
- Right of Way Impacts
- Environment
 - Air Quality and Greenhouse Gas
 - Biological Resources
 - Cultural Resources
 - Community Impacts and Public Access
 - Hydrology and Flooding
 - Land Use and Population Growth
 - Noise
- Public Acceptability

Environmental evaluation criteria were developed based on physical, biological, social, and economic factors that were anticipated to be differentiators among the alternatives. For certain criteria that comprise a wide breadth of resources (e.g., biological resources), subcategories were created to assess those criteria at a more detailed level. For a complete list of evaluation criteria, please refer to the evaluation matrix in Appendix A.

Data and Analysis

Relevant existing information and reports were reviewed to obtain data for the assessment. Data were collected from available studies, plans, national and state government databases, county websites, geospatial data, and stakeholder input.

A desktop level geographic information system (GIS) analysis was conducted for criteria with available corresponding geospatial data along each alternative right-of-way. The preliminary right-of-way alignments were overlain by GIS layers to calculate preliminary potential impacts. Certain criteria allowed for direct quantitative desktop results to be assessed, whereas other criteria required qualitative assessment of data.

A comparison matrix was created to assess greater and lesser impacts among the alternatives, and to identify any fatal flaws. For every criterion, each alternative was compared against the other alternatives to determine which alternative(s) posed greater or lesser impacts compared other alternatives in that category. A color-coded rank was then assigned to that criterion’s cell in the matrix to visually display how that criteria scored across the five alternatives, as shown below.

Scores highest when compared to other alternatives; net benefit or minimal impact.	Used to distinguish an alternative that is in-between minimal to moderate impact.	Scores moderate when compared to other alternatives; moderate but mitigatable/avoidable impact.	Used to distinguish an alternative that is in-between moderate and potentially significant impact.	Scores lowest when compared to other alternatives; notable or significant impact.
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For criteria categories containing subcategories, each subcategory was color ranked separately. The overall criteria category was then color ranked based on an assessment of the subcategory color rankings (refer to Section 6).

The engineering features and cost estimates are included in the matrix for informational rather than for assessment purposes. As a result, those cells were not assessed nor color ranked.

Criteria Category Methods

The methods used to evaluate each resource criteria category are described below.

Purpose and Need

Each alignment was assessed to determine the extent to which it met the Purpose and Need of the project.

Traffic

Traffic effects were assessed for each alternative using two metrics: (1) year 2022 peak hour travel times from SR 29 to US 101, and (2) the daily vehicle miles of travel (VMT) difference from the existing alignment for 2040 as a four county total.

Right-of-Way

Right-of-way boundaries and parcel maps were obtained for each of the five alternatives. Using GIS, right-of-way acreages were calculated for the following categories:

- Agricultural
- Commercial/Industrial
- Educational/Institutional
- Existing right-of-way
- Municipal/Utility
- Open Water
- Other/Unknown
- Park/Open Space
- Refuge Area/Wildlife
- Residential

Total right-of-way acreages and right-of-way acquisition acres were then calculated. The alternatives were ranked relative to the total amount of right-of-way acquisition that would be required.

Environmental

For the environmental criteria, methods were generally consistent with a high-level environmental screening approach.

Air Quality and Greenhouse Gas

The metric used to assess alternatives for air quality and greenhouse gas (GHG) is the difference in operational emissions of criteria pollutants and GHGs. An analysis was performed by MTC that combined the four northern county (Sonoma, Marin, Napa, and Solano) totals and showed travel data output for carbon dioxide and the following criteria pollutants: carbon monoxide, particulate matter of 2.5 microns or less (PM_{2.5}), particulate matter of 2.5 to 10 microns (PM₁₀), and wintertime nitrogen oxides (NOx). For PM_{2.5} and PM₁₀, the calculated emissions totals included exhaust, tire wear, and brake wear. For GHG, carbon dioxide emissions were calculated using daily fuel usage, miles per gallon, and daily vehicle hours traveled. Emissions were reported in kilograms per day (kg/day).

Biological Resources

Because the alternatives span a range of different environments, from the shallow waters of San Pablo Bay to the upland hill slopes to the north, and because the alternatives would impact a differing variety of habitats from mudflat/shallow water through tidal marsh to wetland-upland transition zone, several subcategories were identified for the biological resources evaluation. These subcategories considered how the landscape of habitats may change in the coming decades as a result of climate change and sea level rise (e.g., an alternative that is constructed through tidal marshes today may be in open water by the end of the century).

To assess potential impacts on biological resources, GIS data and other database information for several sensitive resource categories were gathered from various sources to identify those sensitive resources known or with potential to occur within the study area. These data layers were compared against the five alternative alignments to determine potential impacts relative to the following evaluation sub-categories:

- Total acres of potentially jurisdictional wetlands and other waters within the right-of-way
- Number of state and federally-listed threatened and endangered species with potential to occur
- Presence of designated critical habitat under the federal Endangered Species Act
- Salt marsh harvest mouse habitat
- Present day habitat for sensitive bird species
- Estimated impacts to critical habitat and other habitat for state and federally-listed threatened and endangered species
- Total acres of habitat within the right-of-way
- Marsh/migration/transition zone
- Areas designated as high priority for long-term bird habitat by the Point Blue model
- Mudflats and shallow subtidal habitat
- Future mudflats and shallow subtidal habitat
- Ecological corridors

Total acres of the following habitat categories were calculated for each alignment right-of way: annual grassland; barren; blue oak woodland; coastal oak woodland; cropland; eucalyptus; existing right-of way; urban; valley oak woodland; and wetlands, baylands, and open water.

Except as noted above, these metrics reflect the presence or absence of a particular habitat, not its abundance or condition. Similarly, the metric for state and federally-listed threatened and endangered species is the total number of listed species, not the number of individual animals, and so does not allow the impact to the total population of a given species to be considered.

Hydrology and Flooding

Hydrology and flooding were assessed by comparing the proposed minimum roadway design elevations to existing and future flood elevations considering astronomical tide, storm surge, and wave effects. The proposed alignment for each alternative was also overlaid on the projected extent of future inundation due to sea level rise to evaluate the potential for the highway to act as a barrier to natural hydrologic processes. In addition, the number and location of major creek, stream, and tidal slough crossings were identified to evaluate potential conflicts of each alignment with riverine and tidal connectivity and storm flows. The cost impacts of multiple channel crossings and necessary bridge structures are captured in the engineering and cost criteria.

Cultural Resources

Potential impacts on cultural resources were assessed based on (1) the number of known archaeological resources, historic-era structures, and shipwrecks; and (2) the number of eligible or listed properties/historical resources to the National Register of Historic Places (NRHP)/California Register of Historical Resources (CRHR). The following efforts were undertaken to gather data to inform the analysis of these criteria.

A cultural resources records search of the study area, including a 0.5-mile buffer for each alternative alignment, was conducted at the Northwest Information Center (NWIC) on June 22, 2018, to identify previously recorded resources in the area (NWIC File #17-3078). Specific cultural resource studies were not reviewed at this time.

On June 19, 2018, a request was made of the Native American Heritage Commission (NAHC) for a search of the Sacred Lands File and a list of Native American contacts for the study area. On June 29, 2018, the NAHC replied that there were sacred sites identified in the study area, and to contact a representative of the “Mishewal-Wappo Tribe of Alexander Valley directly for more information about potential sacred sites and tribal cultural resources” within the study area. On July 10, 2018, letters were sent to the Native Americans listed on the NAHC contact list describing the project with maps depicting the five alternatives, requesting information or concerns they might have regarding the study area. No responses were received as of the date of this report.

On June 19, 2018, a request was made of the State Lands Commission (SLC) to search the Shipwreck Database for potential resources within the five alignments within the study area. No response from the SLC was received.⁷

An attempt was made to review the GIS layers from Caltrans' *Research Design and Treatment Plan for Native American Archaeological Resources in the San Francisco Bay-Delta Region* (Far Western Anthropological Research Group 2017). However, these files were not made available, and because the maps within the document were not at a scale to allow accurate review for this large-scale project, this document could not be used as part of this analysis.

Community Impacts and Public Access

To assess potential impacts on communities and public access, GIS data were gathered from various sources to create .KMZ files for identifying existing communities (including residential and business neighborhoods/districts) and recreational and public access resources within the study area. These data layers were compared against the five alternative alignments to determine potential impacts on community character and cohesion (e.g., introduction of a barrier within an established community), and on recreation and public access.

⁷ The SLC maintains shipwreck information on its website, but the only locational data provided is the county in which the ships were wrecked. In addition, the SLC online list of shipwrecks does not include all the wrecks.

Land Use and Population Growth

To assess impacts to land use and population growth, GIS data were gathered from various sources, including the MTC planned land use layer (MTC, 2006), to create .KMZ files for identifying planned and existing land uses within the study area. These data layers were compared against the five alternative alignments to determine potential impacts relative to land use compatibility conflicts, Section 4(f) resources⁸, farmlands, and growth inducement.

In addition, for farmlands, maps and GIS data from the California Department of Conservation, Division of Land Resource Protection, Farmland Mapping and Monitoring Program (2016) were used to determine impacts on Prime Farmland, Farmland of Local Importance, Unique Farmland, and Farmland of Statewide Importance. Definitions for each category of farmlands, as defined by the California Department of Conservation (2016), are as follows:

- **Prime Farmland** – Irrigated land with the best combination of physical and chemical features able to sustain long term production of agricultural crops. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for production of irrigated crops at some time during the four years prior to the mapping date.
- **Farmland of Local Importance** – Land of importance to the local agricultural economy as determined by each county's board of supervisors and a local advisory committee.
- **Unique Farmland** – Lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.
- **Farmland of Statewide Importance** – Irrigated land, similar to Prime Farmland, that has a good combination of physical and chemical characteristics for the production of agricultural crops. This land has minor shortcomings, such as greater slopes or less ability to store soil moisture than Prime Farmland. Land must have been used for production of irrigated crops at some time during the four years prior to the mapping date.

Noise

To assess potential noise impacts from the alternatives, the U.S. Geological Survey (USGS) Geographic Names Information System (GNIS) was utilized to create .KMZ files for identifying sensitive receptors within a 0.5-mile radius of each alignment. For this assessment, sensitive receptors include residential parcels, schools, libraries, religious institutions, and hospitals; potential impacts of the alternatives on recreational land uses are addressed under the Section 4(f) analysis. Residential parcels were compared against the residential land uses, as shown in the MTC 2006 General Plan GIS layer, to ensure these parcels were accurately presented.

Public Acceptability

The public acceptability assessment was based on an initial focus group study for the project conducted by Moore Iacofano Goltsman, Inc. (MIG) to collect input from stakeholders on potential approaches for improving SR 37. Focus groups were recruited to convene diverse and representative groups of residents from the four counties bordering SR 37 – Marin, Napa, Solano, and Sonoma counties. Focus groups were conducted in each of the four counties, and a fifth focus group was comprised of Spanish-speaking residents of Sonoma County. The focus groups utilized the same format to collect comparable input from each focus group, and ranged from 10 to 14 participants (MIG, 2018). As part of the focus group study, input was solicited from participants on the alternatives being considered for the Ultimate Project. As part of the study, participants ranked the different alternatives in order of preference.

⁸ Section 4(f) resources, as defined by 23 CFR Part 774, are publicly-owned parks, recreational areas, wildlife refuges, and publicly or privately-owned historical resources.

Technical Feedback

Technical Advisory Committee

Preliminary evaluation criteria were presented to the SR 37 Technical Advisory Committee (TAC) on May 18, 2018 and feedback was obtained on the categories. Feedback on criteria included ensuring that the higher-level categories are equally weighted, particularly where criteria categories contain multiple subcategories so that certain categories (e.g., biological resources with multiple subsections) do not outweigh other equally important categories and modifying the Land Cover Type category to include 'Commercial' to be assessed with 'Light Industrial'. The criteria were modified based on TAC feedback.

Environmental Technical Working Group

Preliminary matrix results were presented to the Environmental Technical Working Group on July 31, 2018, with a focus on biology and hydrology. The technical working group discussed feedback on how the criteria were assessed and the criteria themselves. Following the meeting, further input on the biological resources and hydrology evaluations was solicited from the Environmental Technical Working Group members to inform the content of the evaluation matrix.

5. Engineering Features and Cost

Engineering Features

Engineering features were identified for each alternative to inform the evaluation of traffic, environmental and right-of-way impacts. These features were not ranked for the alternatives comparison. Basic features (e.g., length, tie-in locations) for each alternative, as described in Chapter 3, are presented in the matrix in Appendix A, along with approximate depth to Young Bay Mud, a consideration in project design and construction reflected in the cost estimates. Key information on intersection impacts, railroad crossings, channel crossings, and utility crossings are summarized below and further detailed in Appendix A.

Intersection Impacts

Each alternative's impacts on existing intersections are described below.

A1 Existing Hybrid and A2 Existing Causeway

Alternatives 1 and 2 would require reconfiguration of the SR 37/Mare Island interchange and SR 37/SR 121 intersection.

A3 Northern

Alternative 3 intersection impacts would include:

- The SR 37/SR 29 interchange would be converted to an interchange with direct connector ramps.
- Meadows Drive would be converted to a right-in/right-out intersection at SR 29 through the frontage road.
- Mini Drive would need to be elevated as an overpass over SR 29.
- Kimberly Drive would be converted to a right-in/right-out intersection at SR 29.
- American Canyon Road and S. Napa Junction Road would be grade separated from SR 29 and would connect to SR 29 through frontage roads. SR 29 would be depressed from about 1,000 feet south of American Canyon Road to 1,000 feet north of S. Napa Junction Road.
- Donaldson Way would be grade separated from SR 29 and would connect to SR 29 through frontage roads; only right-in/right-out movements would be allowed from to/from Donaldson Way and the frontage road.
- North Napa Junction Rd would be converted to a right-in/right-out intersection at SR 29 through the frontage road.
- The SR 12 and SR 29 intersection would be converted to a full interchange with direct connector ramps.
- All existing access roads across the railroad and along SR 121 would be maintained along the new SR 37 alignment through median left turn lanes.

A4 Southern 1

Under Alternative 4, the SR 37/SR 121 intersection would be converted to an interchange with direct connector ramps.

A5 Southern 2

Under Alternative 5, the SR 121 intersection would require conversion to an interchange with direct connector ramps.

Railroad Crossings

The Existing Hybrid and Existing Causeway Alternatives (A1 and A2) would span the SMART tracks near Tolay Creek. The Northern Alignment Alternative (A3) would span over the SMART tracks at two different locations. Southern Alignment Alternative 1 (A4) would also span over the SMART tracks. Therefore, Alternatives A1 through A4 would not impact the SMART tracks.

Under Southern Alignment Alternative 2 (A5), the SR 37 connection to US 101 would need to be reconfigured and would potentially involve impacts to the SMART tracks adjacent to US 101 and SR 37.

Channel Crossings

The channel crossings for each alternative are as follows:

- Existing Hybrid and Existing Causeway Alternatives (A1 and A2) would span over Sonoma Creek, Tolay Creek, and the CDFW water control structure.
- The Northern Alignment Alternative (A3) would span over all existing creeks and channels along the alignment.
- Southern Alignment Alternative 1 (A4) would span over Sonoma Creek and Tolay Creek.
- Southern Alignment Alternative 2's (A5) profile would be raised above the estimated sea level rise water design elevation of the other alternatives (to an approximate maximum elevation of 100 feet MHHW) to clear the shipping lane west of SR 121.

Utility Crossings

Because the Existing Hybrid and Existing Causeway alternatives (A1 and A2) are within the existing SR 37 alignment, utility impacts were identified for these alternatives as part of this assessment. Alternatives A1 and A2 would have the same utility crossings:

- Pacific Gas and Electric transmission towers near Sonoma Creek Bridge and north of SR 37 would require relocation (two towers west of Sonoma Creek Bridge and one tower west of Sonoma Creek Bridge); the transmission lines may require raising for vertical clearance over the raised highway;
- Utility poles north of SR 37 would require relocation from SR 121 to Sonoma Creek Bridge; and
- Utility poles south of SR 37 would require relocation from Skaggs Island Road to Access Road 2.

Specific identification of utility impacts for Alternatives A3 through A5 was beyond the scope of the conceptual design for these alternatives completed as part of this assessment. Under the Northern Alignment Alternative (A3), utility impacts are anticipated but would require further study to specifically identify. For Southern Alignment Alternatives 1 and 2 (A4 and A5), utility impacts are not anticipated but further study would be required to confirm.

Cost

Cost estimates were developed for each alternative that include costs for design, right-of-way (including environmental mitigation), utilities⁹, construction and support. A summary of the estimated costs is presented in Table 2.

⁹ Although specific utility impacts were not identified at this stage for the northern and southern alignments, the cost estimates for these alternatives include allowances for utility relocation (based on the extent of existing development along the proposed alignments) and increased contingencies.

Table 2. Estimated Project Costs

Cost Items	A1. Existing Alignment Hybrid	A2. Existing Alignment Causeway	A3. Northern Alignment	A4. Southern Alignment 1	A5. Southern Alignment 2
	2018 \$	2018 \$	2018 \$	2018 \$	2018 \$
Roadway Items	\$711	\$386	\$1,010	\$348	\$401
Structure Items	\$1,206	\$2,140	\$1,430	\$2,171	\$2,496
Subtotal Construction Cost	\$1,917	\$2,526	\$2,440	\$2,519	\$2,897
Right of Way	\$234	\$166	\$575	\$109	\$130
Total Capital Outlay Cost	\$2,151	\$2,692	\$3,015	\$2,628	\$3,027
PR/ED Support	\$54	\$67	\$76	\$66	\$76
PS&E Support	\$86	\$108	\$121	\$105	\$121
Right of Way Support	\$11	\$14	\$15	\$13	\$15
Construction Support	\$75	\$94	\$106	\$92	\$106
Total Capital Outlay Support Cost	\$226	\$283	\$318	\$276	\$318
Total Project Cost (approx. total)	\$2.4B	\$2.9B	\$3.3B	\$2.9B	\$3.3B

Numbers shown in million \$ except Total Project Cost

Cost estimates were not ranked during the analysis; the cost data are shown for informational purposes only.

6. Assessment Results

Summary results of the alternatives assessment matrix are shown in the Table 3 and discussed below. For the complete detailed alternatives assessment matrix, see Appendix A.

Table 3. Alternatives Matrix Summary

Resource Area	A1 Existing Alignment Hybrid	A2 Existing Alignment Causeway	A3 Northern Alignment	A4 Southern Alignment 1 (Shoreline)	A5 Southern Alignment 2 (San Pablo Bay)
Purpose and Need	Green	Green	Orange	Yellow	Yellow
Traffic	Green	Green	Red	Green	Yellow
Right of Way	Yellow	Yellow	Red	Yellow	Orange
GHGs	Green	Green	Red	Green	Red
Biology	Orange	Yellow	Orange	Yellow	Yellow
Hydrology	Orange	Green	Orange	Green	Green
Cultural	Yellow	Yellow	Red	Yellow	Yellow
Community/Public Access	Green	Green	Red	Yellow	Yellow
Land Use/Growth	Green	Green	Red	Light Green	Yellow
Public Acceptability	Green	Green	Red	Yellow	Yellow

Legend:

Net benefit or minimal impact	Minimal to moderate impact	Moderate but mitigatable/avoidable impact	Moderate to significant impact	Notable or significant impact
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Purpose and Need

Each alternative’s consistency with the project purpose and need is described below. All alternatives would help meet the purpose and need relative to providing the option for drivers to increase their vehicle occupancy (by including managed lanes to encourage the use of carpooling), and improving the resiliency of transportation infrastructure to sea level rise and flooding (by including a minimum design elevation based on 66 inches of sea level rise at year 2100). The following sections discuss the relative merits and deficiencies for each alternative with respect to the purpose and need criteria.

Existing Alignment Hybrid (A1) and Causeway (A2)

Both the Existing Alignment Hybrid and Causeway Alternatives would meet the project purpose and need to improve traffic flow and peak travel times. As detailed under the Traffic analysis section below, these alternatives and the Southern Alignment Alternatives would result in similar peak travel times and reduction in travel time compared to 2022 no project conditions.

Both alternatives would also provide accommodation for multimodal use, and because they would be located along the existing alignment, they would meet the need for improving non-vehicular access to wildlife viewing and other shoreline recreation. Access to properties off of SR 37 will require special consideration with respect to sea level rise; the profile of SR 37 would be raised, but depending on location and topography, local access roads and shoreline features may become inundated and the shoreline will change.

Both alternatives would also meet the project purpose and need to provide ecological and hydrologic enhancements to facilitate adaptation of the corridor landscape to sea level rise. Because they would be located along the existing alignment, these alternatives would best meet the need of improving ecologic and hydrologic connectivity to facilitate proper function of corridor wetlands in protecting area land uses from the effects of flooding and sea level rise. Both alternatives would include new bridges constructed at Tolay Creek and Sonoma Creek with longer spans to allow for hydrologic and ecologic connectivity. The Causeway Alternative, which would involve less embankment than the Hybrid Alternative, would provide for greater hydrologic and ecologic connectivity.

Northern Alignment (A3)

While the Northern Alignment Alternative would improve traffic flow, it would do so to a substantially lesser degree than the other alternatives due to the greater length of the SR 37 alignment between SR 121 and Mare Island. Because of this alternative's longer route for drivers traveling between Marin County and Solano County, travel time for this segment would be almost twice that achieved by the other alternatives.

This alternative would provide accommodation for multimodal use. However, because SR 37 would be realigned inland to the north, the highway would no longer provide access to the existing wildlife viewing and other shoreline recreation destinations along the current SR 37 corridor. The State would presumably relinquish the portion of the existing SR 37 right-of-way that would be abandoned, moving the designated State Route to the new Northern Alignment. The portion of the SR 37 abandoned right-of-way would no longer be maintained by the State. Local access to properties and would have to be defined as part of the relinquishment process.

If the existing alignment of SR 37 is maintained as a local roadway, it may preclude or reduce long-term options to improve hydrologic and ecologic connectivity between the north and south sides of the SR 37 alignment to facilitate the adaption of the North San Pablo Bay shoreline to flooding and sea level rise. Decisions would have to be made on whether to maintain or remove existing bridges.

The long-term threat of inundation of the vulnerable portions of the abandoned SR 37 roadway may ultimately prevent the existing highway from being used as either local access or opportunities for public access, since maintaining the relinquished portion of SR 37 would defeat the purpose of the project to adapt to sea level rise achieved by abandoning the most vulnerable portions of the existing highway.

In summary, the Northern Alignment provides the ecological benefit of moving the existing SR 37 corridor north of the existing shoreline. It may functionally serve areas to the north, but would not benefit existing east-west travelers compared to the existing route. The Northern Alignment would adversely increase travel time and VMT for individual cars compared to the existing alignment. Decisions and agreements would be needed to resolve who takes responsibility for the portion of SR 37 that would no longer be within the State Highway system, and whether it even remains in place or is removed. For these reasons, the Northern Alignment Alternative least meets the project purpose and need compared to the other alternatives.

Southern Alignment 1 (A4) and Southern Alignment 2 (A5)

As noted above, both Southern Alignment Alternatives would improve traffic flow and peak travel times to a similar degree as the Existing Alignment Alternatives. Southern Alignment 2 has a travel benefit of improving travel time by providing a potentially a shorter east-west route along the northern portion of the San Francisco and San Pablo Bay.

These alternatives would provide accommodation for multimodal use; however, because there would a new SR 37 alignment offshore to the south, it would not improve non-vehicular access to wildlife viewing and other shoreline recreation destinations along the current corridor.

Similar to the Northern Alignment Alternative, with the realignment of SR 37 offshore to the south, the project would include fewer enhancements to improve hydrologic and ecologic connectivity between the north and south sides of the SR 37 alignment to facilitate the adaption of the North San Pablo Bay shoreline to flooding and sea level rise. While the Sonoma Creek Bridge would be removed to enhance hydrologic connectivity, the remainder of the existing SR 37 alignment would be converted to a local road, or potentially removed. If left in place as a local road, it also would require a decision on maintenance responsibility, and does not address sea level rise adaptation.

Overall, the Southern Alignment Alternatives meet the purpose and need to a greater degree than the Northern Alignment Alternative but to a lesser degree than the Existing Alignment Hybrid and Causeway Alternatives.

Traffic

Existing Alignment Hybrid (A1) and Causeway (A2)

The Existing Alignment Alternatives and Southern Alignment 1 (discussed below) perform best relative to the traffic metrics. Based on the MTC Travel One Model results, the Existing Alignment Alternatives would have peak hour travel times from SR 29 to US 101 of 23 minutes for the Westbound AM peak hour and 28 minutes for the Eastbound PM peak hour. Because the Existing Alignment Alternatives would follow the current SR 37 alignment, they would not increase travel distance would result in the lowest VMT.

Northern Alignment (A3)

The Northern Alignment Alternative performs the poorest of the alternatives relative to the traffic metrics. The Northern Alignment would be approximately twice as long as the existing alignment. This longer travel distance results in notably higher peak hour travel times from SR 29 to US 101 of 42 minutes for the Westbound AM peak hour and 50 minutes for the Eastbound PM peak hour, which are almost double the peak hour travel times of all other alternatives. The Northern Alignment Alternative would result in a notable increase in daily VMT of 985,000 (2.6 percent) when compared to the Existing Alignment Alternatives for the portion of SR 37 from Mare Island to SR 121. However, this VMT increase is associated with the longer travel distance and not vehicle volumes served, and therefore would be an overall adverse change in comparison to the existing alignment.

Southern Alignment 1 (A4)

The peak hour travel times for Southern Alignment 1 were assumed to be the same as those for the Existing Alignment Alternatives because Southern Alignment 1 parallels the Existing Alignment Alternatives and has nearly the same alignment length. Likewise, the increase in daily VMT for the portion of SR 37 from Mare Island to SR 121 would be negligible under this alignment because it is only marginally longer than the Existing Alignment Alternatives.

Southern Alignment 2 (A5)

Southern Alignment 2 performs better than the Northern Alignment but not as well as the Existing Alignment Alternatives and Southern Alignment 1 relative to the traffic metrics. Southern Alignment 2's travel distance between SR 29 and US 101 is 2 miles shorter than the Existing Alignment Alternatives.

Consequently, Southern Alignment 2 has the lowest peak hour travel times for this distance of 22 minutes for the Westbound AM peak hour and 27 minutes for the Eastbound PM peak hour; these times are 1 minute shorter in each peak direction than the Existing Alignment Alternatives and Southern Alignment 1. However, this alignment would increase the travel distance between SR 29 and SR 121 because SR 121 has to be extended south to connect with the realigned SR 37. This would result in higher peak hour travel times for this segment of 24 minutes for the Westbound AM peak hour and 29 minutes for the Eastbound PM peak hour.

Under this alternative, there would be two travel route options between US 101 and SR 121, resulting in an increase in travel demand that is accordingly reflected in the daily VMT estimates. There would be a notable increase in daily VMT from Mare Island to SR 121 of 1,028,400 (2.7 percent) compared to the Existing Alignment Alternatives. Including the connection to US 101, the increase in daily VMT would be 1,062,000 (2.8 percent) compared to the existing alignment.

Right-of-Way

The right-of-way requirements for each alternative by land use type are provided in Table 4 below.

Table 4. Right-of-Way Acreage Alternatives Comparison

Metric	A1 Existing Alignment Hybrid	A2 Existing Alignment Causeway	A3 Northern Alignment	A4 Southern Alignment 1	A5 Southern Alignment 2
Agricultural	40	22	203	34	25
Commercial/Industrial	13	12	90	12	12
Educational/Institutional	0	0	0	0	2
Existing Right of Way	88	59	166	22	17
Municipal/Utility	0	0	12	0	28
Open Water	2	2	0	0	58
Other/Unknown	1	1	26	<1	<1
Park/Open Space	2	2	49	1	1
Refuge Area/Wildlife	106	74	42	100	139
Residential	0	0	6	0	0
Total	252	172	594	169	282
Right-of-Way Acquisition Acres	164	113	428	147	265

Source: Solano County Assessor's Office, 2012; Sonoma County Assessor's Office, 2016; Napa County Assessor's Office, 2016; Marin County Assessor's Office, 2018.

Existing Alignment Hybrid (A1) and Causeway (A2)

The land use types within the acquired right-of-way for the Existing Alignment Alternatives would be primarily refuge area/wildlife and agricultural, and to a lesser degree commercial/industrial. The Hybrid Alternative would require greater right-of-way acquisition than the Causeway Alternative (164 acres versus 113 acres) because approximately half of the Hybrid alignment would be embankment. The Existing Alignment Alternatives, along with Southern Alignment 1, have considerably lower right-of-way

requirements compared to the Northern Alignment and Southern Alignment 2, but were scored moderate in this category based on total acquisition acreage and land use types affected.

Northern Alignment (A3)

The land use types within the acquired right-of-way for the Northern Alignment would be primarily agricultural (almost half of acquired acreage) followed by commercial/industrial, park/open space, and refuge area/wildlife. At 428 acres, the right-of-way acquisition acreage for the Northern Alignment is substantially higher than for the other alternatives; this alternative was scored notable/significant in this category based on total acquisition acreage and land use types affected.

Southern Alignment 1 (A4)

Similar to the Existing Alignment Alternatives, the land use types within the acquired right-of-way for the Southern Alignment 1 Alternative would be primarily refuge area/wildlife and agricultural, and to a lesser degree commercial/industrial; this alternative was scored moderate in this category based on total acquisition acreage (147 acres) and land use types affected.

Southern Alignment 2 (A5)

Southern Alignment 2 would have the second highest right-of-way acquisition of the five alternatives at 265 acres. Almost half of the total acreage acquired would be from the refuge area/wildlife classification. The other land use types primarily affected would be open water, municipal/utility, agricultural, and commercial/industrial. This alternative was scored intermediate between moderate and notable/significant based on total acquisition acreage and land use types affected.

Air Quality and GHG

Because the Existing Alignment Alternatives would follow the current SR 37 alignment, they would result in the lowest criteria pollutant and GHG daily operational emissions. The estimated difference in criteria pollutant and GHG daily operational emissions from the Existing Alignment Alternatives is presented by alternative in Table 5.

Table 5. Alternative Impacts to Air Quality and GHGs

Metric (kg/day)	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5 Southern Alignment 2	
	Hybrid Existing Alignment	Causeway Existing Alignment			SR 29 to SR 121	SR 29 to US 101
CO			+771.12		+803.51	+831.15
PM _{2.5}			+20.85		+21.86	+22.44
Total PM ₁₀	-	-	+50.41	Negligible	+52.79	+54.21
Winter NO _x			+113.83		+123.65	+122.57
CO ₂			+251		+264.36	+272.55

Source: MTC, 2018.

Existing Alignment Hybrid (A1) and Causeway (A2)

The Existing Alignment Alternatives would follow the current SR 37 alignment and would have the shortest overall distance (9.5 miles) for vehicles to travel. Therefore, these alternatives would result in the lowest criteria pollutant and GHG operational emissions of all the Ultimate Project alternatives.

Northern Alignment (A3)

The Northern Alignment would be approximately twice as long as the Existing Alignment Alternatives. This longer travel distance would result in a notable increase in criteria pollutant and GHG operational emissions compared to those generated under the Existing Alignment Alternatives.

Southern Alignment 1 (A4)

Southern Alignment 1 would have a negligible difference from the Existing Alignment Alternatives in criteria pollutant and GHG operational emissions because the length of this alignment (9.9 miles) would be similar in distance to that of the Existing Alignment Alternatives.

Southern Alignment 2 (A5)

Southern Alignment 2 would have a total alignment length of 20.1 miles because it would extend to US 101 and include a connector to SR 121. Table 5 reports the estimated emissions for both the portion of this alignment from SR 29 to SR 121 (i.e., the termini of the other alternatives) as well as the total alignment from SR 29 to US 101. Under this alternative, there would be two travel route options between US 101 and SR 121, resulting in increased travel demand that is accordingly reflected in the operational emissions estimates. Like the Northern Alignment Alternative, Southern Alignment 2 would result in a notable increase in criteria pollutant and GHG operational emissions compared to those generated under the Existing Alignment Alternatives.

Biology

The potential impacts of each alternative alignment on biological resources based on the evaluation criteria in Chapter 4 are discussed below. These criteria include the connectivity between habitats. The creeks and their adjacent marshes in the study area act as ecological corridors for species to move between the Bay, tidal marshes and the uplands. Alternatives that run through the coastal tidal marshes have the widest creeks and associated marsh. The inland Northern Alignment would cross narrower creek channels. The transition between tidal marshes and uplands is important habitat for certain species as high tide refugia for marsh species, as pathways for water and sediment, and as corridors for species to move between uplands and the marshes. Most of the natural wetland-upland transition zones in the study area are to the north of the San Pablo Baylands.

Existing Alignment Hybrid (A1)

Existing habitat categories within the Existing Alignment Hybrid right-of-way include annual grassland, barren, cropland, existing right-way, urban, and wetlands/baylands/open water. The total of potentially jurisdictional wetlands and other waters within the right-of-way is 116 acres, including 67 acres of wetlands and 49 acres of other waters. This is the second highest total of combined impacts and highest total of wetland impacts of all alternatives, and is due to the amount of proposed embankment for this alternative.

Twelve state or federally-listed threatened or endangered species have the potential to occur along the Existing Alignment Hybrid corridor, including one plant, Soft salty-bird's beak, and eleven wildlife species: western snowy plover, California Ridgway's rail, peregrine falcon, California black rail, California red-legged frog, salt marsh harvest mouse, longfin smelt, delta smelt, steelhead, green sturgeon, and chinook salmon. Three of these species have designated critical habitat within the alignment corridor: steelhead, green sturgeon, and chinook salmon, which is the same as for the Existing Alignment Causeway and Southern Alignment 1 Alternatives. The Existing Alignment Hybrid borders the northern edge of salt marsh harvest mouse habitat between Sonoma Creek and Mare Island and cuts through habitat for this species at the mouth of Sonoma Creek. Habitat for California Ridgway's rail is within and adjacent to the alignment. This alternative's impacts to state or federally-listed threatened or endangered species and their habitat was ranked as moderate to potentially significant. Salt marsh harvest mouse, California Ridgway's rail, and California black rail habitat would be impacted by fill placement for embankment in areas that represent a small fraction of historic habitat available for these species in the estuary. This

could create barriers to habitat connectivity for salt marsh harvest mouse. The elevated roadway structure and causeway segments would help to reduce habitat and connectivity impacts.

The embankment portions of this alignment would serve as barriers to ecological corridors within coastal tidal marshes. The Existing Alignment Hybrid Alternative does not cross any natural upland marsh migration zones; however, it would impact transition zone high tide refugia on the existing SR 37 embankment slopes due to widening of the roadway footprint.

This alignment avoids most present day mudflats; however, much of the alignment may be mudflat in the future. The alignment contains lower priority long-term bird habitat as present day coastal marshes are expected to become inundated with the progression of sea level rise.

Based on the findings above, the Existing Alignment Hybrid Alternative would likely have greater overall impacts on biological resources than the Existing Alignment Causeway and Southern Alignment Alternatives, and similar overall impacts to the Northern Alignment Alternative. Overall, the Existing Alignment Hybrid Alternative was ranked as having moderate to potentially significant impacts on biological resources based on the criteria evaluated.

Existing Alignment Causeway (A2)

Existing habitat categories within the Existing Alignment Causeway right-of-way include annual grassland, barren, cropland, existing right-way, urban, and wetlands/baylands/open water. The total of potentially jurisdictional wetlands and other waters within the right-of-way is 84 acres, including 46 acres of wetlands and 38 acres of other waters. This is the second lowest total of combined impacts and the second highest total of wetland impacts of all alternatives.

As noted above, the same twelve state or federally-listed threatened or endangered species have the potential to occur along this alignment as the Existing Alignment Hybrid Alternative and Southern Alignment 1. Similarly, three of these species also have designated critical habitat within the alignment corridor. The Existing Alignment Causeway borders the northern edge of salt marsh harvest mouse between Sonoma Creek and Mare Island and cuts through habitat for this species at the mouth of Sonoma Creek. Habitat for California Ridgway's rail is within and adjacent to the alignment. This alternative's impacts to state or federally-listed threatened or endangered species and their habitat was ranked as minimal to moderate. Species such as salt marsh harvest mouse, California Ridgway's rail, and California black rail habitat would be impacted by construction; however, the elevated causeway structure would limit the roadway's footprint on important habitat and would provide for greater habitat connectivity compared to the Existing Alignment Hybrid.

This alignment would include minimal embankment sections, and therefore would not adversely impact ecological corridors. The Existing Alignment Causeway Alternative does not cross any natural upland marsh migration zones; causeway segments across much of its length would have minimal impact on transition zone high tide refugia. This alignment avoids most present day mudflats; however, much of the alignment may be mudflat in the future. The alignment contains lower priority long-term bird habitat as present day coastal marshes are expected to become inundated with the progression of sea level rise.

The Existing Alignment Causeway Alternative would likely have less overall impacts on biological resources than the Existing Alignment Hybrid and Northern Alignment Alternatives, and similar overall impacts to the Southern Alignment Alternatives. Overall, the Existing Alignment Causeway Alternative was ranked as having moderate impacts on biological resources based on the criteria evaluated.

Northern Alignment (A3)

Existing habitat categories within the Northern Alignment right-of-way include annual grassland, barren, blue oak woodland, coastal oak woodland, cropland, eucalyptus, existing right-way, urban, valley oak woodland, and wetlands/baylands/open water. The total of potentially jurisdictional wetlands and other waters within the right-of-way is 67 acres, including 44 acres of wetlands and 23 acres of other waters. This is the lowest total of combined impacts and the third highest total of wetland impacts of all alternatives, and is reflective of the inland route of this alternative.

Twenty state or federally-listed threatened or endangered species have the potential to occur along the Southern Alignment 2 corridor. These include the same 11 wildlife species identified for the Existing Alignment Alternatives and Southern Alignment 1 Alternative, plus four additional wildlife species (bank swallow, Swainson's hawk, vernal pool fairy shrimp, and California freshwater shrimp), and five plant species (two-fork clover, Sonoma sunshine, Pitkin marsh lily, Contra Costa goldfields, and Tiburon paintbrush). Seven of these species have critical habitat within the alignment corridor: western snowy plover, steelhead, green sturgeon, chinook salmon, Contra Costa goldfields, Soft salty bird's beak, and vernal pool fairy shrimp. The Northern Alignment has the greatest number of listed species with potential to occur as well as designated critical habitats of all alternatives. Habitat for salt marsh harvest mouse is present along this alignment and will be important habitat as sea level rise transitions habitat zones to higher ground. This alternative's potential to impact to state or federally-listed threatened or endangered species and their habitat was ranked as moderate based on the number of listed species and critical habitats present, although the level of impacts may not be significant.

This alignment could serve as barrier to ecological corridors; proposed causeway structure at smaller channel crossings would help to reduce effects. The Northern Alignment crosses potential natural marsh migration zones except to the east of Merazo. The alignment would be a causeway where it crosses these zones, which would reduce impacts. This alignment avoids most present day mudflats and anticipated future mudflats. The alignment contains higher priority long-term bird habitat as inland marshes will survive the longest with the progression of sea level rise.

Based on the findings above, the Northern Alignment Alternative would likely have greater overall impacts on biological resources than the Existing Alignment Causeway and Southern Alignment alternatives, and similar overall impacts to the Existing Alignment Hybrid Alternative. Overall, the Northern Alignment Alternative was ranked as having moderate to potentially significant impacts on biological resources based on the criteria evaluated.

Southern Alignment 1 (A4)

Existing habitat categories within the Southern Alignment 1 right-of-way include annual grassland, cropland, existing right-way, urban, and wetlands/baylands/open water. The total of potentially jurisdictional wetlands and other waters within the right-of-way of Southern Alignment 1 is 103 acres, including 31 acres of wetlands and 72 acres of other waters. This is the third highest total of combined impacts and the lowest total of wetland impacts of all alternatives.

As noted above, the same twelve state or federally-listed threatened or endangered species have the potential to occur along this alignment as the Existing Alignment Alternatives. Similarly, three of these species also have designated critical habitat within the alignment corridor. Most of this alternative alignment is outside of salt marsh harvest mouse habitat; some potential habitat is present at the mouth of Sonoma Creek. Habitat for California Ridgway's rail is within and adjacent to the alignment. This alternative's impacts to state or federally-listed threatened or endangered species and their habitat was ranked as moderate. Southern Alignment 1 avoids most marsh habitat, but bisects mudflat habitat and would introduce new potential impacts to aquatic species and shorebird species that forage in mudflats.

This alignment would occur primarily offshore and would include minimal embankment sections, and therefore would not adversely impact ecological corridors. Southern Alignment 1 does not cross any natural upland marsh migration zones and therefore would not impact these features. The alignment runs parallel to the existing alignment through mudflats adjacent to salt marsh edge from the mouth of Sonoma Creek to Figueros Tract/Mare Island. With sea level rise, much of the proposed alignment may become shallow subtidal habitat. The alignment contains lower priority long-term bird habitat as present day coastal marshes are expected to become inundated with the progression of sea level rise.

Based on the findings above, Southern Alignment 1 would likely have less overall impacts on biological resources than the Existing Alignment Hybrid and Northern Alignment Alternatives, and similar overall impacts to the Existing Alignment Causeway and Southern Alignment 2 Alternatives. Overall, the Southern Alignment 1 Alternative was ranked as having moderate impacts on biological resources based on the criteria evaluated.

Southern Alignment 2 (A5)

Existing habitat categories within the Southern Alignment 2 right-of-way include annual grassland, barren cropland, existing right-way, urban, and wetlands/baylands/open water. The total of potentially jurisdictional wetlands and other waters within the right-of-way of Southern Alignment 2 is 207 acres, including 37 acres of wetlands and 170 acres of other waters. This is the highest total of combined impacts and the highest total of other waters impacts of all alternatives, and is reflective of this alternative's routing over the open waters of San Pablo Bay.

Thirteen state or federally-listed threatened or endangered species have the potential to occur along the Southern Alignment 2 corridor. These include the same 12 species identified for the Existing Alignment Alternatives and Southern Alignment 1 Alternative, plus one additional plant species (Marin western flax). Three of these species have designated critical habitat within the alignment corridor: steelhead, green sturgeon, and chinook salmon. Most of this alternative alignment is outside of salt marsh harvest mouse habitat; it borders potential habitat at the mouth of Novato Creek and at southern end of Tubbs Island. Habitat for California Ridgway's rail is within and adjacent to the alignment. This alternative's impacts to state or federally-listed threatened or endangered species and their habitat was ranked as moderate to potentially significant. Southern Alignment 2 avoids most marsh habitat, but bisects San Pablo Bay and would introduce potential impacts to aquatic species over a greater habitat area than Southern Alignment 1.

This alignment would occur primarily over open water and would include minimal embankment sections, and therefore would not adversely impact ecological corridors. Southern Alignment 2 does not cross any natural upland marsh migration zones except on the existing levee slopes; therefore, impacts would be minimal. The alignment crosses mudflats at Figueros Tract/Mare Island and at Novato Creek; this mudflat habitat may be shallow subtidal in the future. The alignment contains lower priority long-term bird habitat as present day coastal marshes are expected to become inundated with the progression of sea level rise.

Based on the findings above, Southern Alignment 2 would likely have less overall impacts on biological resources than the Existing Alignment Hybrid and Northern Alignment Alternatives, and similar overall impacts to the Existing Alignment Causeway and Southern Alignment 1 Alternatives. Overall, the Southern Alignment 2 Alternative was ranked as having moderate impacts on biological resources based on the criteria evaluated.

Hydrology

Because the minimum roadway design elevation was selected in consideration of astronomical tide, storm surge, and wave effects (and includes 1 to 2 feet of freeboard), the roadway or roadway structure is not anticipated to be impacted by coastal flooding over its anticipated lifespan (through 2100) for all alternatives. Based on current state sea level rise guidance, there is a small likelihood (<5 percent chance) that observed sea level rise could exceed 66 inches by end-of-century under a high emissions scenario; however, the roadway design can accommodate some additional sea level rise due to the freeboard that is incorporated into the design elevations and by recognizing that flooding would occur very rarely with temporary impacts. Minimum roadway design elevations can be re-evaluated in subsequent phases of design in consideration of evolving climate change science and sea level rise projections at that time. Because all alternatives would be elevated above anticipated future coastal and riverine flood hazards and the design elevation was selected using a consistent approach across all alternatives, roadway elevation was not a distinguishing criterion among the alternatives.

Figure 8 shows each alignment and the projected extent of flooding for a 100-year storm surge event with 66 inches of sea level rise (representative of a high-range, end-of-century sea level rise projection). The potential impacts of each alternative alignment on hydrology and tidal/riverine flows are discussed below.

Existing Alignment Hybrid (A1)

The Existing Alignment Hybrid traverses historical baylands and is located primarily within an area projected to be impacted by future sea level rise. This alignment includes 4.7 miles of bridge and causeway segments in locations where the highway could interfere with channel and marsh flows to reduce impacts to hydrology; however, portions of the alignment (4.8 miles) would be constructed on embankment which would restrict hydrologic connectivity. The proposed embankment across Tubbs Island could reduce potential opportunities for restoration in the Tubbs Island area in the future because the embankment would act as a barrier to tidal flows and prevent reconnection of historical tidal channels that cross underneath the highway. This alternative would partially impede tidal and riverine flows and hydrologic connectivity between San Pablo Bay and the Napa-Sonoma wetland areas.

A major bridge crossing at Sonoma Creek and minor crossing at Tolay Creek would need to be lengthened to provide additional channel capacity to convey increased tidal flows as a result of future wetland restoration activities that are proposed upstream of these bridges. The design of these crossings takes these flows into account, and as a result it is not anticipated that the highway or bridge abutments would restrict future tidal or riverine flows.

The Existing Alignment Hybrid was scored as having moderate to potentially significant impacts to hydrology due to the presence of embankment segments that could limit tidal flows and hydrologic connectivity and limit the potential for future restoration activities.

Existing Alignment Causeway (A2)

The Existing Alignment Causeway traverses historical baylands and is located primarily within an area projected to be impacted by future sea level rise. This alignment includes 8.5 miles of bridge and causeway segments across much of its length to reduce impacts on channel and marsh flows. Approximately 1.0 mile of the alignment would be on embankment, greatly reducing potential impacts to hydrologic flows compared to the Existing Alignment Hybrid Alternative. This alternative would generally allow unimpeded tidal and riverine flows and hydrologic connectivity between San Pablo Bay and the Napa-Sonoma wetland areas.

A major bridge crossing at Sonoma Creek and minor crossing at Tolay Creek would need to be lengthened to provide additional channel capacity to convey increased tidal flows as a result of future wetland restoration activities that are proposed upstream of these bridges. The design of these crossings takes these flows into account, and as a result it is not anticipated that the highway or bridge abutments would restrict future tidal or riverine flows.

The Existing Alignment Causeway was scored as having a net benefit/minimal impact to hydrology due to the presence of causeway segments along much of its length that would allow for tidal flows and hydrologic connectivity and the potential for future restoration activities.

Northern Alignment (A3)

The Northern Alignment traverses the northern limits of the historical baylands-upland transition; however, portions of the alignment cross the floodplains of the Napa River and Sonoma Creek. This alignment includes 6.0 miles of bridge and causeway segments to reduce impacts on channel and marsh flows. Approximately 14.9 miles of the alignment would be on embankment, potentially impeding natural runoff processes from upland areas. In addition, the alignment is located in valuable upland transitional habitat that will become important in the future for migration of estuarine and brackish habitat in response to sea level rise. This alternative would allow unimpeded tidal and riverine flows and connectivity between San Pablo Bay and the Napa-Sonoma wetland areas.

A new bridge crossing would be needed at the Napa River and causeway segments would be needed across historical baylands in the vicinity of the Napa River and Sonoma Creek.

The Northern Alignment was scored as having moderate to potentially significant impacts to hydrology due to its location and use of embankment in valuable upland transitional habitat at the Bay margin.

Southern Alignment 1 (A4)

Southern Alignment 1 primarily traverses mudflats along the edge of San Pablo Bay. This alignment includes approximately 9.3 miles of bridge and causeway segments with a minimal portion (0.6 miles) on embankment. This alternative would allow unimpeded tidal and riverine flows and hydrologic connectivity between San Pablo Bay and the Napa-Sonoma wetland areas.

New bridge crossings at Sonoma Creek and Tolay Creek would be required as part of the new alignment.

Southern Alignment 1 was scored as having a net benefit/minimal impact to hydrology due to the presence of causeway segments along much of its length across mudflats that would allow for tidal flows and hydrologic connectivity and the potential for future restoration activities.

Southern Alignment 2 (A5)

Southern Alignment 2 primarily traverses open water in San Pablo Bay. This alignment includes approximately 17.0 miles of bridge and causeway segments and 3.1 miles of embankment, primarily at the east and west ends of the alignment. This alternative would allow unimpeded tidal and riverine flows and hydrologic connectivity between San Pablo Bay and the Napa-Sonoma wetland areas.

Bridge/navigation spans would be required for passage to the Petaluma River and Sonoma Creek.

Southern Alignment 2 was scored as having a net benefit/minimal impact to hydrology due to the presence of causeway segments along much of its length across open water that would allow for tidal flows and hydrologic connectivity and the potential for future restoration activities.

Cultural Resources

The following is based on a review of existing records of cultural resources sites that occur along or near the alternative alignments. The following summary of information is considered only an indicator of cultural resources along the alignments, and further work is needed to define the full extent of resources, their eligibility, and potential for actual impacts. As noted in Section 4, the Native American groups that were contacted did not respond to an inquiry regarding potential sacred sites and tribal cultural resources, and the SLC did not respond to a request for information from its Shipwrecks Database; therefore, potential impacts to these resources are not included in the comparative analysis below.

Existing Alignment Hybrid (A1) and Causeway (A2)

The NWIC record search identified seven previously recorded resources within 0.5 mile of the Existing Alignment Alternatives. One of these resources, the Mare Island Naval Shipyard National Historic District is eligible for listing by the NRHP/CRHR. Two of the previously recorded resources require further study to determine eligibility. Because of the eligible Mare Island Naval Shipyard National Historic District and two resources requiring further study, the Existing Alignment Alternatives were ranked as having a moderate potential to impact cultural resources.

Northern Alignment (A3)

The NWIC record search identified 19 previously recorded resources within 0.5 mile of the Northern Alignment. Fifteen of these resources have not been evaluated and would require further study to determine eligibility. No eligible resources were identified within this alignment. The Northern Alignment is by far the most sensitive for previously recorded prehistoric and historical archaeological sites, as well as built environment resources; therefore, this alternative is considered to have the greatest potential to impact to cultural resources of the five alignments and was ranked as having a significant potential to impact cultural resources.

Southern Alignment 1 (A4)

The NWIC record search identified eight previously recorded resources within 0.5 mile of Southern Alignment 1. One of these resources, the Mare Island Naval Shipyard National Historic District is eligible

for listing by the NRHP/CRHR. Three of the previously recorded resources require further study to determine eligibility. Because of the eligible Mare Island Naval Shipyard National Historic District and three resources requiring further study, the Southern Alignment 1 Alternative was ranked as having a moderate potential to impact cultural resources.

Southern Alignment 2 (A5)

The NWIC record search identified eight previously recorded resources within 0.5 mile of Southern Alignment 2. One of these resources, the Mare Island Naval Shipyard National Historic District is eligible for listing by the NRHP/CRHR. Two of the previously recorded resources require further study to determine eligibility. Because of the eligible Mare Island Naval Shipyard National Historic District and two resources requiring further study, the Southern Alignment 2 Alternative was ranked as having a moderate potential to impact cultural resources.

Community Impacts and Public Access

This section, as well as the subsequent Land Use section, describes community and public access resources as they currently exist. Although SR 37 may be adapted to climate change effects with the proposed improvements for each alternative, access off of SR 37 to these resources may be impaired in the future if local roads or driveways become subject to inundation.

Existing Alignment Hybrid (A1) and Causeway (A2)

The Existing Alignment Alternatives would not be expected to impact community character and cohesion. With the exception of commercial/industrial areas at the eastern alignment terminus at Mare Island, the alignment corridor is relatively rural in nature. These alternatives would expand SR 37 on its current alignment and would not introduce any new barriers or features that would divide existing communities or substantially change the character of the current corridor.

The current alignment provides access to multiple recreational/public access areas including the San Pablo Bay NWR, Napa-Sonoma Marshes Wildlife Area, Caltrans public viewing areas near West Vista Point and the Mare Island interchange, and Skaggs Island. The Existing Alignment Alternatives would maintain access from SR 37 to these recreational destinations/public access points.

Therefore, the Existing Alignment Alternatives received an overall ranking of minimal impact for community impacts and public access.

Northern Alignment (A3)

The Northern Alignment Alternative would require converting SR 29, between SR 37 and Napa Junction, from a conventional highway to an expressway to accommodate six lanes of traffic with frontage roads on either side for local circulation. This segment of SR 29 would be grade separated at the four existing local roadway intersections. This portion of SR 29 is primarily commercial and residential, and the construction of a six-lane expressway could serve as a barrier between the east and west sides of the corridor and would likely change the character of the community through increased traffic levels. The Northern Alignment would also conflict with goals of the City of American Canyon to transform the Broadway Corridor (SR 29) into a mixed-use, small-town neighborhood, as outlined in the Broadway District Specific Plan Draft EIR (City of American Canyon, 2017). The Specific Plan considers several mobility enhancements, including reduction in SR 29 speed limits from 50 and 55 miles per hour to 35 miles per hour, street extensions, bicycle and pedestrian facilities, and streetscape improvements; although this plan has not been finalized, the Northern Alignment would not be compatible with the vision for the district set forth in the draft plan. Therefore, impacts related to community cohesion and character are considered potentially significant for the Northern Alignment.

Under this alternative, the existing SR 37 roadway would be converted to a local road, and the bridge at Sonoma Creek would be removed to enhance hydrologic connectivity. Access would be maintained to the San Pablo Bay NWR, Napa-Sonoma Marshes Wildlife Area, Caltrans public viewing areas near West Vista Point and the Mare Island interchange, and Skaggs Island via the local road; however, these areas

would no longer be directly connected to SR 37. In addition, with removal of the Sonoma Creek Bridge, a direct connection between the recreational/public access destinations east and west of this bridge along the current SR 37 alignment would no longer be available. Because of these changes, certain recreational/public access points along the current SR 37 alignment could be more difficult to reach, depending on point of origin. This impact is expected to be greater under the Northern Alignment than under the Southern Alignment Alternatives because the Northern Alignment would have less direct connection to the termini of the existing SR 37 corridor, requiring greater use of other routes to reach recreational/public access points along the current corridor.

Based on these issues, the Northern Alignment received an overall ranking of notable/potentially significant impact for community impacts and public access.

Southern Alignment 1 (A4)

Southern Alignment 1 would not be expected to impact community character and cohesion. With the exception of commercial/industrial areas at the eastern alignment terminus at Mare Island, the alignment corridor is relatively rural in nature. This alternative would realign most of SR 37 just offshore, parallel to its current alignment, and would not introduce any new barriers or features that would divide existing communities or substantially change the character of the corridor.

Under this alternative, the existing SR 37 roadway would be converted to a local road, and the bridge at Sonoma Creek would be removed to enhance hydrologic connectivity. Access would be maintained to the San Pablo Bay NWR, Napa-Sonoma Marshes Wildlife Area, Caltrans public viewing areas near West Vista Point and the Mare Island interchange, and Skaggs Island via the local road; however, these areas would no longer be directly connected to SR 37. In addition, with removal of the Sonoma Creek Bridge, a direct connection between the recreational/public access destinations east and west of this bridge along the current SR 37 alignment would no longer be available. Because of these changes, certain recreational/public access points along the current SR 37 alignment could be more difficult to reach, depending on point of origin.

Based on the potential public access impacts, Southern Alignment 1 received an overall ranking of moderate impact for community impacts and public access.

Southern Alignment 2 (A5)

Southern Alignment 2 was ranked moderate for potential community impacts. This alternative would realign most of SR 37 over San Pablo Bay. With the exception of commercial/industrial areas at the eastern alignment terminus at Mare Island and residential/commercial areas at the western alignment terminus, the alignment is relatively rural in nature where it crosses over land. At its western terminus, the new alignment would pass just north of the Bel Marin Keys community prior to tying into SR 101. The community character of Bel Marin Keys could be impacted by the introduction of a substantial causeway structure and source of noise from highway traffic.

As with Southern Alignment 1, under this alternative the existing SR 37 roadway would be converted to a local road, and the bridge at Sonoma Creek would be removed to enhance hydrologic connectivity. As described above, these changes could make it more difficult to reach certain recreational/public access points along the existing SR 37 alignment, depending on point of origin.

Land Use and Population Growth

Existing Alignment Hybrid (A1) and Causeway (A2)

Because the Existing Alignment Alternatives would occur along the current SR 37 highway alignment, adverse land use compatibility impacts are not expected. These alternatives would cross through agricultural land and the San Pablo Bay NWR. Other land use designations along the existing alignment include recreation and commercial/industrial.

The Existing Alignment Alternatives were ranked moderate for potential Section 4(f) impacts. Both alternatives are located within the San Pablo Bay NWR and Napa-Sonoma Marshes Wildlife Area and would expand the footprint of the current roadway alignment. There are other recreational and access areas along the alignments that would also have to be assessed for potential impacts if they meet the Section 4(f) criteria.

The Existing Alignment Hybrid right-of-way includes 66 acres of Farmland of Local Importance. The Existing Alignment Causeway right-of-way includes 37 acres of Farmland of Local Importance. Based on acreage and farmland classification category, these alternatives would have potentially impacts similar to the Southern Alignment Alternatives and substantially less than those of the Northern Alignment Alternative.

These alternatives would improve traffic flow, throughput, and intermodal use along an existing transportation corridor. They would not add any new access to lands that are not already accessible, and in general the lands traversed by SR 37 consist largely of refuge and protected resources. For these reasons, the Existing Alignment Alternatives are not expected to induce growth.

Based on the above, the Existing Alignment Alternatives received an overall ranking of minimal impact for land use and population growth.

Northern Alignment (A3)

The Northern Alignment Alternative would cross through refuge/wildlife, agricultural, park/open space, recreation, residential, educational/institutional, and commercial/industrial land uses. This alignment would cross through residential areas in Napa County (American Canyon). Three schools (American Canyon School, Napa Junction Magnet Elementary School, and Dan Mini Elementary School) are located within 0.25 mile of the Northern Alignment. Due to the number of sensitive land uses along the proposed alignment, this alternative could result in land use compatibility conflicts.

The Northern Alignment would cross through the Napa-Sonoma Marshes Wildlife Area and Tolay Creek Ranch refuge and wildlife areas. This alternative would also potentially impact Veterans Memorial Park in the City of American Canyon. The potential 4(f) impacts of this alternative are considered greater than those of the Existing Alignment Alternatives because it would create a new roadway alignment into undisturbed areas rather than expand the existing SR 37 alignment.

The Northern Alignment would have considerably greater potential farmlands impacts than all other alternatives. This right-of-way for this alternative includes 54 acres of Prime Farmland, 50 acres of Farmland of Local Importance, 5 acres of Unique Farmland, and 3 acres of Farmland of Statewide Importance, for a total of 147 acres.

The Northern Alignment Alternative would place a new major transportation corridor through an area that is largely undeveloped. This would provide access to new areas and likely change regional transportation patterns, which could encourage new development near the alignment. As such, this alignment could create significant indirect and cumulative impacts related to population growth.

Based on the above, the Northern Alignment Alternative received an overall ranking of notable/significant impact for land use and population growth.

Southern Alignment 1 (A4)

Southern Alignment 1 would cross through refuge/wildlife, park/open space, recreation, agricultural, and commercial/industrial land uses. Although this alternative would create a new alignment for SR 37, a large portion of this alignment would be offshore, along the shoreline parallel to the existing SR 37 corridor, and therefore is considered less likely to result in land use conflicts compared to the Northern Alignment and Southern Alignment 2.

Southern Alignment 1 would cross through the Napa-Sonoma Marshes Wildlife Area and San Pablo Bay NWR. The potential 4(f) impacts of this alternative are considered greater than those of the Existing Alignment Alternatives because it would create a new roadway alignment through undisturbed areas rather than expand the existing SR 37 alignment.

The Southern Alignment 1 right-of way includes 24 acres of Farmland of Local Importance and 2 acres of Unique Farmland, for a total of 26 acres. Southern Alignment 1 would potentially impact fewer acres of farmlands than the Existing Alignment Alternatives but slightly more Southern Alignment 2.

Similar to the Existing Alignment Alternatives, Southern Alignment 1 would not add any new access to lands that are not already accessible. The majority of this alignment would be offshore and in general the lands traversed by this alignment consist largely of refuge and protected resources. For these reasons, Southern Alignment 1 is not expected to induce growth.

Based on the above, Southern Alignment 1 received an overall ranking of minimal to moderate impact for land use and population growth.

Southern Alignment 2 (A5)

Land uses along the Southern Alignment 2 Alternative include refuge/wildlife, park/open space, recreation, agricultural, residential, educational/institutional, and municipal/utility. Several residential communities would be located less than 0.25 mile from the proposed alignment. Although many of these uses would not be directly impacted because most of the proposed alignment would be over open water in San Pablo Bay, there could be compatibility conflicts with certain sensitive land uses, including residences. This alternative was ranked as having moderate land use compatibility impact potential relative to the other alternatives.

Southern Alignment 2 would cross through the San Pablo Bay Wildlife Area and San Pablo Bay NWR. The potential 4(f) impacts of this alternative are considered greater than those of the Existing Alignment Alternatives because it would create a new roadway alignment through undisturbed areas rather than expand the existing SR 37 alignment.

The Southern Alignment 2 right-of way includes 8 acres of Farmland of Local Importance and 4 acres of Unique Farmland, for a total of 12 acres, the lowest of all alternatives.

Southern Alignment 2 would be primarily located over open water (San Pablo Bay) and areas of undeveloped land that are dominated by marshland and wildlife/refuge areas; therefore, it would not provide access to new areas and would not be expected to significantly induce growth. However, some growth could occur as a result of the more direct route between Vallejo and Highway 101, as well as there being two highway route options between US 101 and SR 121. These features could induce growth near the eastern and western termini (i.e., Mare Island and the US 101/SR 37 interchange), although these areas are already fairly developed, as well as in areas north along SR 121.

Based on the above, Southern Alignment 2 received an overall ranking of moderate impact for land use and population growth.

Noise

Existing Alignment Hybrid (A1) and Causeway (A2)

The Existing Alignment Alternatives, along with Southern Alignment Alternative 1, have the lowest number of identified sensitive receptors within 0.5 mile, and therefore lower potential to result in adverse noise impacts than the Northern Alignment and Southern Alignment 2 alternatives. Twenty-two residential parcels were identified within 0.5-mile of Existing Alignment Alternatives. No schools, libraries, religious institutions, or hospitals were identified within a 0.5-mile of the alignments. These alternatives were ranked minimal impact for noise relative to the other alternatives.

Northern Alignment (A3)

The Northern Alignment would have the greatest potential to result in adverse noise impacts of all the alternatives. Within 0.5-mile of this proposed alignment, 6,445 residential parcels and six schools were identified. No libraries, religious institutions, or hospitals were identified within a 0.5-mile of the alignment. This alternative was ranked notable/significant impact for noise relative to the other alternatives.

Southern Alignment 1 (A4)

Because of the close proximity of Southern Alignment 1 to the Existing Alignment Alternatives, it has the same sensitive receptors identified within 0.5 mile (22 residential parcels). As noted above, both Existing Alignment Alternatives and Southern Alignment Alternative 1 have lower potential to result in adverse noise impacts than the Northern Alignment and Southern Alignment 2 alternatives. This alternative was ranked minimal impact for noise relative to the other alternatives.

Southern Alignment 2 (A5)

Southern Alignment 2 would have less potential to adversely impact residential parcels than the Northern Alignment, but a greater potential to adversely impact residential parcels than the Existing Alignment and Southern Alignment 1 alternatives. Within 0.5 mile of Southern Alignment 2, 917 residential parcels were identified. There were no schools, libraries, religious institutions, or hospitals identified within a 0.5-mile of the alignment. This alternative was ranked moderate impact for noise relative to the other alternatives.

Public Acceptability

Existing Alignment Hybrid (A1) and Causeway (A2)

The focus groups generally liked that the Existing Alignment Hybrid and Causeway Alternatives would include additional lanes and protect the roadway from sea level rise. Focus group participants recognized that these two alternatives are very similar, but also liked certain aspects of one alternative over the other. Participants who preferred the Hybrid Alternative thought it would be more cost-effective and quicker to build than the Causeway Alternative. Participants who preferred the Causeway Alternative thought it would have less of an environmental impact. The Existing Alignment Hybrid and Causeway Alternatives were more positively perceived by the focus group participants than the Northern and Southern Alignment Alternatives, and the Existing Alignment Causeway Alternative was the most preferred alternative overall.

Northern Alignment (A3)

The majority of focus group participants widely disliked the Northern Alignment Alternative because of the increased mileage and associated transportation costs; participants expressed they would prefer sitting in traffic than traveling the extra distance. Additionally, participants were concerned this alternative would exacerbate existing traffic issues in Napa County, especially around American Canyon, and would take longer to build than the other alternatives. Some group focus participants thought this alternative could result in increased tourism in Napa, provide a more direct route to Sonoma and Napa, and would be less harmful to wetlands and wildlife; however, overall the Northern Alignment Alternative was perceived negatively and was the lowest-ranked (least-liked) alternative by the focus groups.

Southern Alignment 1 (A4) and Southern Alignment 2 (A5)

Focus group participants were divided on their opinions towards the Southern Alignment Alternatives. Southern Alignment Alternative 1 was generally perceived to have higher costs and a greater impact on environmental resources and natural beauty of the region. Southern Alignment Alternative 2 was extremely polarizing during focus groups discussions, as compared to the other alternatives. Those in support of Southern Alignment Alternative 2 liked that it would provide direct routes between multiple destinations, particularly between US 101 and Interstate 80, and would create multiple route options throughout the region. Those who opposed Southern Alignment Alternative 2 believed it would have higher costs, take too long to build, and have a greater impact on ships, environmental resources and natural beauty of the region. Overall, the focus group participants preferred the Southern Alignment Alternatives to the Northern Alignment Alternative but not to the Existing Alignment Alternatives.

7. Summary Comparison of Alternatives

Overall, the Existing Alignment Hybrid and Existing Alignment Causeway Alternatives scored more favorably than the northern and two southern alignment alternatives. The Existing Alignment Alternatives best meet the project purpose and need while minimizing environmental impacts, and are the alternatives expected to be more widely preferred by the public based on the initial focus group study (MIG, 2018). The Existing Alignment Alternatives would result in the lowest future travel times for the existing SR 37 travel corridor between SR 121 and Mare Island, would have the lowest vehicle miles traveled (VMT), and would have the lowest criteria pollutant and greenhouse gas operations emissions. These alternatives require considerably less right-of-way acquisition than the Northern Alignment and Southern Alignment 2 Alternatives. Use of the existing rural corridor for either the Hybrid Alternative or Causeway Alternative would minimize potential impacts to residences, businesses, communities and land use. These alternatives would also best maintain public access to the San Pablo Bay NWR, wildlife areas, and trails along the current highway, and provide opportunities to enhance public shoreline access. The Existing Alignment Hybrid Alternative would result in greater biological resources and hydrology impacts than the Existing Alignment Causeway Alternative due to embankment placement, which would also reduce restoration potential.

Because of its longer route, the Northern Alignment Alternative would have future travel times almost double those of the other alternatives and would increase daily VMT and criteria pollutant and greenhouse gas operational emissions compared to the alternatives along the existing alignment. The Northern Alignment would require the highest amount of right-of-way acquisition at 428 acres. Other drawbacks of this alternative are that it transects more sensitive habitat types than the other alternatives, has greater potential cultural resources and community impacts, has potential to induce growth, and decreases public access. Because of the conversion of the existing SR 37 to a local road and removal of the Sonoma Creek Bridge, this alternative would decrease existing public access to the San Pablo Bay NWR, wildlife areas, and trails. The Northern Alignment was widely disliked by focus group participants due to increased mileage and associated transportation costs and concern regarding traffic impacts in Napa.

The Southern Alignment 1 Alternative would have environmental impacts and right-of-way acquisition needs similar to the Existing Alignment Alternatives; however, the impacts would occur primarily to offshore and tidal mudflat habitats. Because of its offshore alignment and the conversion of the existing SR 37 to a local road and removal of the Sonoma Creek Bridge, this alternative would decrease existing public access to the San Pablo Bay NWR, wildlife areas, and trails. Focus group participants did not prefer this alternative as they perceived it would have higher costs and greater impacts on the environment and the region's natural beauty.

The Southern Alignment 2 Alternative would have the lowest travel times for the entire SR 37 corridor (between SR 29 and US 101); however, it would serve the highest travel demand, thereby increasing daily VMT and criteria pollutant and greenhouse gas operational emissions compared to the alternatives along the existing alignment. Southern Alignment 2 would require 1.5-2 times more right-of-way acreage than the Existing Alignment Alternatives and would impact offshore habitats. This alternative would have potential land use conflicts and community impacts. Because of its location over open water and the conversion of the existing SR 37 to a local road and removal of the Sonoma Creek Bridge, this alternative would decrease existing public access to the San Pablo Bay NWR, wildlife areas, and trails. Focus group participants were split on Alternative 5, some perceived this alternative would have higher costs and environmental impacts while others liked that it would provide multiple direct routes between points.

In terms of estimated cost (in 2018\$), the Existing Alignment Hybrid would be the least expensive alternative (\$2.4B), followed by the Existing Alignment Causeway and Southern Alignment 1, each at \$2.9B. The Northern Alignment and Southern Alignment 2 Alternatives would have the highest costs, each at \$3.3B.

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Appendix A - Alternatives Evaluation Matrix

Category	Subcategory	Metric	Alternatives				
			A1. Existing Alignment Hybrid	A2. Existing Alignment Causeway	A3. Northern Alignment	A4. Southern Alignment 1	A5. Southern Alignment 2
Engineering Features		General population area served by alignment	Primary weekday travel between Contra Costa Co. (I-680 corridor) and Sonoma Co. (US 101) and between Solano Co. and Marin and Sonoma counties (US 101 corridor). Concentration of origin/destinations at Vallejo.	Primary weekday travel between Contra Costa Co. (I-680 corridor) and Sonoma Co. (US 101) and between Solano Co. and Marin and Sonoma counties (US 101 corridor). Concentration of origin/destinations at Vallejo.	Similar to A1, A2 and A4, plus likely to induce increase of origins/destinations in Solano and Napa counties.	Primary weekday travel between Contra Costa Co. (I-680 corridor) and Sonoma Co. (US 101) and between Solano Co. and Marin and Sonoma counties (US 101 corridor). Concentration of origin/destinations at Vallejo.	Similar to A1, A2 and A4, plus induced demand expected because there would be two routes between 101 and 121.
		Total length of alignment from eastern to western terminus	9.5 miles	9.5 miles	20.9 miles	9.9 Miles	20.1 miles (14.6 miles of the east-west segment, 3.5 miles of the north-south SR 121 Extension, and 2.0 miles of ramps)
		Termini of alignment tie-in location	Western Terminus: SR 37/SR 121 intersection Eastern Terminus: West approach of Napa River Bridge	Western Terminus: SR 37/SR 121 intersection Eastern Terminus: West approach of Napa River Bridge	Western Terminus: SR 37/SR 121 intersection Eastern Terminus: SR 37/SR 29 interchange	Western Terminus: SR 37/SR 121 interchange Eastern Terminus: West approach of Napa River Bridge	Western Terminus: US 101 Eastern Terminus - West Approach of Napa River Bridge Northern Extension tie in to SR 121
		Length of fill/embankment versus causeway/bridges	4.8 miles of fill/embankment 4.7 miles of causeway/bridge	1.0 mile of fill/embankment 8.5 miles of causeway/bridge	14.9 miles of fill/embankment 6.0 miles of causeway/bridge	0.6 mile of fill/embankment 9.3 miles of causeway/bridge	3.1 miles of fill/embankment 17 miles of causeway/bridge
		Depth to Young Bay Mud	70 feet	70 feet	20-30 feet across west causeway except at railroad crossing areas, L= 3.3 miles 20-30 feet along east causeway, L=2.0 miles	100 feet	70-100 feet
		Intersection Impacts	The SR 37/Mare Island interchange and SR 37/SR 121 intersection would be reconfigured to connect to the new alignment.	The SR 37/Mare Island interchange and SR 37/SR 121 intersection would be reconfigured to connect to the new alignment.	1. SR 29 interchange would be converted to full freeway-freeway interchange with direct connector ramps. 2. Meadows Dr. would be converted to a right in/right out intersection at SR 29 through frontage road. 3. Mini Dr. would be elevated to overpass SR-29. Impacts along Mini Dr. extend about 1100 feet on either side of railroad. Impacts to gas station at north east quadrant of the intersection. 4. Kimberly Dr. would be converted to a right-in/right-out intersection at SR 29. 5. American Canyon Road and S Napa Junction Road would be grade separated from SR 29 and would connect to SR 29 through frontage roads. SR 29 would be depressed from about 1,000 ft. south of American Canyon Road to 1000 ft. north of S Napa Junction Road. 6. Donaldson Way would be grade separated from SR 29 and would connect to SR 29 through frontage roads. Only right-in/right-out movements would be allowed from to/from Donaldson Way and frontage road. 7. N Napa Junction Rd would be converted to a right-in/right-out intersection at SR 29 through frontage road. 8. SR 12/SR 29 intersection would be converted to a full interchange with direct connector ramps. 9. All existing access roads across the railroad and along SR 121 would be maintained along the new SR 37 alignment through median left turn lanes.	SR 37/SR121 intersection would be converted to an interchange with direct connector ramps.	SR 37/SR121 intersection would be converted to an interchange with direct connector ramps.
		Railroad Crossings	Alignment would span over SMART tracks near Tolay Creek.	Alignment would span over SMART tracks near Tolay Creek.	Northern Alignment would span over SMART tracks at two locations.	Alignment will span over SMART tracks.	SR 37 connection to US 101 would need to be reconfigured and would potentially involve impacts to the SMART tracks adjacent to US 101 and SR-37.
		Channel crossings	Would span over Sonoma Creek, Tolay Creek and CDFW Water control structure.	Would span over Sonoma Creek, Tolay Creek and CDFW Water control structure.	Would span over all existing creeks and channels along the alignment.	Would span over Sonoma Creek Bridge and Tolay Creek.	Profile would be raised above estimated sea level rise water elevation to clear the shipping lane west of SR 121.
		Utility crossings	1. PG&E transmission towers near Sonoma Creek Bridge and north of SR37 would need relocation (two towers west of Sonoma Creek Bridge, one tower west of Sonoma Creek Bridge). Transmission lines may require raising for vertical clearance over raised highway. 2. Utility poles north of SR 37 would require relocation from SR 121 to Sonoma Creek Bridge. 3. Utility poles south of SR 37 would require relocation from Skaggs Island Road to Access Road 2.	1. PG&E transmission towers near Sonoma Creek Bridge and north of SR37 would need relocation (two towers west of Sonoma Creek Bridge, one tower west of Sonoma Creek Bridge). Transmission lines may require raising for vertical clearance over raised highway. 2. Utility poles north of SR 37 would require relocation from SR 121 to Sonoma Creek Bridge. 3. Utility poles south of SR 37 would require relocation from Skaggs Island Road to Access Road 2.	Utility impacts anticipated but not specifically identified as part of this assessment. Would require further study.	Utility impacts not anticipated but would require further study.	Utility impacts not anticipated but would require further study.
		Cost	Total Project Cost	\$2.4B	\$2.9B	\$3.3B	\$2.9B

Purpose and Need	Does the alignment meet the purpose and need of the project?	Would meet all aspects of purpose and need.	Would meet all aspects of purpose and need.	Longer travel distance would not improve peak travel times as well as other alternatives. Would not improve non-vehicular access to wildlife viewing and other shoreline recreation destinations along the current corridor. Would not realize ecological enhancement benefits as well as existing alignment alternatives.	Would not improve non-vehicular access to wildlife viewing and other shoreline recreation destinations along the current corridor. Would not realize ecological enhancement benefits as well as existing alignment alternatives.	Would not improve non-vehicular access to wildlife viewing and other shoreline recreation destinations along the current corridor. Would not realize ecological enhancement benefits as well as existing alignment alternatives.
Traffic	Traffic Summary					
	Year 2022 Travel Time SR 29 to US 101 (approx. 19 miles)	23 min WB AM Peak Hour 28 min EB PM Peak Hour	23 min WB AM Peak Hour 28 min EB PM Peak Hour	42 min WB AM Peak Hour 50 min EB PM Peak Hour	23 min WB AM Peak Hour 28 min EB PM Peak Hour	For SR 29 to SR 121 only: 24 min WB AM Peak Hour 29 min EB PM Peak Hour for SR 29 to US 101 (2 miles shorter SR 29 to US 101): 22 min WB AM Peak Hour 27 min EB PM Peak Hour
	Daily VMT Difference from Existing Alignment (2040, 4 county total) [relative to existing alignment]	0	0	(+)985,000 [2.6%]	Negligible	(+)1,028,400 [2.7%] with connection to SR 121 only; (+)1,062,000 [2.8%] with connection to SR 121 and US 101 There is induced demand because two routes are available between 101 and 121.
Right-of-Way Acquisition	Agricultural	40	22	203	34	25
	Commercial/Industrial	13	12	90	12	12
	Educational/Institutional	0	0	0	0	2
	Existing Right-of-Way	88	59	166	22	17
	Municipal/Utility	0	0	12	0	28
	Open Water	2	2	0	0	58
	Other/Unknown	1	1	26	<1	<1
	Park/Open Space	2	2	49	1	1
	Refuge Area/Wildlife	106	74	42	100	139
	Residential	0	0	6	0	0
Total	252	172	594	169	282	
Right-of-Way Acquisition Acres	164	113	428	147	265	
Air Quality & GHG	Criteria Pollutant and GHG Operational Emissions Estimate (difference from existing alignment)			CO: +771.12 kg/day PM2.5: +20.85 kg/day Total PM10: +50.41 kg/day Winter NOx: +113.83 kg/day CO2: +251kg/day	Negligible	For SR 29 to SR 121 only: CO: +803.51 kg/day PM2.5: +21.86 kg/day Total PM10: +52.79 kg/day Winter NOx: +123.65 kg/day CO2: +264.36 kg/day For SR 29 to US 101 (includes part of Segment A): CO: +831.15 kg/day PM2.5: +22.44 kg/day Total PM10: +54.21 kg/day Winter NOx: +122.57 kg/day CO2: +272.55 kg/day
	Biology Resources Summary					
	Wetlands in Right-of-Way	67	46	44	31	37
	Other Waters in Right-of-Way	49	38	23	72	170
	Wetlands and Other Waters in Right of Way	116	84	67	103	207
	Number of state and federally-listed threatened and endangered species with potential to occur	T&E: 12 -> Western snowy plover, California Ridgway's rail, peregrine falcon, California black rail, California red-legged frog, salt marsh harvest mouse, longfin smelt, delta smelt, steelhead, green sturgeon, chinook salmon, Soft salty bird's-beak	T&E: 12 -> Western snowy plover, California Ridgway's rail, peregrine falcon, California black rail, California red-legged frog, salt marsh harvest mouse, longfin smelt, delta smelt, steelhead, green sturgeon, chinook salmon, Soft salty bird's-beak	T&E: 20 -> Western snowy plover, California Ridgway's rail, peregrine falcon, California black rail, bank swallow, Swainson's hawk, California red-legged frog, vernal pool fairy shrimp, California freshwater shrimp, salt marsh harvest mouse, longfin smelt, delta smelt, steelhead, green sturgeon, chinook salmon, two-fork clover, Sonoma sunshine, Pitkin marsh lily, Contra Costa goldfields, Tiburon paintbrush	T&E: 12 -> Western snowy plover, California Ridgway's rail, peregrine falcon, California black rail, California red-legged frog, salt marsh harvest mouse, longfin smelt, delta smelt, steelhead, green sturgeon, chinook salmon, Soft salty bird's-beak	T&E: 13 -> Western snowy plover, California Ridgway's rail, peregrine falcon, California black rail, California red-legged frog, salt marsh harvest mouse, longfin smelt, delta smelt, steelhead, green sturgeon, chinook salmon, Soft salty bird's-beak, Marin western flax
	Critical habitat	3 spp: steelhead, green sturgeon, chinook salmon	3 spp: steelhead, green sturgeon, chinook salmon	7 spp: Western snowy plover, steelhead, green sturgeon, chinook salmon, Contra Costa Goldfields, Soft salty bird's beak, vernal pool fairy shrimp	3 spp: steelhead, green sturgeon, chinook salmon	3 spp: steelhead, green sturgeon, chinook salmon
	Salt marsh harvest mouse (SMHM) habitat	Alignment borders the northern edge of SMHM habitat between Sonoma Creek and Mare Island and cuts through SMHM habitat at the mouth of Sonoma Creek.	Alignment borders the northern edge of SMHM habitat between Sonoma Creek and Mare Island, and cuts through SMHM habitat at the mouth of Sonoma Creek.	Habitat for SMHM present, important as SLR transitions habitat zones.	Alignment runs close to and through potential SMHM habitat at the mouth of Sonoma Creek. Cuts across mature marsh habitat at Figueros Tract (by Mare Island). Majority of alignment is overwater and outside of habitat.	Alignment cuts across mature marsh habitat at Figueros Tract (by Mare Island). Borders potential SMHM habitat at the mouth of Novato Creek and at southern end of Tubbs Island. Majority of alignment is outside of habitat.
	Habitat for sensitive bird species	Present day Ridgway's rail habitat within and adjacent to alignment.	Present day Ridgway's rail habitat within and adjacent to alignment.	Avoids present day Ridgway's rail habitat, crosses through other bird habitats.	Alignment runs close to and through Ridgway's rail habitat at the mouth of Sonoma Creek. Cuts across mature marsh habitat at Figueros Tract (by Mare Island). Would impact mudflats used by other sensitive bird species.	Alignment runs close to and through Ridgway's rail habitat at the mouth of Sonoma Creek. Cuts across mature marsh habitat at Figueros Tract (by Mare Island).

Environment	Biology	Estimated impacts to critical habitat and other habitat for state and federally-listed threatened and endangered species	Elevated structure designed to minimize impacts; potential significant impacts to rails and SMHM species that occupy this marshland habitat by filling wetland and creating larger barriers in some places, connectivity in others (potentially greater impacts to fewer species).	Elevated structure on piles, construction will have impacts but once built provides most connectivity; potential significant impacts to rails and SMHM species that occupy this habitat during construction but less of a footprint due to piers, O&M long-term habitat connectivity greatly increased.	Less impacts to SMHM and rails, however, likely impacts to more T&E species because this alignment crosses through several habitat types and would create a new roadway on elevated embankment that does not exist today (potentially lesser impacts to several species).	Avoids most marsh habitat, but bisects mudflat habitat. Would introduce new potential impacts to aquatic species and shorebird species that forage in mudflats.	Avoids most marsh habitat. Would introduce new potential impacts to aquatic species over San Pablo Bay.
		Habitat types in new ROW and acreages	162	113	429	147	265
		Annual Grassland	1	1	150	13	24
		Barren	7	4	24	0	1
		Blue Oak Woodland	0	0	4	0	0
		Coastal Oak Woodland	0	0	6	0	0
		Cropland	29	15	131	22	23
		Eucalyptus	0	0	3	0	0
	Existing ROW	88	59	165	22	16	
	Urban	9	9	45	8	9	
	Valley Oak Woodland	0	0	0	0	0	
	Wetlands, Baylands, Open Water	116	84	66	103	208	
	Marsh migration/transition zone	Alignment does not cross any natural upland marsh migration zones. It would impact transition zone high tide refugia on the existing SR 37 embankment slopes due to widening of footprint.	Alignment does not cross any natural upland marsh migration zones. Little impact to existing transition zone high tide refugia if existing berm left in place.	Alignment is causeway where it crosses potential natural marsh migration zones except to the east of Merazo.	Alignment does not cross any natural upland marsh migration zones. Runs parallel to bayward edge of strip marsh.	Alignment does not cross any natural upland marsh migration zones except on the existing levee slopes.	
	High priority for long-term bird habitat by Point Blue model	Passes through lesser priority areas as in the long term this is where marshes will tend to drown closer to the Bay.	Passes through lesser priority areas as in the long term this is where marshes will tend to drown closer to the Bay.	Passes through more higher priority areas because in the long term this is where marshes will survive longest.	Passes through lesser priority areas as in the long term this is where marshes will tend to drown closer to the Bay.	Passes through lesser priority areas as in the long term this is where marshes will tend to drown closer to the Bay.	
	Mudflats and shallow subtidal	Avoids most mudflats	Avoids most mudflats	Avoids most mudflats	Alignment runs parallel in mudflats adjacent to salt marsh edge from the mouth of Sonoma Creek to Figueros Tract/Mare Island.	Alignment crosses mudflats at Figueros Tract/Mare Island and at Novato Creek.	
	Future mudflats and shallow subtidal	Much of alignment may be mudflat in the future.	Much of alignment may be mudflat in the future.	Avoids most mudflats	Much of alignment may be shallow subtidal rather than mudflat in the future.	Mudflat habitat may be shallow subtidal in the future.	
	Ecological corridors	Crosses large channels and adjacent mature marsh on bridge, no crossing of upland-marsh connection.	Crosses large channels and adjacent mature marsh on bridge, no crossing of upland-marsh transition zone.	Crosses smaller channels on causeway, crosses upland-marsh transition zone at grade from Sears Point along SR 121 and along Buchli Rd.	Crosses large channels at Tolay Creek cuts across the western end of the strip marsh at Mare Island on a causeway.	Crosses large channels at Tolay Creek cuts across the western end of the strip marsh at Mare Island on a causeway.	
Hydrology	Roadway impacts on hydrology	Hybrid embankment-causeway alternative that would partially impede tidal and riverine flows and hydrologic connectivity between San Pablo Bay and Napa-Sonoma wetlands. Embankment across Tubbs Island may reduce future restoration potential. Sonoma Creek and Tolay Creek bridges would be lengthened to allow for increased tidal flows as a result of proposed upstream tidal wetland restoration.	Mostly causeway alternative that would generally allow for unimpeded tidal and riverine flows and hydrologic connectivity between San Pablo Bay and Napa-Sonoma wetlands. Sonoma Creek and Tolay Creek bridges would be lengthened to allow for increased tidal flows as a result of proposed upstream tidal wetland restoration.	Hybrid embankment-causeway alternative along northern margin of the Bay. Causeway segments would traverse Napa River and Sonoma Creek floodplains. Would allow for unimpeded tidal and riverine flows and hydrologic connectivity between San Pablo Bay and Napa-Sonoma wetlands; however, embankment segments along upland transitional habitat may impede natural runoff processes and wetland migration in response to future sea level rise.	Mostly causeway alternative that would primarily traverse mudflats along San Pablo Bay. Would allow for unimpeded tidal and riverine flows and hydrologic connectivity between San Pablo Bay and Napa-Sonoma wetlands.	Mostly causeway alternative that would primarily traverse open water across San Pablo Bay. Would allow for unimpeded tidal and riverine flows and hydrologic connectivity between San Pablo Bay and Napa-Sonoma wetlands.	
Cultural Resources	Cultural Resources Summary						
	Known archaeological resources, historic-era structures, shipwrecks	Seven previously recorded resources within 0.5 mile, including one eligible resource and two resources requiring further study to determine eligibility. *Information on tribal cultural resources and shipwrecks has not been received.	Seven previously recorded resources within 0.5 mile, including one eligible resource and two resources requiring further study to determine eligibility. *Information on tribal cultural resources and shipwrecks has not been received.	Fifteen resources identified within the alignment require further study to determine eligibility. *Information on tribal cultural resources and shipwrecks has not been received.	Eight previously recorded resources within 0.5 mile, including one eligible resource and three resources requiring further study to determine eligibility. *Information on tribal cultural resources and shipwrecks has not been received.	Eight previously recorded resources within 0.5 mile, including one eligible resource and two resources requiring further study to determine eligibility. *Information on tribal cultural resources and shipwrecks has not been received.	
	Eligible or listed properties/historical resources to National /California Registers	Mare Island Naval Shipyard National District (eligible)	Mare Island Naval Shipyard National District (eligible)	None identified	Mare Island Naval Shipyard National District (eligible)	Mare Island Naval Shipyard National District (eligible)	
Community Cohesion/Public Access Summary	Community Cohesion/Public Access Summary						
	Changes to community character or cohesion	With the exception of commercial/industrial areas at the eastern alignment terminus at Mare Island, the alignment corridor is rural in nature. Alternative would expand SR 37 on its current alignment and would not introduce any new barriers or features that would divide existing communities or substantially change the character of the current corridor.	With the exception of commercial/industrial areas at the eastern alignment terminus at Mare Island, the alignment corridor is rural in nature. Alternative would expand SR 37 on its current alignment and would not introduce any new barriers or features that would divide existing communities or substantially change the character of the current corridor.	This alternative would require converting SR 29, between SR 37 and Napa Junction, from a conventional highway to an expressway to accommodate six lanes of traffic with frontage roads on either side for local circulation. This portion of SR 29 is primarily commercial and residential, and the construction of a six-lane expressway could serve as a barrier between the east and west sides of the corridor and would likely change the character of the community through increased traffic levels. The Northern Alignment would also conflict with goals of the City of American Canyon to transform the Broadway Corridor (SR 29) into a mixed-use, small-town neighborhood.	With the exception of commercial/industrial areas at the eastern alignment terminus at Mare Island, the alignment corridor is rural in nature. Alternative would not introduce any new barriers or features that would divide existing communities or substantially change the character of the corridor.	With the exception of commercial/industrial areas at the eastern alignment terminus at Mare Island and residential/commercial areas at the western alignment terminus, the alignment is rural in nature where it crosses over land. At its western terminus, the new alignment would pass just north of the Bel Marin Keys community prior to tying into SR 101. The community character of Bel Marin Keys could be impacted by the introduction of a substantial causeway structure and source of noise from highway traffic.	

	Community Cohesion and Public Access	Changes to recreational/public access	Access to San Pablo Bay NWR, Napa-Sonoma Marshes Wildlife Area, and other public access points would be maintained.	Access to San Pablo Bay NWR, Napa-Sonoma Marshes Wildlife Area, and other public access points would be maintained.	Access would be maintained to the San Pablo Bay NWR, Napa-Sonoma Marshes Wildlife Area, Caltrans public viewing areas near West Vista Point and the Mare Island interchange, and Skaggs Island via a local road (i.e., converted existing SR 37 alignment); however, these areas would no longer be directly connected to SR 37. In addition, with removal of the Sonoma Creek Bridge, a direct connection between the recreational/public access destinations east and west of this bridge along the current SR 37 alignment would no longer be available. Because of these changes, certain recreational/public access points could be more difficult to reach, depending on point of origin.	Access would be maintained to the San Pablo Bay NWR, Napa-Sonoma Marshes Wildlife Area, Caltrans public viewing areas near West Vista Point and the Mare Island interchange, and Skaggs Island via a local road (i.e., converted existing SR 37 alignment); however, these areas would no longer be directly connected to SR 37. In addition, with removal of the Sonoma Creek Bridge, a direct connection between the recreational/public access destinations east and west of this bridge along the current SR 37 alignment would no longer be available. Because of these changes, certain recreational/public access points could be more difficult to reach, depending on point of origin.	Access would be maintained to the San Pablo Bay NWR, Napa-Sonoma Marshes Wildlife Area, Caltrans public viewing areas near West Vista Point and the Mare Island interchange, and Skaggs Island via a local road (i.e., converted existing SR 37 alignment); however, these areas would no longer be directly connected to SR 37. In addition, with removal of the Sonoma Creek Bridge, a direct connection between the recreational/public access destinations east and west of this bridge along the current SR 37 alignment would no longer be available. Because of these changes, certain recreational/public access points could be more difficult to reach, depending on point of origin.	
	Land Use and Population Growth	Land Use/Growth Summary						
		Potential land use compatibility conflicts	Because this alternative would occur along an existing highway alignment, adverse land use compatibility impacts are not expected.	Because this alternative would occur along an existing highway alignment, adverse land use compatibility impacts are not expected.	Alignment would cross through refuge/wildlife areas, agriculture/resource extraction land, multiple park/open space areas, and residential areas. Three schools are located within 0.25 mile of the alignment. This alternative would put a new four-lane highway through sensitive land use areas where no such major transportation facility currently exists.	Although this alternative would create a new alignment for SR 37, a large portion of this alignment would be offshore, along the shoreline parallel to the existing SR 37 corridor, and therefore is considered less likely to result in land use conflicts compared to the Northern Alignment and Southern Alignment 2.	Although many of the land use along this alignment would not be directly impacted because most of the proposed alignment would be over open water in San Pablo Bay, there could be compatibility conflicts with certain sensitive land uses, including residences.	
		Section 4(f)	Alignment is located within the San Pablo Bay NWR and Napa-Sonoma Marshes Wildlife Area; would expand footprint of an existing alignment. There are other recreational and access areas along the alignments that would also have to be assessed for potential impacts if they meet the Section 4(f) criteria.	Alignment is located within the San Pablo Bay NWR and Napa-Sonoma Marshes Wildlife Area; would expand footprint of an existing alignment. There are other recreational and access areas along the alignments that would also have to be assessed for potential impacts if they meet the Section 4(f) criteria.	Alternative would create new alignment that crosses through the Napa-Sonoma Marshes Wildlife Area and Tolay Creek Ranch refuge and wildlife areas. Alternative would also potentially impact Veterans Memorial Park in the City of American Canyon.	Alternative would create new alignment that crosses through the San Pablo Bay NWR and Napa-Sonoma Marshes Wildlife Area.	Alternative would create new alignment that crosses through the San Pablo Bay NWR and San Pablo Bay Wildlife Area.	
		Farmlands	Farmland of Local Importance (66 acres) Total = 66 acres	Farmland of Local Importance (37 acres) Total = 37 acres	Unique Farmland (5 acres) Farmland of Statewide Importance (38 acres) Farmland of Local Importance (50 acres) Prime Farmland (54 acres) Total = 147 acres	Unique Farmland (2 acres) Farmland of Local Importance (24 acres) Total = 26 acres	Unique Farmland (4 acres) Farmland of Local Importance (8 acres) Total = 12 acres	
		Population growth - is the alignment growth inducing?	Hybrid Alternative would improve traffic flow, throughput, and intermodal use along an existing transportation corridor. There would not be any new access to lands that are not already accessible. Therefore, growth inducement is not expected.	Causeway Alternative would improve traffic flow, throughput, and intermodal use along an existing transportation corridor. There would not be any new access to lands that are not already accessible. Therefore, growth inducement is not expected.	Northern Alignment could have substantial growth-inducing effects. Alternative would place a new major transportation corridor through an area that is largely undeveloped. This would provide access to new areas and likely change regional transportation patterns, which could encourage new development near the alignment.	Southern Alignment 1 would not add any new access to lands that are not already accessible. The majority of this alignment would be offshore and in general the lands traversed by this alignment consist largely of refuge and protected resources. Therefore, growth inducement is not expected.	Southern Alignment 2 would primarily be located over open water (San Pablo Bay) and areas of undeveloped land that are dominated by marshland and wildlife/refuge areas; therefore, it would not provide access to new areas and would not be expected to significantly induce growth. However, some growth could occur as a result of the more direct route between Vallejo and Highway 101, as well as there being two highway route options between US 101 and SR 121.	
	Noise	Number of Sensitive Receptors within 0.5-mile buffer	22 - Residential Parcels 0 - Schools 0 - Libraries 0 - Religious Institutions 0 - Hospitals	22 - Residential Parcels 0 - Schools 0 - Libraries 0 - Religious Institutions 0 - Hospitals	6,445 - Residential Parcels 6 - Schools 0 - Libraries 0 - Religious Institutions 0 - Hospitals	22 - Residential Parcels 0 - Schools 0 - Libraries 0 - Religious Institutions 0 - Hospitals	917 - Residential Parcels 0 - Schools 0 - Libraries 0 - Religious Institutions 0 - Hospitals	
Public Acceptability	Public acceptability based on focus group study	The Existing Alignment Hybrid and Causeway Alternatives were perceived similarly and favored over the other alternatives in the focus group study. Some participants preferred the Hybrid alternative because they thought it would be more cost-effective and quicker to build.	The Existing Alignment Hybrid and Causeway Alternatives were perceived similarly and favored over the other alternatives in the focus group study. Some participants preferred the Causeway alternative because they thought it would have less of an environmental impact. The Causeway alternative was the most preferred alternative overall.	The Northern Alignment Alternative was widely disliked by focus group participants because of the increased mileage and associated transportation, as well as concern that it would exacerbate existing traffic issues in Napa, especially around American Canyon, and would take longer to build. This alternative was the lowest-ranked (least-liked) alternative by the focus groups.	Focus group participants perceived Southern Alignment 1 would have higher costs and impact on the environment and the region's natural beauty.	Southern Alignment 2 was extremely polarizing in the focus group study compared to the other alternatives. Those in support of Southern Alignment 2 liked that it would provide direct routes between multiple destinations, particularly between US 101 and Interstate 80, and would create multiple route options throughout the region. Those who opposed Southern Alignment 2 believed it would have higher costs, take too long to build, and have a greater impact on ships, environmental resources and natural beauty of the region.		

Legend					
Description	Scores highest when compared to other alternatives; net benefit or minimal impact.	Used to distinguish an alternative that is in-between minimal to moderate impact.	Scores moderate when compared to other alternatives; moderate but mitigatable/ avoidable impact.	Used to distinguish an alternative that is in-between moderate and potentially significant impact.	Scores lowest when compared to other alternatives; notable or significant impact.

