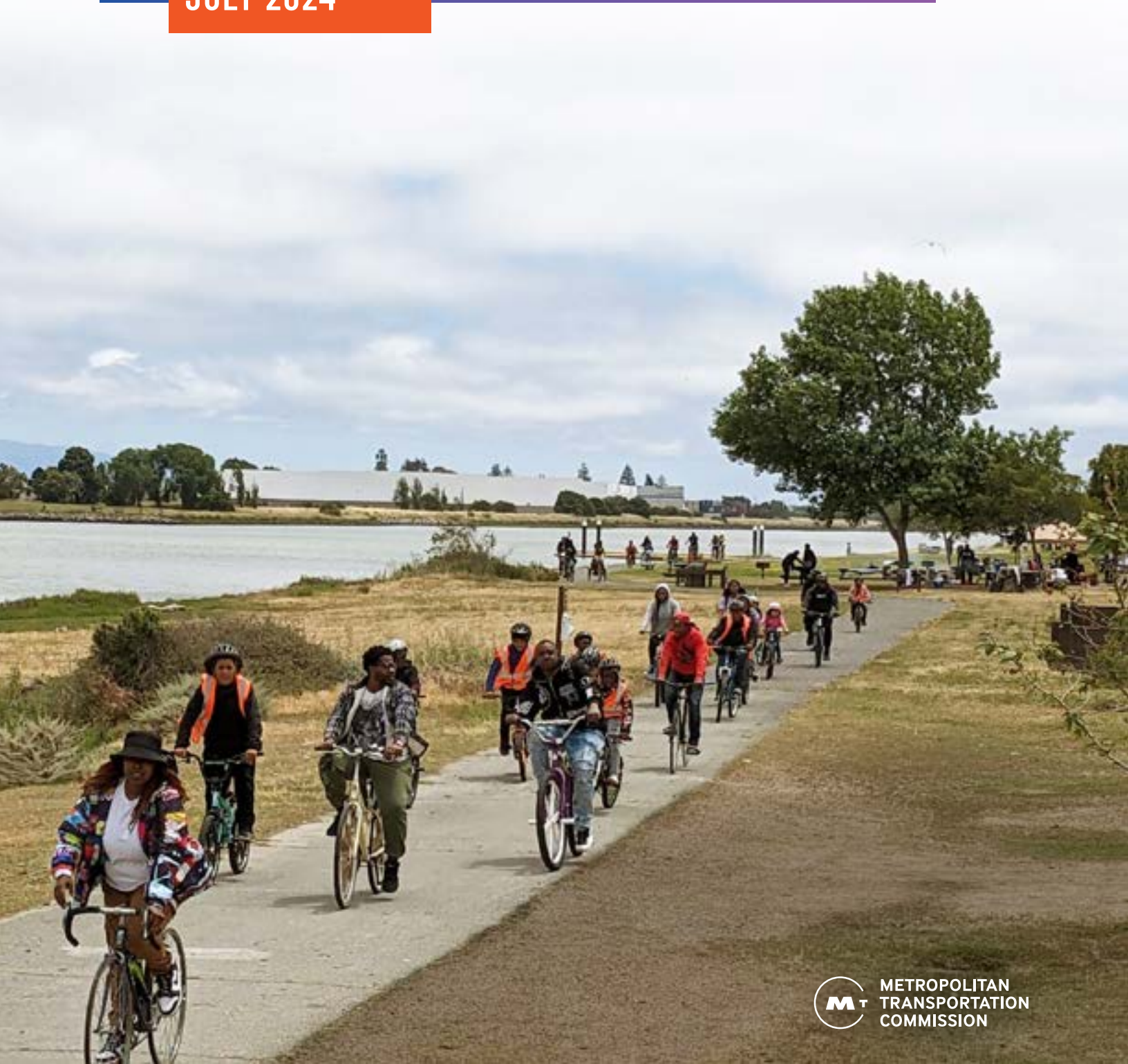


BAY TRAIL GAP CLOSURE IMPLEMENTATION PLAN

JULY 2024



METROPOLITAN
TRANSPORTATION
COMMISSION

ACKNOWLEDGMENTS



MTC PROJECT MANAGEMENT TEAM

Lily Brown – Project Manager
Nicola Szibbo – Principal in Charge
Toshi Shephard-Ohta – Assistant Director of Active Transportation and Shared Mobility

WORKING GROUP MEMBERS

Representatives from each federal, state, county, city, transit agencies and advocacy groups are listed on page 28-29.

COMMUNITY-BASED ORGANIZATIONS



East Oakland Neighborhood Initiative (Oakland)



Canal Alliance (San Rafael)



Rich City Rides (Richmond)



Green Hive (Vallejo)



Rafiki Coalition with
SF Bike Coalition
SF Parks Alliance (San Francisco)



Veggielution (San Jose)



El Concilio (East Palo Alto)

Cover image: East Oakland Neighborhood Initiative (EONI) Bike Party (Source: Zander Westbrook Design)
This page: Rich City Rides event (Source: Zander Westbrook Design)

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SAN FRANCISCO

BayTrail

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Photo: San Francisco, CA (Source: Zander Westbrook Design)



01

INTRODUCTION

Photo: Vallejo, CA (Source: Zander Westbrook Design)

INTRODUCTION

PURPOSE

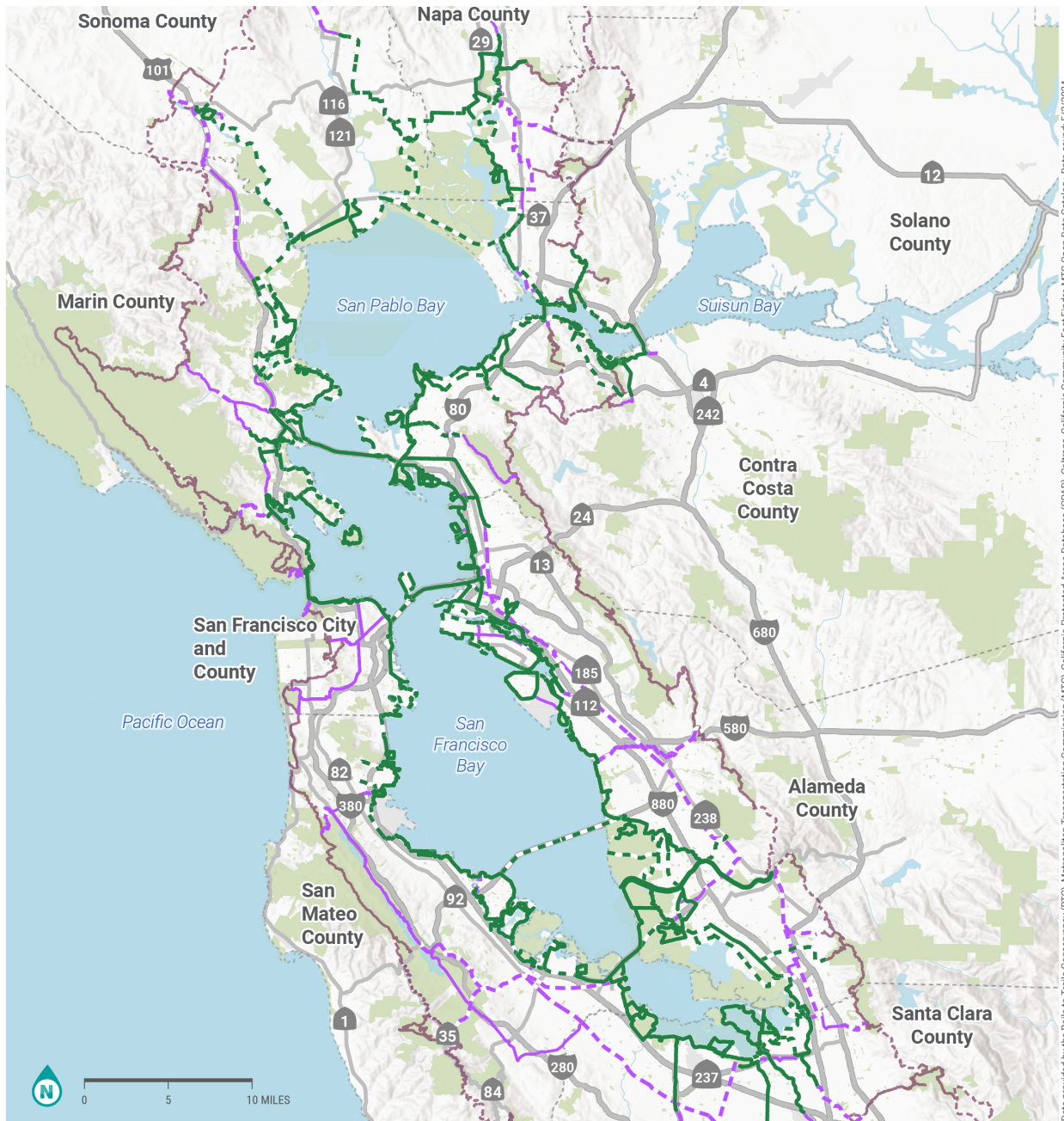
The Bay Trail Gap Closure Implementation Plan (BTGCIP) sets priorities for future work to complete the vision of the San Francisco Bay Trail—an interconnected system of on- and off-street trails circumnavigating San Francisco and San Pablo Bays. The alignment originates from the Bay Trail Plan created by the Association of Bay Area Governments (ABAG). In 1987, Senate Bill 100 directed ABAG to “develop and adopt a plan and implementation program, including a financing plan, for a continuous recreational corridor.” Implementation of the trail began in the early 1990s and continues today. The ultimate vision for the Bay Trail is a continuous, 500-mile trail around San Francisco and San Pablo Bays serving 47 cities in all nine Bay Area counties and crossing seven toll bridges. The Bay Trail is envisioned as a welcoming environment for a variety of users including people who walk, bike, and roll. It is intended to be used for many purposes, including recreation, commuting to work and school, running errands, accessing transit, and visiting friends and family. The goal of the trail is to foster active transportation, healthy communities, environmental stewardship and education, and equitable public shoreline access for all Bay Area residents and visitors. As of 2024, 352 miles (70%) of the 500-mile vision have been constructed, with the trail crossing five toll bridges (plus half of the Bay Bridge to Yerba Buena Island). The remaining segments are among the most complicated due to limited right-of-way, environmental barriers, conflicts with existing utilities and other structures, or boundaries necessitating interjurisdictional coordination.

The purpose of the BTGCIP is to identify and evaluate segments of the Bay Trail and connector trails that are currently missing (i.e., trail gaps) in order to prioritize their design and construction as the full build-out of the Bay Trail is implemented. Expanding Bay Trail access to Equity Priority Communities and enhancing conditions on existing trail segments were key focuses of this project and integral to the evaluation and analysis process. The plan focuses on developing connections to parks and open space (e.g., Bay Area Ridge Trail and Water Trail), providing access to transit facilities and other active transportation infrastructure, preserving the shoreline environment, adapting to climate change and sea level rise, and creating a comfortable and convenient user experience.

This project evaluated 1) the Bay Trail and 2) Connector Trails that directly connect to the Bay Trail and lie within the extensive network of regional trails in the San Francisco Bay Area (Figure 1). Other trail systems within this regional network that were not evaluated include the Ridge Trail, The Great Delta Trail, and the Great Redwood Trail. For this analysis, the Bay Trail and Connector Trails are considered separate entities worthy of independent prioritization scores.

Terminology

- ▶ **Bay Trail Gaps**
Gaps directly on the Bay Trail
- ▶ **Connector Trail Gaps**
Gaps located on a trail that connects to the Bay Trail



TRAIL FACILITIES

- Bay Trail (existing)
- - Bay Trail (proposed)
- Connector Trail (existing)
- - Connector Trail (proposed)
- Bay Area Ridge Trail (existing)*
- - Bay Area Ridge Trail (proposed)*

*The Bay Area Ridge Trail (existing and proposed) served as the outer boundary for identifying Connector Trails.

DESTINATIONS & BOUNDARIES

- Park/ Open Space
- - County Boundary
- Road
- Freeway

Figure 1. Project area map showing the existing and proposed locations of the Bay Trail and Connector Trails

PROJECT HISTORY

Senate Bill 100, authored by then-state Senator Bill Lockyer and passed into law in 1987, directed ABAG to develop a plan for a regional trail system including a specific alignment for the Bay Trail. Implementation of the trail began in the early 1990s. In 2005, ABAG published the San Francisco Bay Trail Gap Analysis Study to help guide future trail development. The BTGCIP builds on the success of the 2005 gap analysis, which established baseline data, cataloged all existing gaps into a single GIS geodatabase, and established the initial prioritization framework. The BTGCIP expands the original framework and shifts the focus to assessing the potential benefits of closing individual gaps, in addition to assessing potential feasibility.

Furthermore, the BTGCIP expanded its purview to assess Connector Trails that link communities to the Bay Trail. In this updated gap analysis study a greater emphasis was placed on Equity Priority Community engagement and needs along with aligning the prioritization criteria with Plan Bay Area 2050. Finally, the study updated cost estimates and conducted sea level rise analysis to begin the discussion about how certain segments of the Bay Trail may need to consider adaptation strategies in the future.

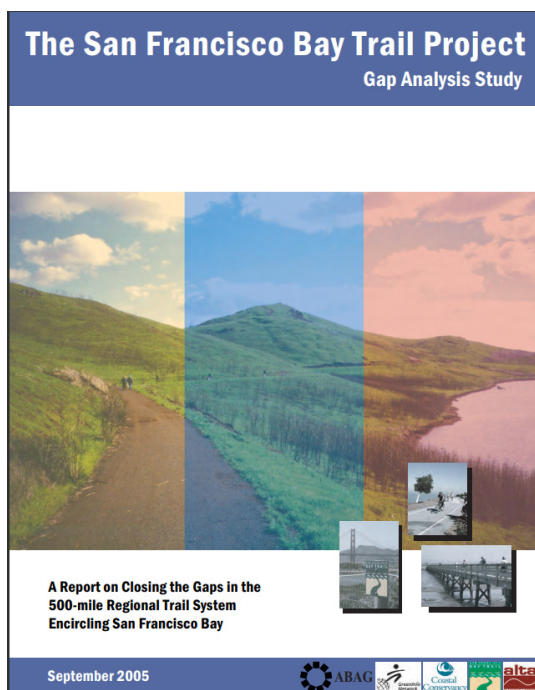


Figure 2. 2005 San Francisco Bay Trail Project Gap Analysis Study

PLAN CONTENTS

The BTGCIP presents the culmination of extensive stakeholder engagement and data analysis since the previous 2005 analysis and includes a greater focus on equity.

Engagement

The BTGCIP focused on working with the San Francisco Bay Trail Board and Steering Committee, stakeholders and the community to identify new criteria for prioritizing gap closures and assessing the projects identified to address existing gaps. This process involved collaboration with a wide range of agency partners from federal, state, city, county, transit agencies and advocacy groups through the project Working Group. This group was integral to the project providing key direction and review of data metrics and prioritization process. Furthermore, this project partnered with nine Community-Based Organizations (CBOs) who work within and represent communities within [Equity Priority Communities \(EPCs\)](#). Each CBO helped to bring a more direct connection with community members and provide opportunities to engage with and guide the project outcomes. The ultimate outcome of this process is a prioritized list of gap closure projects that reflect the needs of the communities and partners while factoring in the real-world constraints to closing existing gaps. The Stakeholder and Public Engagement section of this plan (beginning on page 24) summarizes the process for engaging with the community and stakeholders.

Data Analysis

WORKING GROUP REVIEW

The first major component of data analysis included updating and verifying Bay Trail data for on-street and off-street segments. The Working Group played a critical role in providing alignment corrections and updates to the available Bay Trail data. MTC made over 50 edits to the alignment based on comments provided by the Working Group.

DESKTOP REVIEW

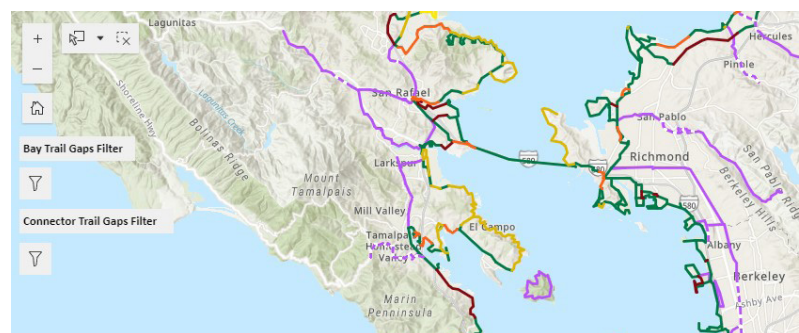
The project team conducted an extensive desktop review of 60 miles of existing on-street segments (Class II and Class IV) to verify the facility type, built status, and identify substandard segments which did not include a sidewalk on one or more sides of the road or included a bicycle facility that was below best practices minimum widths of five feet.

FIELD REVIEW

The project team conducted a field review of all existing off-street (Class I) Bay Trail segments (nearly 300 miles) using a custom-built and GPS-enabled smartphone app. Teams of two surveyors on bicycles collected data on trail conditions along with an extensive photo inventory. This extensive fieldwork identified potential areas of improvement along the trail to address existing barriers or areas with poor conditions and pinchpoints.

The spatial data analysis conducted for this plan takes a fresh look at the remaining gaps and identifies a prioritized list of Bay Trail Gaps and Connector Trail Gaps across the nine-county study area; county-by-county rankings of Bay Trail Gaps and Connector Trail Gaps are also provided for a more focused understanding of priority within each county.

The final results of this spatial analysis are best viewed using the project ArcGIS Online viewer available at [MTC Bay Trail Gap Closure Prioritization \(arcgis.com\)](https://arcgis.com).



The Data Collection, Analysis, and Results section of this plan (pages 12 to 23) describes the technical methodology for assessing remaining gaps and provides step-by-step instructions for viewing and searching for gaps in the project ArcGIS Online viewer. Additional details and materials are provided in Appendices A and B.



Photo: Albany Bulb, Albany, CA (Source: Zander Westbrook Design)

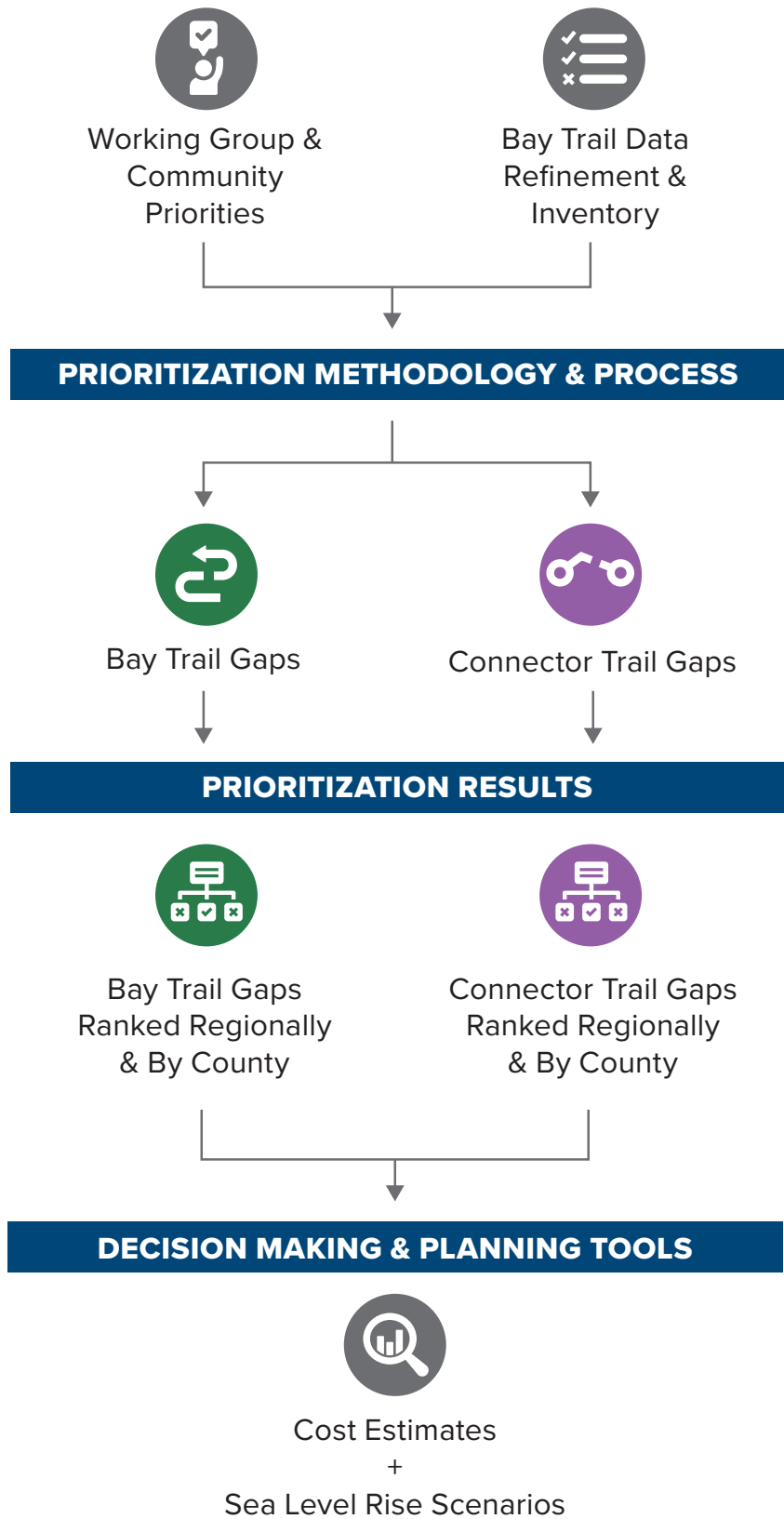



Figure 3. Prioritization and Analysis Results Process Diagram



DATA COLLECTION, ANALYSIS, AND RESULTS

Photo: Bay Farm Island (Source: Zander Westbrook Design)

DATA COLLECTION, ANALYSIS, AND RESULTS

The BTGCIP focused on refining the previous analysis methodology, conducted in 2005, based on key priorities for gap closure on the Bay Trail and Connector Trails. This process involved identifying new prioritization criteria and data sources, which allowed for a more robust analysis of the network based on priorities identified by the Working Group. The project team also updated existing data related to the Bay Trail including refining alignments and gathering trail condition data on existing segments through a combination of desktop review and fieldwork. This project prioritized closing gaps within MTC identified Equity Priority Communities to improve access to the Bay Trail and Connector Trails. This section describes how trail data was collected, refined, and analyzed to develop prioritization results.

BAY TRAIL DATA REFINEMENT

An integral step of this project included updating and refining existing datasets with the support of the working group members. Working group members helped to review existing datasets to update the status and alignments of trail segments. The project team conducted an in-depth desktop review of each existing on-street segment of the Bay Trail to validate and refine the existing alignments and status of each existing segment. Following the review from the working group and desktop level review of on-street segments, the project team conducted an extensive in-person review of the existing segments of the Bay Trail. For this effort members of the project team bicycled all off-street (Class I) segments of the Bay Trail over a two-week period to assess conditions of key infrastructure. This process and the results are further described below. This multi-step process to update and refine Bay Trail data established a uniform baseline of understanding of the existing conditions of the Bay Trail across the nine-county study area.



Photo: California Maritime Academy, Vallejo, CA (Source: Zander Westbrook Design)

Inventory Methodology and Results

In order to conduct a complete inventory of the existing Class I segments of the Bay Trail, pairs of observers used a customized version of the GPS-enabled ESRI QuickCapture smartphone app to focus on different aspects of the trail condition while riding as shown in Figure 4 and Figure 5.

This process helped project team members to quickly identify a select set of common issues while riding their bike using a hand-bar mounted input. In addition to using the QuickCapture app, project team members

used the established visual dictionary included in Table 1 to identify and categorize issues along trail segments and mark wayfinding signage locations. They also captured geo-referenced images along the trail at five-second intervals using a GPS-enabled GoPro camera to establish a visual database of trail conditions. More information on the methodology for conducting this fieldwork is included in Appendix A.

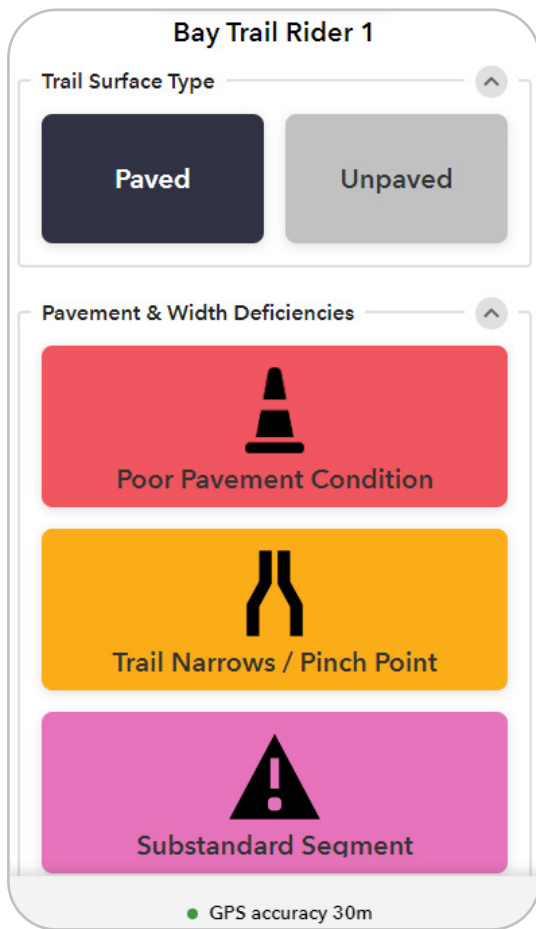


Figure 4. The first of two project team members using the ESRI QuickCapture app focused on assessing paved and unpaved surface types and pavement width deficiencies

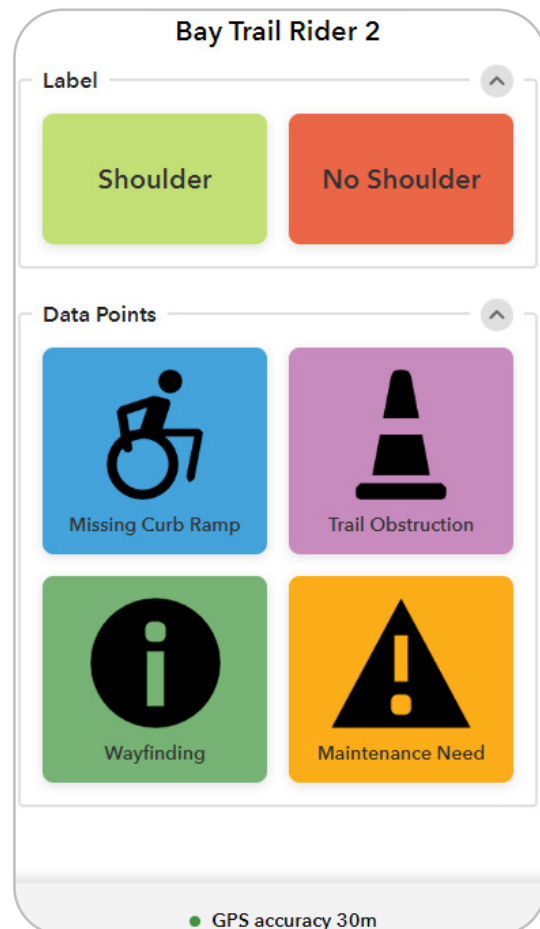


Figure 5. The second project team member using the ESRI QuickCapture app focused on the location of the trail (shoulder vs. non-shoulder), missing curb ramps, trail obstructions, wayfinding signage, and maintenance needs

Table 1. Bay Trail Inventory Visual Dictionary

DATA ATTRIBUTE AND SAMPLE PHOTO

Trail Surface – Paved



DATA ATTRIBUTE AND SAMPLE PHOTO

Trail with Shoulder



Trail Surface – Unpaved



Trail without Shoulder



Poor Pavement Condition



Trail Narrows/Pinch Point



DATA ATTRIBUTE AND SAMPLE PHOTO

Missing Curb Ramp



Maintenance Need



Trail Obstruction



WAYFINDING SIGN TYPES INCLUDED

Wayfinding – Branded Bay Trail Sign



Wayfinding – Map with Bay Trail Logo



Inventory Results

The results of this field inventory for existing off-street segments of the Bay Trail are included in this ArcGIS Online viewer: [Bay Trail Fieldwork Review \(arcgis.com\)](#).

The data collected by the team during the summer and fall of 2023 subdivides trail segments into 250-foot subsegments for a focused review of the existing conditions. The results are summarized in a Pavement Condition Index and a Trail Quality Score. The Pavement Condition Index indicates the number of poor pavement quality deficiencies identified along the subsegment. The Trail Quality Score indicates the total number of deficiencies identified along the

subsegment including bollards/trail obstructions, narrow trail/pinch points, maintenance needs, poor pavement quality, missing curb ramps, and substandard quality segments.

The online viewer (shown in Figure 6) presents the Trail Quality Score as a percentile rank in quintiles with the bottom 20th percentile representing the most reported trail quality issues (legend shown in Figure 7). Clicking on an existing subsegment highlights the results of the data collection effort including the condition, quality, number of obstructions, and subsegment number.

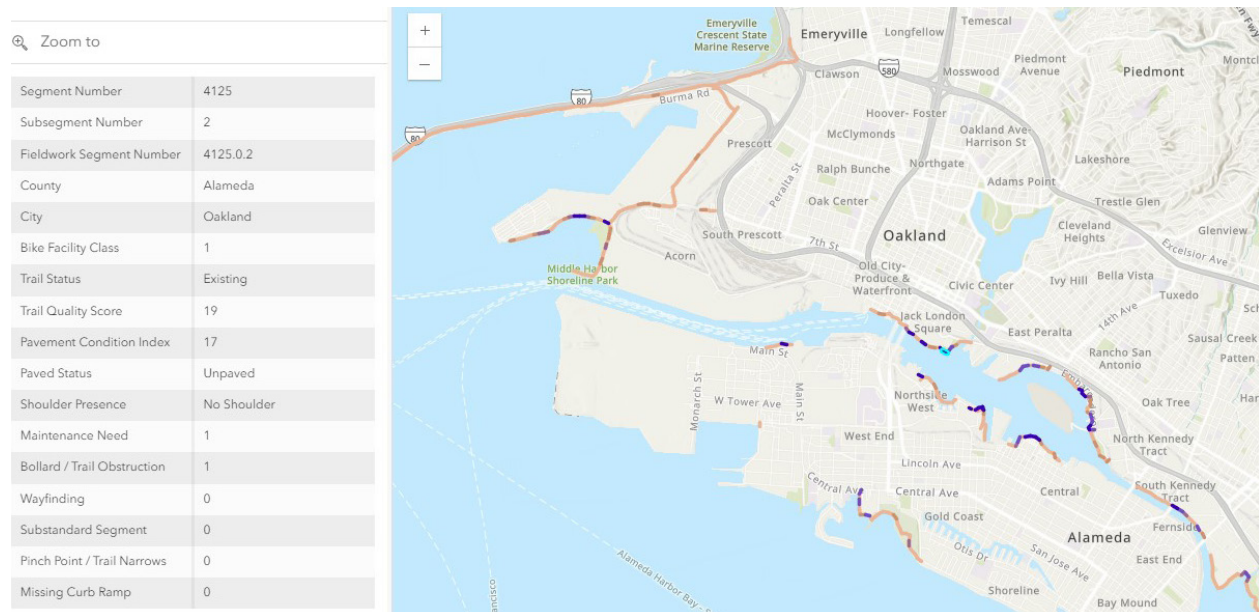


Figure 6. Bay Trail Inventory Review ArcGIS Online viewer includes collected data for individual subsegments



Figure 7. Bay Trail Inventory Review ArcGIS Online viewer legend shows the Trail Quality Score in five categories of need

PRIORITIZATION METHODOLOGY AND RESULTS

Approach

The goal of the prioritization process conducted for this project was to use input from the community and stakeholders to develop a blended analysis of the overall need and potential benefit of closing each gap in the existing network.¹ For simplicity of analysis, the project team divided the full study network into two separate networks:

- ▶ **Bay Trail Gaps** – Gaps directly on the Bay Trail
- ▶ **Connector Trail Gaps²** – Gaps located on a trail that connects to the Bay Trail

These two distinct networks were prioritized using the final data metrics identified in the following section. For a full description of the methodology, see Appendix B.

Data Metrics

Initially, the following prioritization criteria were presented to the Working Group for discussion:

- ◆ Safety
- ◆ Equity
- ◆ Demand
- ◆ Connectivity to Key Destinations
- ◆ Climate Change/Hazard Exposure
- ◆ Plan Bay Area 2050 Consistency
- ◆ Separation/Comfort

The Working Group voted on its three highest priorities before breaking into small groups and voting again after group discussion. At the close of the first working group meeting, Connectivity to Key Destinations, Safety, and Separation & Comfort were the three highest-ranked criteria. The same list of initial criteria was presented and discussed with the San Francisco Bay Trail Board of Directors and with CBOs.

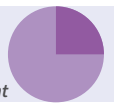
The final criteria identified for this project, associated weights, data sources, and rationale for inclusion are shown to the right and on the following page:



EQUITY

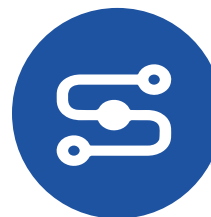
Addressing Equity

25% weight



Source: MTC's Equity Priority Communities

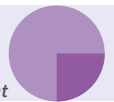
- ◆ This analysis builds off the extensive work by the MTC to map Equity Priority Communities.
- ◆ **Rationale:** This criterion aligns with Plan Bay Area 2050. Each strategy in Plan Bay Area 2050 has been crafted to advance equity, with particular attention paid to the needs of people living in Equity Priority Communities. This also aligns with the priorities of the CBOs and was the 4th highest priority identified by the Working Group.



TRAIL CONTINUITY

Prioritizing Trail Continuity

25% weight



Source: Existing SF Bay Trail

- ◆ Prioritizing segments that create the greatest length of continuous miles of trail.
- ◆ **Rationale:** This criterion was added directly from Working Group Meeting input as a way to prioritize gaps that unlock the greatest length of usable trail.

¹ The project team applied a whole area prioritization scoring approach to leverage analysis metric scores to a hexagonal grid within one-quarter mile of the existing adopted Bay Trail alignment.

² The current Connector Trail database is in the process of being updated outside this project.



JOBS AND HOUSING

Improving Access to Jobs and Housing
12.5% weight



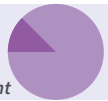
Source: US EPA Smart Location Database

- ◆ Linking employment centers with housing through the Bay Trail presents a strong option for shifting daily work trips out of vehicles and onto an active mode.
- ◆ **Rationale:** This criterion is a proxy for active transportation demand in areas with a high density of jobs and housing. MTC views gaps that connect dense housing and high employment locations as one aspect of “Connecting to Key Destinations,” the Working Group’s highest priority criterion.



PARK ACCESS

Improving Access to Parks
12.5% weight



Source: California Protected Areas Database and Conservation Easement Database

- ◆ Enhancing access to parks throughout the Bay Area is a key goal of the Bay Trail.
- ◆ **Rationale:** While not originally its own criterion, the Bay Trail Board of Directors suggested access to parks should be separated from “Connectivity to Key Destinations” since this is one of the original goals of the Bay Trail to connect 130 parks around the region.



TRANSIT-RICH

Improving Access to Transit-Rich and Connected Communities
12.5% weight



Source: MTC Priority Development Areas, Transit Oriented Communities, Transit Rich Areas

- ◆ Increasing access to transit-rich and connected communities will support future development and planned infrastructure, which is an important goal for the Bay Trail.
- ◆ **Rationale:** This criterion aligns with existing and planned locations where transit is readily available and priority development areas where active transportation is likely to have high demand. This criterion aligns with Plan Bay Area 2050 goals and is another element of providing Connectivity to Key Destinations (both existing and planned).



BAYFRONT EXPERIENCE

Providing a Bayfront Experience
12.5% weight



Source: MTC Water Layer

- ◆ The Bay Trail’s implicit goal is to create a beautiful shoreline path for everyone to enjoy.
- ◆ **Rationale:** This criterion was added after input was received by the Bay Trail Board of Directors. Before adding this criterion, gaps away from the waterfront scored higher than segments along the waterfront. Adding this criteria aligns with the core mission of the San Francisco Bay Trail to create a waterfront trail experience.

Data Metrics (continued)

Criteria that were removed or consolidated include:

- ▶ Separation & Comfort
- ▶ Plan Bay Area 2050 Consistency
- ▶ Climate Change/Hazard Exposure

Safety Separation & Comfort was removed as a potential scoring criterion because the design of each gap is still unknown at this stage. Assuming which gaps will provide greater separation and comfort in this prioritization study would be premature. Plan Bay Area 2050 Consistency is captured across several criteria and was removed as its own distinct criterion. Understanding a gap's susceptibility to Climate Change/Hazard Exposure is important. The study ran several scenarios to indicate which gaps might be inundated by sea level rise in the future. These sections may need additional adaptation strategies under Bay Trail Design Guidelines (currently being updated). As many segments will require adaptation and have nuanced design choices, this criterion was removed for prioritization and remains as planning information only. Finally, Safety was removed as a criterion because the Bay Trail was typically further away from high collision locations. Without a more detailed network analysis, it was unclear if the trail would provide significant safety benefits. High collision locations also tended to overlap with the Access to Jobs and Housing criterion. For more information about the source, scoring methods, and overall methodology, please see Appendix B.

Prioritization Results

This plan represents the culmination of significant efforts to engage with agency partners, community stakeholders and the public to ensure the analysis weighting matches and represents community values and investment priorities. The selected data sources were evaluated on a percentile ranking across the study area and combined using the associated weights identified in the previous section to develop the ranked lists of Bay Trail Gaps and Connector Trail Gaps. The resulting analysis identifies the highest priority gap closure projects across the entire study area and within each county. This helps to identify the top project in each of the nine counties within the study area. MTC intends to utilize the results as one of many criteria that may influence funding decisions. Local jurisdictions are encouraged to utilize the results to guide local funding decisions or in requests for funds from external grant sources.

Prioritization Tables and Interactive Map

Ranked Bay Trail and Connector Trail gaps are listed in Appendix C. The tables include individual criteria scores and priority rankings for trail each gap across the region and within each respective county.


Results can also be viewed online through the project ArcGIS Online viewer available at: [MTC Bay Trail Gap Closure Prioritization \(arcgis.com\)](https://arcgis.com/mtc/bay-trail-gap-closure/prioritization).

Instructions for how to use the viewer follow on pages 21-23.

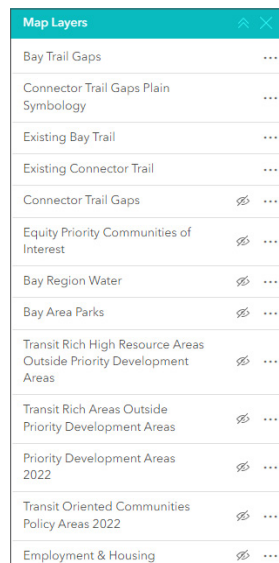
USING THE INTERACTIVE VIEWER










The interactive ArcGIS Online viewer presents a clear way to review and filter the results of the gap prioritization analysis. This section describes the methods for viewing results and getting the most out of the online functionality of the viewer.

How to Turn On and Off Map Layers:

The online viewer presents a total of seven data layers, which may be turned on and off by using the **Map Layer button**  in the top right corner of the map:


1. Click the **Map Layer button** to bring up the Map Layer list, which shows all layers in the map including layers that are initially hidden when the map is opened as indicated by the crossed-out eye icon.

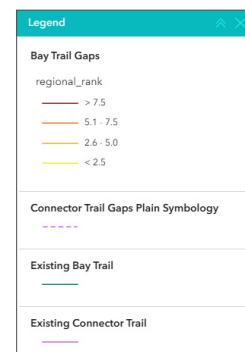









Map Layers	
Bay Trail Gaps	...
Connector Trail Gaps Plain Symbology	...
Existing Bay Trail	...
Existing Connector Trail	...
Connector Trail Gaps	 ...
Equity Priority Communities of Interest	 ...
Bay Region Water	 ...
Bay Area Parks	 ...
Transit Rich High Resource Areas Outside Priority Development Areas	 ...
Transit Rich Areas Outside Priority Development Areas	 ...
Priority Development Areas 2022	 ...
Transit Oriented Communities Policy Areas 2022	 ...
Employment & Housing	 ...

2. To hide any of the four layers that are initially visible on the map (Bay Trail Gaps, Connector Trail Gaps Plain Symbology, Existing Bay Trails, or Existing Connector Gaps), click on the name of the layer you want to hide.
3. To reveal any of the nine layers that are initially hidden from view click on **Map Layer button** in the top right corner and click on an eyeball to turn “on” or “off” a layer.

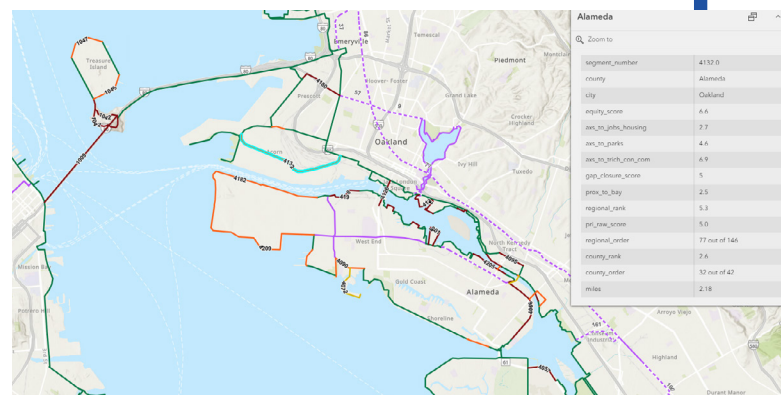
How to View Results:

1. Navigate to the online viewer in a web browser.
2. Click on the **Legend Icon**  in the top right corner of the map. This will populate the legend, which displays the current data layers shown on the map and their associated colors, line weights, and regional ranking for Bay Trail Gaps.



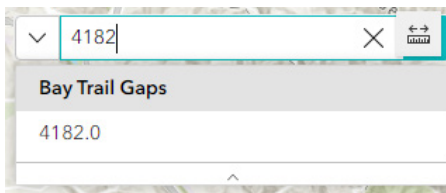
Legend	
Bay Trail Gaps	
regional_rank	
> 7.5	
5.1 - 7.5	
2.6 - 5.0	
< 2.5	
Connector Trail Gaps Plain Symbology	
	
Existing Bay Trail	
	
Existing Connector Trail	
	

3. Click on an associated data layer line to bring up a data text box with the associated data from that specific line segment. For example, clicking on Bay Trail Gap 4132 brings up the text box to the right, which includes key information about the gap including the regional rank, county rank, and associated scores for each data metric.



Searching Results

1. All Bay Trail and Connector Trail Gaps include a specific project number that corresponds with the tables included in this plan. By typing the Segment Number into the search-bar at the top right corner of the screen, you can select the specific gap project of interest and quickly zoom to the project location. See the example below for Gap 4182.



Pre-Defined Filters

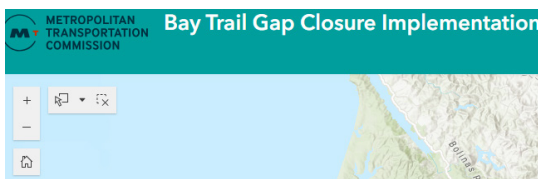
1. The online viewer includes pre-defined filters that allow users to select Bay Trail Gaps and Connector Trail Gaps by county to focus on smaller areas of interest.
2. To apply the pre-defined filters, select the Filter icon on the left side of the screen for either Bay Trail Gaps or Connector Trail Gaps (the functionality for both filters operates in the same way).
3. Select the county of interest.
4. Navigate to the selected group of trails for review.

Photo: Benicia, CA (Source: Zander Westbrook Design)

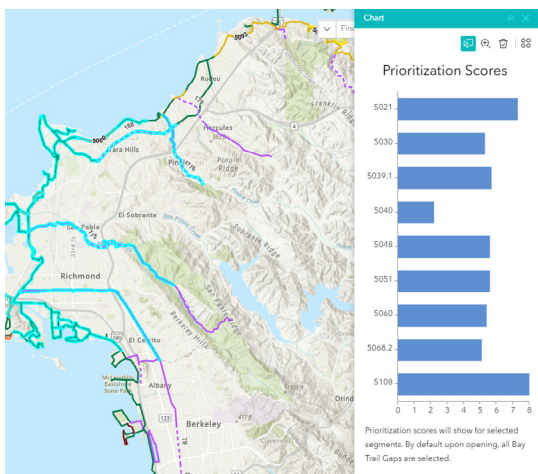


Area Review and Selection

1. You can draw specific areas on the map to identify gaps and see which gaps have the highest prioritization scores.
2. To use this functionality, click on the Draw Selection icon in the top left corner of the screen. Once selected the icon will change colors to match the header bar color.
3. The tool defaults to providing the Rectangle as the method of drawing, but you can change the tool using the drop-down arrow to the right of the Draw Selection icon.
4. Once an area is drawn on the map, the tool will highlight selected gaps in blue and populate prioritization score data within a bar chart accessible under the Charts button. This chart will update automatically if you change the selection.
5. To clear the selection, click on the Clear Selection button to the right of the Draw Selection icon in the top left corner of the screen.
6. To stop using the draw selection tool, simply click the icon again. Once the tool is disengaged, the icon will return to a light-gray color.



3. The tool defaults to providing the Rectangle as the method of drawing, but you can change the tool using the drop-down arrow to the right of the Draw Selection icon.
4. Once an area is drawn on the map, the tool will highlight selected gaps in blue and populate prioritization score data within a bar chart accessible under the Charts button. This chart will update automatically if you change the selection.





STAKEHOLDER AND PUBLIC ENGAGEMENT

Photo: East Oakland Neighborhood Initiative (EONI) Bike Party Engagement Material (Source: Zander Westbrook Design)

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STAKEHOLDER AND PUBLIC ENGAGEMENT

OVERVIEW

The project team engaged with the Bay Trail Board and Steering Committee, general public, community-based organizations (CBOs), and agency/organizational stakeholders across the nine-county study area in two major phases, as shown in Table 2. The first phase provided communities and stakeholders with an overview of the project and solicited feedback on existing gaps, key destinations, and community concerns. During this phase, the project team requested comments on the proposed updated gap prioritization and evaluation criteria, hosted the first Working Group meeting, and began initial engagement with CBOs to listen and learn. The second phase focused on gathering feedback on the proposed gap closure projects and the priority list of projects.

The project team provided information, and updates throughout the life of the project to the public via the project website and the 511.org website to provide Bay residents with access to project materials throughout the duration of the project.



Figure 8. East Oakland Neighborhood Initiative (EONI) Bike Party (May 20, 2023) participants engaging with project map

Table 2. Outreach Activities by Project Phase

ENGAGEMENT PHASE

ACTIVITIES

Phase 1 – Listen & Learn

- ◆ Working Group Meeting #1
- ◆ CBO Events

Phase 2 – Review Results & Projects

- ◆ Working Group Meeting #2
- ◆ Community Workshop

Entire Project

- ◆ Project Website
- ◆ Social Media
- ◆ 511.org Information

STAKEHOLDER ENGAGEMENT

In addition to the broad information and updates available to Bay residents through the project website the project team engaged directly with technical and organizational stakeholders and community stakeholders through the Working Group and CBO events.

Bay Trail Board of Directors and Steering Committee Engagement

MTC met two times with the San Francisco Bay Trail Board of Directors to discuss the Bay Trail Gap Closure Implementation Plan and gather input.

BOARD OF DIRECTORS MEETING #1

- ◆ **Date:** October 22, 2022
- ◆ **Purpose:** To introduce the Bay Trail Gap Closure Implementation Plan to the Board and gather initial feedback on the project purpose, scope of work, and timeline.
- ◆ **Meeting Details:** <https://mtc.ca.gov/meetings-events/san-francisco-bay-trail-board-directors-2022-10-27t200000>

Feedback

Plan Objectives. The Board asked if the plan will evaluate project specific factors such as property ownership and social/political factors that drive project delivery and if MTC will create strategies for each gap. MTC reported that the plan will not propose strategies for each gap will only evaluate priorities based on quantitative criteria. The plan acknowledges that gaps will advance through political support and as funding and opportunities arise.

Prioritization Criteria. The Board asked if they will be able to provide input on the prioritization criteria and if equity criteria might align with the San Francisco Bay Conservation & Development Commission (BCDC)'s



Figure 9. East Oakland Neighborhood Initiative (EONI) Bike Party (May 20, 2023) riders take a break to discuss the Bay Trail and enjoy the views

vulnerable communities designations. The Board also asked if future land use changes will be factored into prioritization. MTC staff confirmed that the prioritization criteria will be shared with the Board and will evaluate equity metrics such as BCDC's vulnerable communities and MTC's Equity Priority Communities. To anticipate future demand for the Bay Trail, MTC will explore criteria such as Planned Development Areas (PDA).

Alignment Changes. The Board asked if the plan will look to add, remove, or change the Bay Trail alignments. MTC staff said the plan will evaluate existing Bay Trail segments to see which ones may be substandard (not meeting Bay Trail Design Guidelines).

Climate Change/Adaptation. The Board asked if the plan will evaluate completed Bay Trail segments vulnerable to sea level rise. MTC staff confirmed sea level rise will be evaluated.

Updating the Plan. The Board asked how often the plan will be updated. While no specific schedule is set for making updates in the future, MTC staff acknowledged recurring updates will be useful.



BOARD OF DIRECTORS MEETING #2

- ◆ **Date:** October 27, 2023
- ◆ **Purpose:** To provide the Board with an update on the engagement with the Working Group and community based organization that had been conducted. MTC also shared preliminary prioritization results for feedback.
- ◆ **Meeting Details:** <https://mtc.ca.gov/meetings-events/san-francisco-bay-trail-board-directors-2023-10-27t200000>

Feedback

Working Group Membership. The Board asked how many Bay Trail Board of Directors and Steering Committee members were on the project Working Group and if local parks departments were participating. MTC reported that Bay Trail Board/ Steering Committee representatives from the Coastal Conservancy, East Bay Regional Parks District, Santa Clara County, and Trails for Richmond Action Committee (TRAC) were involved in the Bay Trail Gap Closure Implementation Plan Working Group. The working group includes parks department staff from around the region.

Plan Implementation. The Board asked how MTC intends to implement the plan. MTC does not own any segments of the Bay Trail so implementation will be led by local jurisdictions, however, this plan will help identify a pipeline of high priority opportunities that MTC can support with funding and technical assistance.

Prioritization Results. The Board suggested that the shoreline segments of the Bay Trail are more valuable than in-land segments and the prioritization should account for that. The Board also asked if the methodology only looks at parks or if it includes other protected open spaces. MTC will re-assess the criteria and weighting to account for greater access to waterfront parks since that is a goal of the Bay Trail. The criteria currently includes all protected open spaces that provide public access.

MTC also shared information on the Bay Trail field survey that was conducted as part of the project as part of a larger “Road Map” presentation on the future of the Bay Trail. MTC discussed the Bay Trail Road Map with the Board of Directors on April 26, 2024 ([meeting details](#)) and with the Steering Committee on March 28, 2024 ([meeting details](#)).

Working Group

The project Working Group consisted of representatives from federal, state, county and regional agencies, cities, nonprofit organizations, and other interested parties across the nine-county Bay Area as shown in Figure 11. Each member organization is listed below and on the next page. Members of the working group were convened during both project phases to provide input on the prioritization criteria and the identified gap closure projects. Details from

each meeting along with identified outcomes are provided after the list of working group members, below. In between meetings with the full group, the project team engaged with each working group member directly throughout the life of the project to gather feedback and help refine existing data related to the Bay Trail and Connector Trails. Their individual input and involvement throughout the project was integral to the success of this project.

WORKING GROUP MEMBERS

County and Regional Agencies

- ◆ Alameda County Public Works
- ◆ Alameda County Transportation Commission
- ◆ City/County Association of Governments of San Mateo County (C/CAG)
- ◆ Contra Costa County Department of Conservation and Development
- ◆ Contra Costa County Public Works Dept
- ◆ Contra Costa Transportation Authority
- ◆ Marin County Department of Public Works
- ◆ Napa County Department of Public Works
- ◆ Napa Valley Transportation Authority
- ◆ San Francisco County Transportation Authority
- ◆ San Francisco Public Works
- ◆ San Mateo County Office of Sustainability
- ◆ San Mateo County Transportation Authority
- ◆ Santa Clara County Roads and Airports Department
- ◆ Santa Clara Valley Transportation Authority
- ◆ Santa Clara Valley Water District
- ◆ Solano County Transportation Authority
- ◆ Solano County
- ◆ Solano County Division of Public Works
- ◆ Sonoma County Department of Transportation and Public Works
- ◆ Sonoma-Marín County Area Rail Trail
- ◆ Sonoma County Transportation Authority
- ◆ Transportation Authority of Marin
- ◆ West Contra Costa Transportation Advisory Committee

Cities

- ◆ City of Alameda
- ◆ City of Albany
- ◆ City of American Canyon
- ◆ City of Belvedere
- ◆ City of Benicia
- ◆ City of Berkeley
- ◆ City of Brisbane
- ◆ City of Burlingame
- ◆ City of Corte Madera
- ◆ City of East Palo Alto
- ◆ City of El Cerrito
- ◆ City of Emeryville
- ◆ City of Foster City
- ◆ City of Fremont
- ◆ City of Hayward
- ◆ City of Hercules
- ◆ City of Larkspur
- ◆ City of Martinez
- ◆ City of Menlo Park
- ◆ City of Mill Valley
- ◆ City of Millbrae
- ◆ City of Milpitas
- ◆ City of Mountain View
- ◆ City of Napa
- ◆ City of Newark
- ◆ City of Novato
- ◆ City of Oakland
- ◆ City of Palo Alto
- ◆ City of Pinole
- ◆ City of Redwood City
- ◆ City of Richmond
- ◆ City of San Bruno
- ◆ City of San Carlos
- ◆ City of San Francisco
- ◆ City of San José
- ◆ City of San Leandro
- ◆ City of San Mateo
- ◆ City of San Pablo
- ◆ City of San Rafael
- ◆ City of Sausalito
- ◆ City of South San Francisco
- ◆ City of Sunnyvale
- ◆ City of Tiburon
- ◆ City of Union City
- ◆ City of Vallejo

Transit Agencies and Other Agency Stakeholders

- ◆ AC Transit
- ◆ Amtrak
- ◆ Bay Area Rapid Transit (BART)
- ◆ Bay Area Metro/Bay Area Toll Authority
- ◆ California State Parks
- ◆ Caltrain
- ◆ Caltrans Bay Area (District 4)
- ◆ Coastal Conservancy
- ◆ East Bay Regional Park District (EBRPD)
- ◆ EBRPD, Trails Program
- ◆ Golden Gate Bridge, Highway and Transportation District
- ◆ Golden Gate National Recreation Area (NPS)
- ◆ Greater Vallejo Recreation District
- ◆ Hayward Area Recreation and Park District
- ◆ Marin County Parks
- ◆ Marin Transit
- ◆ Metropolitan Transportation Commission (MTC)
- ◆ MTC/Association of Bay Area Governments (ABAG)
- ◆ MTC/Bay Trail
- ◆ Napa County Regional Park & Open Space District
- ◆ National Park Service
- ◆ SamTrans
- ◆ San Francisco Airport
- ◆ San Francisco Bay Conservation and Development Commission
- ◆ San Francisco Recreation and Parks
- ◆ San Jose Airport
- ◆ San Mateo County Parks
- ◆ Santa Clara County Parks and Recreation Department
- ◆ Sonoma-Marín Area Rail Transit (SMART)
- ◆ Solano County Parks
- ◆ SolTrans
- ◆ Sonoma County Regional Parks
- ◆ Union City Transit
- ◆ US Fish and Wildlife Service
- ◆ Water Transit
- ◆ West Contra Costa Transportation Advisory Committee (WCCTAC)
- ◆ Water Emergency Transportation Authority (WETA)

Nonprofit and Advocacy Organizations

- ◆ Bay Area Discovery Museum
- ◆ Bay Area Ridge Trail
- ◆ Bay Area Trails Collaborative
- ◆ Bay Trail
- ◆ Bike East Bay
- ◆ Bike Silicon Valley
- ◆ BORP Adaptive Sports and Recreation
- ◆ Don Edwards San Francisco Bay National Wildlife Refuge
- ◆ Friends of Stevens Creek Trail
- ◆ Golden Gate Parks Conservancy
- ◆ Guadalupe River Park Conservancy
- ◆ Marin County Bicycle Coalition
- ◆ Midpeninsula Regional Open Space District
- ◆ Parks Conservancy
- ◆ Peninsula Open Space Trust
- ◆ PG&E
- ◆ Port of Oakland (airport)
- ◆ Port of Oakland (seaport)
- ◆ Port of Redwood City
- ◆ Port of Redwood City
- ◆ Port of San Francisco
- ◆ Presidio Trust
- ◆ Richardson Bay Audubon Center & Sanctuary
- ◆ San Bruno Bicycle Pedestrian Advisory Committee
- ◆ Silicon Valley Bicycle Coalition
- ◆ Vine Trail
- ◆ Westcat
- ◆ WTB-TAM

WORKING GROUP MEETING #1

The first meeting of the project Working Group occurred on November 29, 2022, and was hosted virtually on Zoom with a total of 98 participants representing nine Bay Area counties. Working Group members received an overview of the project and provided feedback on the existing gaps as well as the selection and weighting of draft prioritization criteria. Participants were broken up into five different breakout rooms with four distinct geographic areas of focus and one regionally focused breakout room.

- ◆ Breakout Group 1: Alameda County
- ◆ Breakout Group 2: North Bay
- ◆ Breakout Group 3: San Mateo
- ◆ Breakout Group 4: San Francisco/Santa Clara County
- ◆ Breakout Group 5: Regional

During the meeting, attendees were asked to identify the leading issues which have prevented gap closure projects since the previous study. The results, shown in Figure 12, highlighted three leading factors: funding, staff resources, and right-of-way availability.

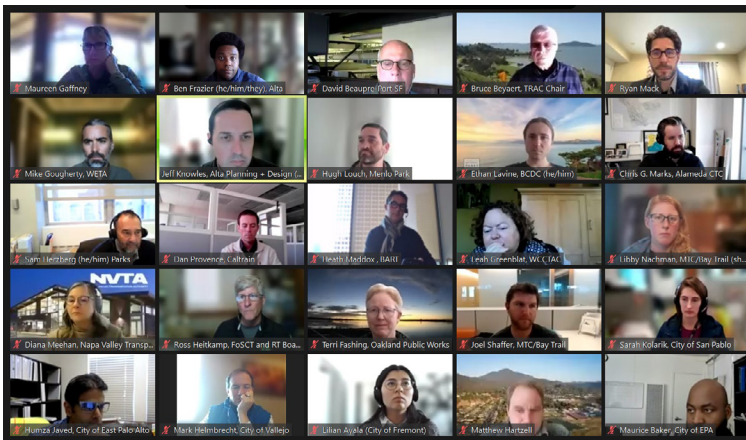


Figure 10. Working Group Meeting #1 (November 29, 2022) Online meeting room screen capture

Working Group members provided two rounds of feedback on the draft prioritization criteria and ranked them in the following order of priority:

- ◆ Connectivity to Key Destinations
- ◆ Safety
- ◆ Equity
- ◆ Separation and Comfort
- ◆ Demand
- ◆ Climate Change/Hazard Exposure
- ◆ Plan Bay Area 2050 Consistency

This ranking guided the analysis methodology and final criterion selection further described in the Data Collection, Analysis, and Results section on page 12.

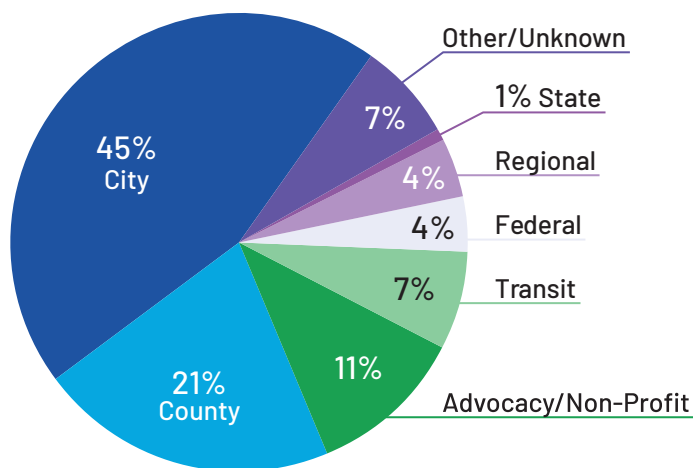


Figure 11. Working Group Participant Organizations

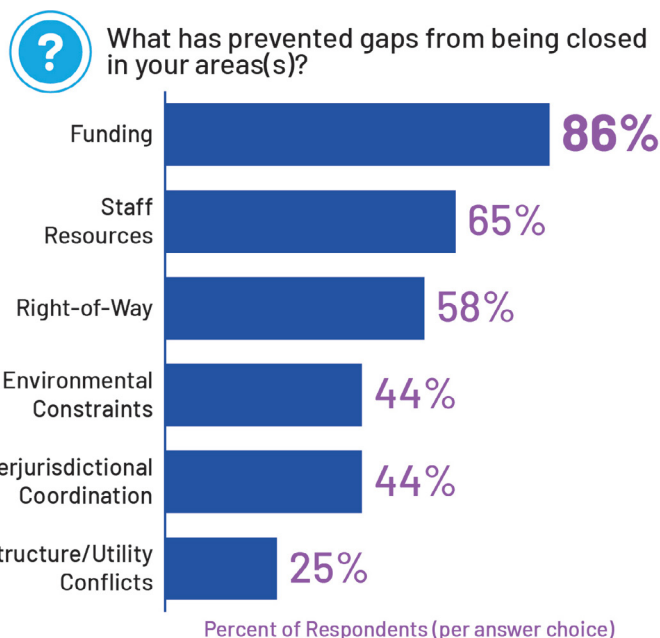


Figure 12. Working Group Member responses from Meeting #1 regarding barriers to gap closure

WORKING GROUP MEETING #2

The second Working Group meeting was hosted on September 26, 2023 as a hybrid meeting with a total of 71 members attending either in-person or virtually. During this meeting the project team presented an update on completed CBO and community engagement efforts and provided draft prioritization criteria and weighting to gather feedback from working group members. The project team presented findings from the completed fieldwork and the draft results of the gap prioritization analysis work completed using the project online viewer. The project team showcased functionality of the viewer and showed users how to review projects by county and toggle between projects that address gaps directly on the Bay Trail (Bay Trail Gaps) and those on a trail that connects to the Bay Trail (Connector Trail Gaps).

Please see page 21 for a step-by-step tutorial on how to use the viewer. The online viewer is available at [MTC Bay Trail Gap Closure Prioritization \(arcgis.com\)](https://arcgis.com).



CBO Outreach

During the first phase of the BTGCIP outreach process, the project team collaborated with seven CBOs to lead discussions with over 200 community members about the current and future use of the Bay Trail. These conversations were held in many formats, including bike rides, tabling, zoom meetings, farm gatherings, dinners, and picnics. There were nine events in seven counties. Three events were held in Spanish, and Spanish translation was provided at all events.

Major takeaways and recurring themes from the CBO feedback include:

- ◆ Build Bay Trail segments that connect to parks and improve safe connections along key transportation routes.
- ◆ Completing community connector trails and safe connections to these trails are critical to the success of the Bay Trail and can provide opportunities for isolated communities to access recreation around the shoreline.
- ◆ Address environmental justice concerns and avoid contaminated areas when routing new trail segments along the Bay.
- ◆ Offer free events to get people using the trail more regularly and feeling comfortable being there (e.g., organize rides or walks).
- ◆ Improve bus connections to trailheads and increase spaces at parking lots.

Feedback about maintenance and operations included the following:

- ◆ Maintain the trail (e.g., fill in potholes, clean up trash, and cut down overgrown bushes and weeds).
- ◆ Increase patrols to make trail users feel safer—particularly in remote areas and locations where unhoused community members have encampments.

Participants noted the following desired amenities:

- ◆ Directional signage to help with orientation on the trail and at the trailhead
- ◆ Lighting
- ◆ Bathrooms and more regular cleaning of the existing ones
- ◆ Trash cans, dog waste bags, and signs to remind dog owners to dispose of dog waste
- ◆ Trees and/or provide more shade
- ◆ Play structures for children
- ◆ Educational signs about animals and plants found along the trail
- ◆ Bay Trail maps at local libraries
- ◆ Materials and signs in different languages



Figure 13. Four attendees at the VeggieJelution pop-up event (April 29, 2024) engaging with project map

CBO EVENTS

El Concilio

► East Palo Alto

El Concilio hosted a pop-up meeting at the Cinco de Mayo Festival in East Palo Alto on May 7th, 2023 to discuss the BTGCIP and Equity Strategy. Approximately 80 individuals connected with El Concilio during the event and voiced concerns about trash, maintenance, and safety along the trails. Top priorities identified by participants were bathrooms, shade, and trees added to the Bay Trail.



Figure 14. Engaged resident at the El Concilio Cinco de Mayo Festival pop-up meeting (May 7, 2023)

Rafiki Coalition / SF Bike Coalition / SF Parks Alliance

► San Francisco

Three local organizations collaborated to facilitate a listening session on May 20th, 2023 about the BTGCIP and Equity Strategy: Rafiki Coalition, SF Bike Coalition, and SF Parks Alliance. A total of 12 community members attended the meeting and most were familiar with the local spaces and areas discussed, but not necessarily the Bay Trail as a project. Participants expressed enthusiasm for accessible, local outdoor spaces, but they also mentioned major challenges regarding safety. Attendees were mostly comprised of older adults and expressed concern about the significant environmental health risks posed by the proposed Bay Trail route around the Hunters Point Naval Shipyard, which has been federally designated as a Superfund site due to contamination that has significantly harmed the surrounding community (as evidenced by high rates of cancer, respiratory illnesses, and low birth rates).

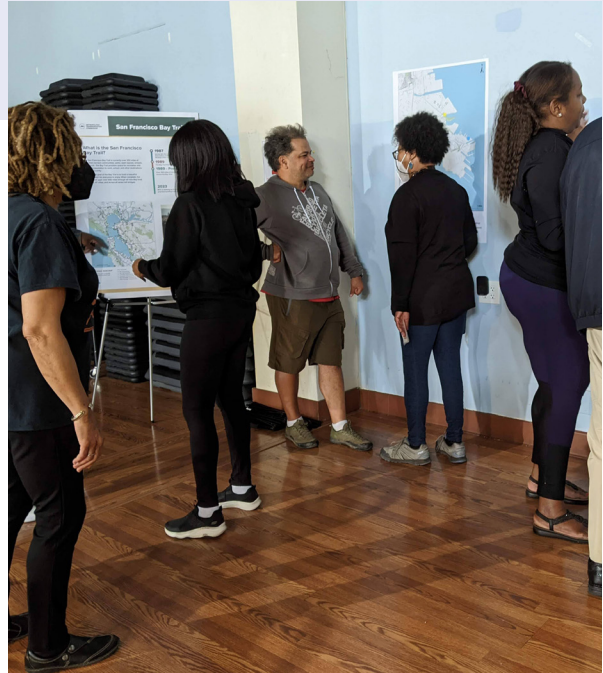


Figure 15. Attendees of the Rafiki Coalition/SF Bike Coalition/SF Parks Alliance (May 20, 2023) listening session speak with each other

Green Hive

► Vallejo

Green Hive recruited residents and hosted an in-person MTC Bay Trail Gap Closure Equity Strategy focus group in Vallejo on April 27th, 2023. There were seven attendees, most of whom knew some of the trails in the area. Participants were concerned with trail accessibility in the Cal Maritime University Area, trail connections to Mare Island, and highlighted safety as a priority. Participants noted that Vallejo needs better infrastructure for people walking, biking, and scooting to get around.



Figure 16. Attendees of the Green Hive focus group in Vallejo (April 27, 2023) discussing concerns with trail accessibility

Rich City Rides

► Richmond

Rich City Rides planned and designed two bike ride events to observe the Bay Trail and connector trails in the vicinity of Richmond, CA on April 30th and May 28th, 2023. In total, there were 32 participants, spanning multiple age groups. There was emphasis on addressing flood-prone areas and adding lighting and waste management improvements, as well as unanimous support for the completion of the trail and closing Connector Trail Gaps.



Figure 17. Attendees of the second Rich City Ride (May 28, 2023) discussing existing Bay Trail gaps on the Bay Trail



Figure 18. Attendees of the first Rich City Ride (April 30, 2023) preparing to begin the ride.

East Oakland Neighborhood Initiative

► Oakland

East Oakland Neighborhood Initiative hosted two events: a bike party around the Martin Luther King Jr. Regional Shoreline on May 20th, 2023 and tabling at the East Oakland Futures Festival (EOFF) on June 3rd, 2023. Over half of the attendees of the bike party were youth community members and EOFF attendees spanned a wide range of ages. Across both events, over 50 community members contributed comments about the completion and improvement of the Bay Trail and important regional connectors, such as the East Bay Greenway and the San Leandro Creek Trail. Participants expressed interest in signage improvements, amenities for children and dogs, and public art/interpretive elements.



Figure 19. Seven East Oakland Neighborhood Initiative (EONI) Bike Party (May 20, 2023) participants engaging with project map



Figure 20. Engaged community members at the East Oakland Futures Festival Pop-up meeting (June 3, 2023)

Canal Alliance

► San Rafael

Canal Alliance hosted a virtual meeting on Zoom on April 19, 2023 to gather feedback and input from community members on existing and proposed trails as presented by the BTGCIP. The twenty-four meeting attendees were all adult members of the community and expressed a need and desire for more safe and accessible trails across the meetings' three breakout rooms. Community members emphasized their desire for improved signage and maps, rest areas for families, lighting, and improved maintenance on the trails.

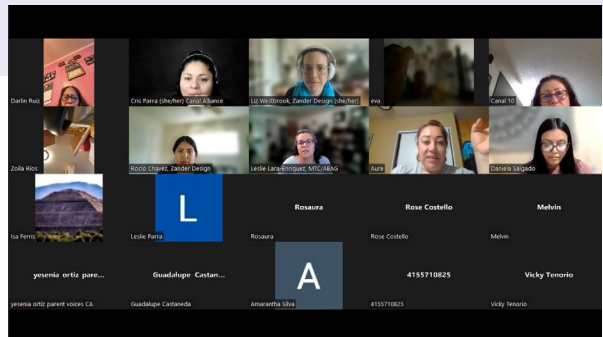


Figure 21. Attendees of the Canal Alliance (April 19, 2023) virtual meeting

Veggielution hosted a Bay Trail pop-up event outdoors at the Veggielution Community Farm pavilion on April 29th, 2023 which included 13 community members who provided feedback and ideas for the project. This event provided childcare and was attended by numerous families with young children. Discussions centered around barriers to trail use, safety, communications, amenities and trail access, and maintenance. All participants believed it was important to have a link to the Bay Trail in East San José, and many participants said that the most important thing they learned at the workshop was that trails like the Bay Trail exist in the area.



Figure 22 . Six attendees at the Veggielution pop-up event (April 29, 2024) engaging with project map



Figure 23. The Veggielution pop-up event (April 29, 2024) gathered feedback from community members of all ages

Community Workshop

During the second phase of engagement in spring 2023, the project team hosted a virtual public meeting as a follow-up to the CBO events. The goal of the meeting was to share an update on the progress of the implementation plan, share how the CBO event input was incorporated into the plan, and review the gap prioritization results.

There were 33 people who attended the meeting (not including the project team) with representation throughout the Bay Area.

The project team presented information about the fieldwork, outreach process, and prioritization framework, followed by location-based breakout sessions to discuss and explore prioritized segments on the MTC Gap Closure Interactive Map.

Breakout Rooms

Meeting participants selected one of five breakout room focus groups based on their geographic area of interest:

- ◆ North and East Bay (facilitated in Spanish)
- ◆ East Bay (facilitated in English)
- ◆ North Bay (facilitated in English)
- ◆ Peninsula and South Bay (facilitated in Spanish)
- ◆ San Francisco, Peninsula, and South Bay (facilitated in English)

Note: Spanish interpretation was available throughout the full group portions of the event and in a Spanish-language breakout room.

Within these regional breakout rooms, participants were able to focus on specific trail segments and discuss existing gaps. Participants provided generally positive feedback on the overall prioritization methods and results and expressed a desire for continued engagement during design and construction of gap closure projects across the study area with an emphasis on providing language-specific outreach particularly for Spanish-speaking residents.



Figure 24. Breakout room presentation in region-wide virtual meeting



Figure 25. Bay Trail next steps presentation in region-wide virtual meeting



SEA LEVEL RISE SCENARIOS

Photo: San Leandro, CA (Source: Zander Westbrook Design)

SEA LEVEL RISE SCENARIOS

Sea Level Rise poses a growing threat to the San Francisco Bay Trail. While not used as a prioritization criterion, the project team evaluated the impacts on various sea-level rise scenarios in order for MTC and partners to make future policy and design decisions. This analysis used data from [NOAA](#) to evaluate 1 & 2 meters of sea level rise across the Bay Trail system (including gaps and existing segments) assuming no flooding and not including low lying areas; connector trails were not included in the sea level rise analysis. Through this analysis, the project team was able to identify the proportion of each trail segment that would be inundated under each scenario of sea level rise. The project team used 10% and 50% inundation to illustrate how different thresholds would be likely to indicate the degree of impact on trails¹. The reasoning behind being, some riders

¹ In TRB's *Investing in Transportation Resilience: A Framework for Informed Choices*, a key aspect of resilience is the degree to which an asset remains functional when exposed to a hazard or disruption. Long-term inundation of a trail segment would mean those portions of a trail are likely not passable.

could choose to continue to use a trail if it is 10% inundated or 50% inundated. Tables 3-6 display the results of this analysis, identifying inundated trails at the 10% scenario (if a trail is inundated at the 50% category it will also be inundated at the 10% scenario).

The results of this analysis will help to inform decision makers when selecting projects and identifying those which may experience a greater impact from sea level rise and require greater levels of resiliency in design. The final results of this analysis were appended to the Bay Trail database.

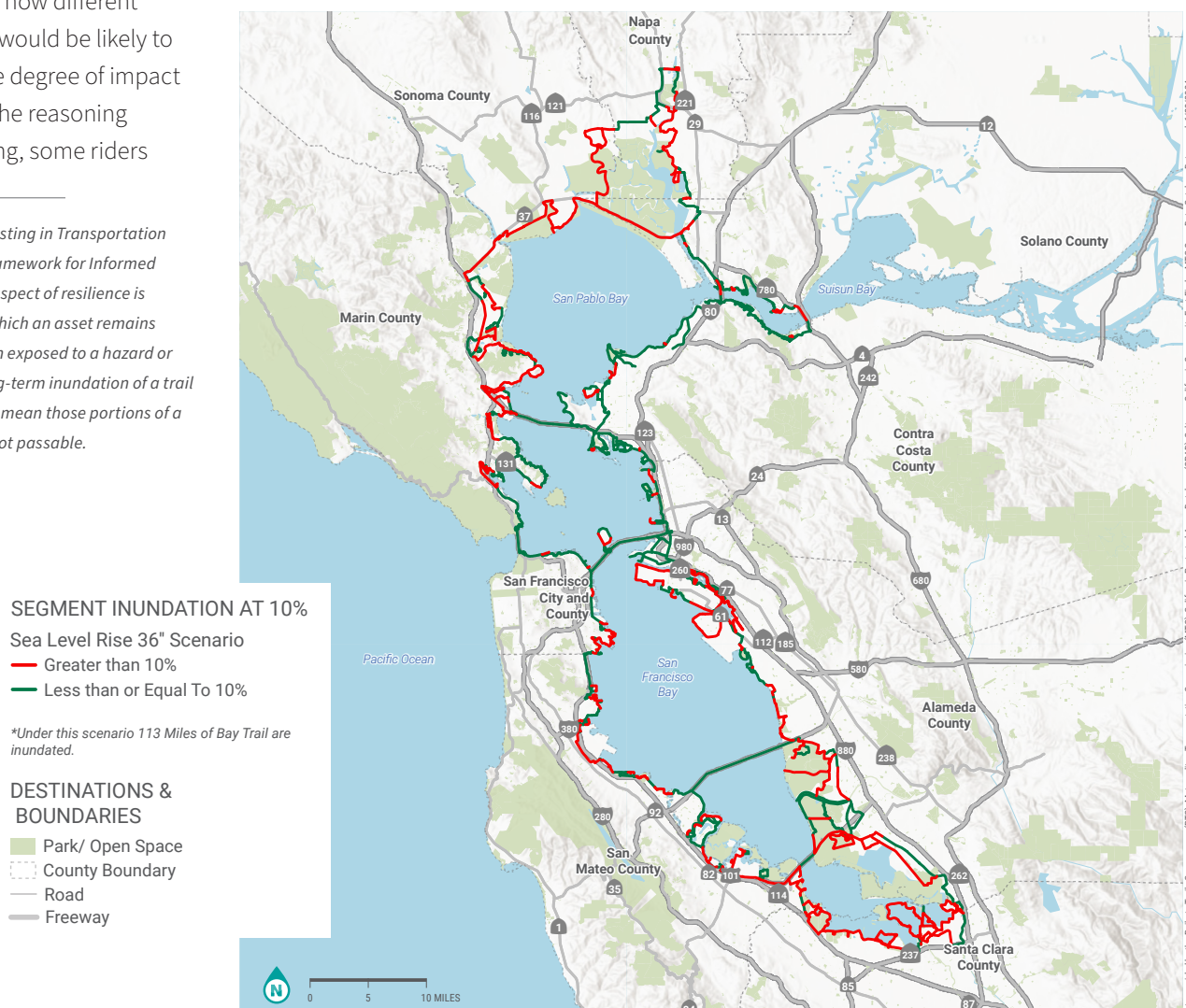


Figure 26. Sea Level Rise Inundation Analysis Map showing Bay Trail inundation in a 36" sea level rise scenario



05 COST ESTIMATE

Photo: Benicia, CA (Source: Zander Westbrook Design)

COST ESTIMATE

METHODOLOGY

In order to assist in the decision-making process and sequencing of gap closure projects it is important to develop an understanding of the potential costs associated with each project. The project team developed cost estimates for all Bay Trail Gaps¹ by updating the existing cost estimation tool from MTC and calculating new estimated costs to close Bay Trail Gaps. The cost estimation tool computed results in 2024 dollars, but can be adjusted for inflation in future years to provide updated estimates. This was done in a two-fold process. First, the project team used the prioritization scores created in the first step of the Bay Trail Gap Implementation Plan Prioritization effort to split the Bay Trail Gaps into two categories: those in the top 25% and those in the bottom 75% of prioritized gaps. Next, those that were in the top 25% went through an extensive manual process to determine cost attributes. Those in the bottom 75% were assigned default assumptions. Bay Trail Gaps with cost estimates provided from a study (completed in 2016 or after) did not receive a new cost estimation. The cost estimation process bypasses Bay Trail gaps where more detailed cost estimates are available regardless of priority ranking. A map of which segments fell into which cost typology assumptions category is shown in Figure 27.

The specific attribute categories and the values measured or assessed by the updated GIS tool to calculate costs include:

- ▶ Segment Facility Type – Class 1 (Multi-use Trail), Class 2 (Bike Lane), Class 4 (Cycle Track including cost of sidewalk)
- ▶ Bridge Type – Pedestrian & Bicycle only or prefabricated and rated for traffic-light vehicles
- ▶ Bridge Length – Total bridge length along a segment measured in feet.
- ▶ Boardwalk Length – Total boardwalk length along a segment measured in feet.
- ▶ Environmental Plan – Determination of environmental plan review needs and permitting type
- ▶ Railroad Crossing – Railroad crossing grade type (if deemed necessary)
- ▶ Sidewalk Presence² - Segments without sidewalk on at least one side included an estimated cost to construct sidewalk on at least one side

For a more detailed description of the methodology and included attributes, please refer to Appendix D.

¹ Connector trails and non-gap Bay Trail segments were not assessed for potential costs.

² This category was only assessed for segments in the top 25% of prioritized gaps which are proposed as Class II facilities.



Data provided by the Rails-to-Trails Conservancy (RTC), Metropolitan Transportation Commission (MTC), California Protected Areas Database (CPAD), Caltrans, California Community Fact Finder, MTC Open Data Catalog. Date saved: 6/27/2024.

COST ESTIMATION SPLIT

- Top 25% Priority Gaps*
- Bottom 75% Priority Gaps

**Top 25% Priority Gaps includes gaps with cost estimate data from previous feasibility studies.*

DESTINATIONS & BOUNDARIES

- Park/ Open Space
- County Boundary
- Road
- Freeway

Figure 27. Cost Estimation Categories

High-Level Cost Assumptions for Bottom 75% of Bay Trail Gaps

The project team applied high-level assumptions to generate cost estimations for the bottom 75% of Bay Trail Gaps. These assumptions were tailored to be conservative estimations of costs, given the uncertainty of additional costs what may be identified during a more detailed design evaluation. High-level assumptions included:

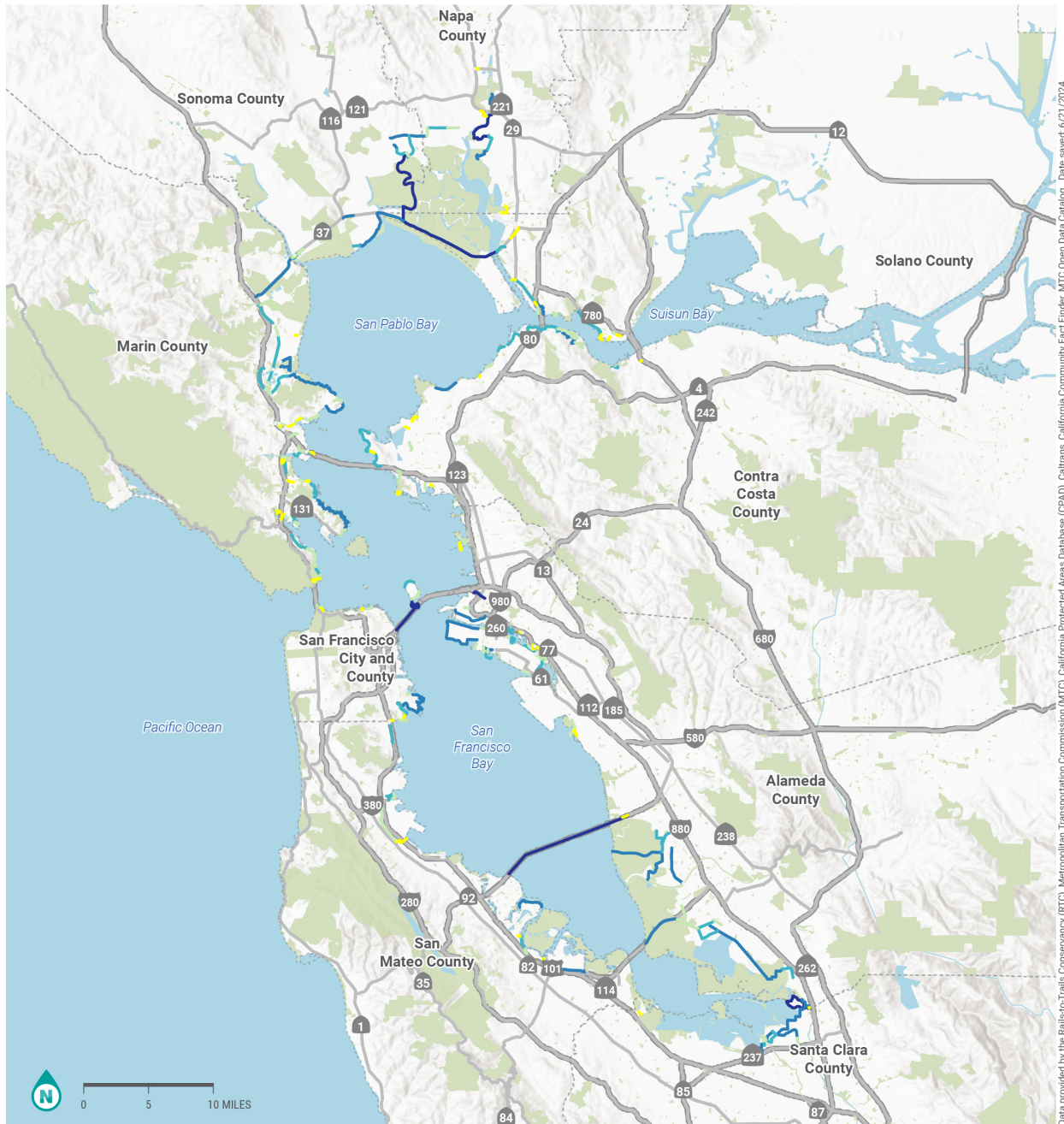
- ▶ All off-street facilities were classified as surface paths, but on-street facilities were classified as Class IV protected facilities.
- ▶ Trail segments intersecting with readily available railway data provided by the USDOT Geodata Platform were assumed to have a railway crossing. A manual review confirmed if a railroad crossing was necessary or not.
- ▶ Trails within wetlands are assumed to have a fixed-cost environmental review and require boardwalks as part of their construction.
- ▶ Trails that cross major water bodies, rivers, or streams are assumed to require bridges spanning at least 200 feet on either side of the water body.

For a more detailed description of the high-level cost estimation assumptions, please refer to Appendix D.

Cost Estimation Results

Results of the cost estimation analysis for all Bay Trail Gaps are shown in Figure 28.





COST ESTIMATION ESTIMATES (2024 DOLLARS)

- >\$25 Million
- \$5 Million to \$25 Million
- \$2 Million to \$5 Million
- \$750,001 - \$2 Million
- \$200,001 - \$750,000
- \$1,052 - \$200,000

DESTINATIONS & BOUNDARIES

- Park/ Open Space
- County Boundary
- Road
- Freeway

Figure 28. Bay Trail Gap Cost Estimation Results (2024 dollars)

Cost Estimates & Priority Level

The project team combined the results of the prioritization process with the cost estimation results for Bay Trail Gaps in order to help decision makers in identifying projects which present the greatest priority with the lowest cost and those which require greater levels of funding.

The final priority score and estimated cost for Bay Trail Gaps are displayed in Figure 29, on the following page, and further divided into four quadrants of priority and cost including:

- ◆ Tier 1 – Higher Priority & Lower Cost
- ◆ Tier 2 – Higher Priority & Higher Cost
- ◆ Tier 3 – Lower Priority & Lower Cost
- ◆ Tier 4 – Lower Priority & Higher Cost

Additionally, projects on major corridors including those on State Route 37, on boardwalks or levees, and on-street gaps are also highlighted in Figure 29.

Projects in Tier 1 represent the greatest opportunity to address high priority gaps with the lowest estimated costs while Tier 2 reflects high priority projects which require a greater level of funding for implementation. Tiers 3 and 4 include projects ranked in an overall lower priority with various levels of estimated costs. Projects within each quadrant are included in Tables 3 - 6 below which highlight their overall priority score, order of magnitude cost estimate, and results of the sea-level rise analysis for 1 meter and 2 meter sea-level rise and their estimated level of inundation.

Order of magnitude cost estimates (in 2024 dollars) correspond to the levels identified in Figure 28 and are as follows:

\$	=	Less than \$200,000
\$\$	=	\$200,001 to \$750,000
\$\$\$	=	\$750,001 to \$2 Million
\$\$\$\$	=	\$2 Million to \$5 Million
\$\$\$\$\$	=	\$5 Million to \$25 Million
\$\$\$\$\$\$	=	Over \$25 Million



Photo: Oakland, CA (Source: Zander Westbrook Design)

TOTAL COST VS PRIORITY SCORE

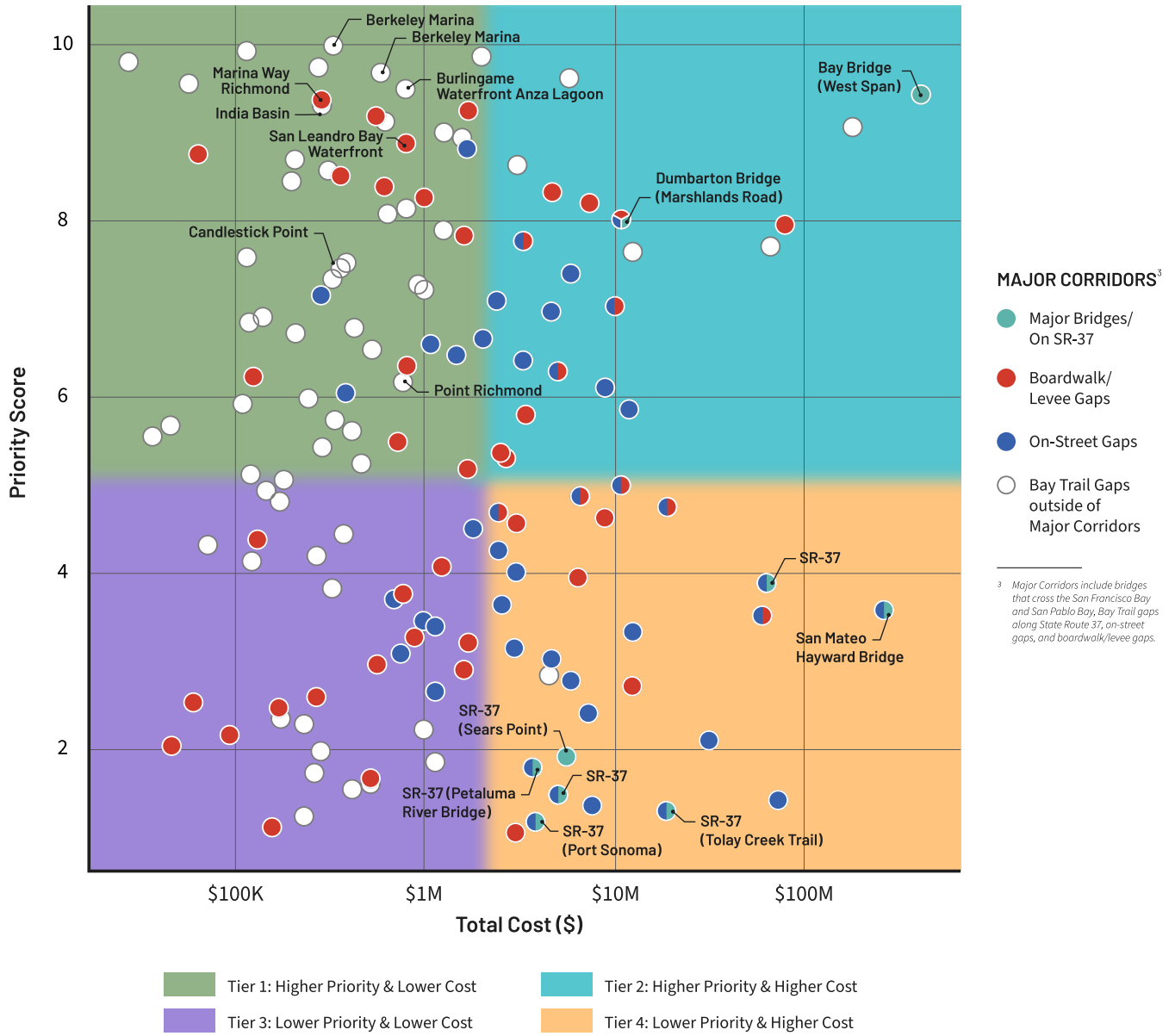


Figure 29. Cost Estimates vs Priority Score Tiering

Table 3. Tier 1 Gaps: Higher Priority & Lower Cost

Note: Gaps within each tier are listed by county in descending priority

SEGMENT NUMBER	COUNTY	PRIORITY SCORE	COST ESTIMATE	PERCENT FLOODED WITH 1 METER (36") SEA LEVEL RISE	PERCENT FLOODED WITH 2 METERS (77") SEA LEVEL RISE	SCENARIO FIRST INUNDATED IN
4159	Alameda	10.00	\$\$\$	0.00%	92.80%	Not Inundated
4116	Alameda	9.75	\$\$\$	39.13%	100.00%	10% Inundated
4151	Alameda	9.69	\$\$\$	0.00%	5.84%	Not Inundated
4046	Alameda	8.89	\$\$\$\$	0.00%	96.76%	Not Inundated
4117	Alameda	8.71	\$\$	55.55%	100.00%	10% Inundated
4194	Alameda	8.58	\$\$\$	0.80%	85.66%	Not Inundated
4095	Alameda	8.52	\$\$\$	0.00%	0.00%	Not Inundated
4201	Alameda	8.15	\$\$\$\$	77.86%	98.27%	10% Inundated
4198	Alameda	8.09	\$\$\$	21.30%	58.46%	10% Inundated
4174	Alameda	7.53	\$\$\$	0.00%	74.24%	Not Inundated
4080	Alameda	7.16	\$\$\$	0.00%	0.00%	Not Inundated
4184	Alameda	6.05	\$\$\$	0.00%	40.93%	Not Inundated
4062	Alameda	5.99	\$\$\$	80.45%	100.00%	10% Inundated
4217	Alameda	5.68	\$	39.73%	91.47%	10% Inundated
5108	Contra Costa	9.94	\$\$	0.00%	67.05%	Not Inundated
5021	Contra Costa	9.38	\$\$\$	0.00%	0.45%	Not Inundated
5077	Contra Costa	8.77	\$\$	0.70%	61.17%	Not Inundated
5039.1	Contra Costa	7.35	\$\$\$	0.00%	0.99%	Not Inundated
5048	Contra Costa	6.92	\$\$	0.00%	31.26%	Not Inundated
5006	Contra Costa	6.73	\$\$	33.52%	57.49%	10% Inundated
5030	Contra Costa	6.18	\$\$\$\$	0.00%	4.16%	Not Inundated
5068.2	Contra Costa	5.56	\$	0.00%	0.00%	Not Inundated
9055	Marin	8.46	\$\$	5.54%	79.19%	Not Inundated
9047	Marin	8.40	\$\$\$	84.22%	100.00%	10% Inundated
9065	Marin	6.86	\$\$	76.79%	100.00%	10% Inundated
9132	Marin	6.55	\$\$\$	100.00%	100.00%	10% Inundated
9119	Marin	6.36	\$\$\$\$	18.76%	67.67%	10% Inundated
9083	Marin	5.75	\$\$\$	0.00%	53.60%	Not Inundated
1048	San Francisco	9.57	\$\$	0.00%	9.85%	Not Inundated
1025	San Francisco	9.32	\$\$\$	4.39%	28.03%	Not Inundated
1005	San Francisco	9.20	\$\$\$	0.00%	100.00%	Not Inundated
1053	San Francisco	7.47	\$\$\$	3.52%	66.99%	Not Inundated
1045	San Francisco	6.79	\$\$\$	12.12%	93.83%	10% Inundated
2057	San Mateo	9.82	\$	0.00%	100.00%	Not Inundated
2042	San Mateo	9.51	\$\$\$\$	20.05%	79.57%	10% Inundated
2015.1	San Mateo	9.14	\$\$\$	46.80%	100.00%	10% Inundated
2102	San Mateo	7.60	\$\$	0.00%	100.00%	Not Inundated
2001	San Mateo	7.29	\$\$\$\$	0.00%	0.00%	Not Inundated
2039	San Mateo	5.93	\$\$	25.11%	100.00%	10% Inundated
3009	Santa Clara	6.24	\$\$	100.00%	100.00%	10% Inundated
6034	Solano	5.62	\$\$\$	0.00%	48.87%	Not Inundated

Table 4. Tier 2 Gaps: Higher Priority & Higher Cost

Note: Gaps within each tier are listed by county in descending priority

SEGMENT NUMBER	COUNTY	PRIORITY SCORE	COST ESTIMATE	PERCENT FLOODED WITH 1 METER (36") SEA LEVEL RISE	PERCENT FLOODED WITH 2 METERS (77") SEA LEVEL RISE	SCENARIO FIRST INUNDATED IN
4122	Alameda	9.88	\$\$\$\$	36.12%	78.62%	10% Inundated
4057	Alameda	9.63	\$\$\$\$\$	97.63%	100.00%	10% Inundated
4126	Alameda	9.08	\$\$\$\$\$	33.29%	61.62%	10% Inundated
4212	Alameda	9.01	\$\$\$\$	13.17%	88.30%	10% Inundated
4096	Alameda	8.83	\$\$\$\$	12.64%	75.32%	10% Inundated
4017	Alameda	8.03	\$\$\$\$\$	28.35%	86.33%	10% Inundated
4180	Alameda	7.97	\$\$\$\$\$	0.00%	63.82%	Not Inundated
4205	Alameda	7.90	\$\$\$\$	12.30%	45.05%	10% Inundated
4066	Alameda	7.84	\$\$\$\$	23.81%	57.25%	10% Inundated
4029.1	Alameda	7.41	\$\$\$\$\$	71.02%	82.16%	10% Inundated
4090	Alameda	7.04	\$\$\$\$\$	1.07%	33.32%	Not Inundated
4069	Alameda	6.67	\$\$\$\$	13.92%	40.57%	10% Inundated
4206	Alameda	6.49	\$\$\$\$	33.61%	39.95%	10% Inundated
4182	Alameda	6.12	\$\$\$\$\$	66.50%	99.42%	10% Inundated
4209	Alameda	5.87	\$\$\$\$\$	79.83%	96.91%	10% Inundated
5076	Contra Costa	9.26	\$\$\$\$	4.29%	27.63%	Not Inundated
5051	Contra Costa	7.23	\$\$\$\$	1.01%	86.90%	Not Inundated
5060	Contra Costa	6.42	\$\$\$\$\$	1.36%	21.14%	Not Inundated
9062	Marin	8.34	\$\$\$\$\$	16.69%	23.35%	10% Inundated
9043	Marin	8.27	\$\$\$\$	91.03%	100.00%	10% Inundated
9103	Marin	8.21	\$\$\$\$\$	0.00%	20.47%	Not Inundated
9123	Marin	7.10	\$\$\$\$\$	89.37%	98.97%	10% Inundated
9038	Marin	6.30	\$\$\$\$\$	24.37%	60.56%	10% Inundated
1009	San Francisco	9.45	\$\$\$\$\$	0.06%	2.07%	Not Inundated
1050	San Francisco	8.64	\$\$\$\$\$	18.08%	43.07%	10% Inundated
1042	San Francisco	7.72	\$\$\$\$\$	0.00%	0.00%	Not Inundated
1027	San Francisco	7.66	\$\$\$\$\$	13.83%	87.16%	10% Inundated
1047	San Francisco	6.61	\$\$\$\$	9.99%	93.10%	Not Inundated
2018	San Mateo	8.95	\$\$\$\$	5.42%	58.68%	Not Inundated
2089	San Mateo	7.78	\$\$\$\$\$	61.27%	100.00%	10% Inundated
2066	San Mateo	6.98	\$\$\$\$\$	47.11%	98.54%	10% Inundated
2028	San Mateo	5.81	\$\$\$\$\$	26.14%	50.13%	10% Inundated

Table 5. Tier 3 Gaps: Lower Priority & Lower Cost

Note: Gaps within each tier are listed by county in descending priority

SEGMENT NUMBER	COUNTY	PRIORITY SCORE	COST ESTIMATE	PERCENT FLOODED WITH 1 METER (36") SEA LEVEL RISE	PERCENT FLOODED WITH 2 METERS (77") SEA LEVEL RISE	SCENARIO FIRST INUNDATED IN
4022.1	Alameda	5.50	\$\$\$	0.00%	39.82%	Not Inundated
4045	Alameda	5.44	\$\$\$	0.00%	92.15%	Not Inundated
4139.1	Alameda	5.25	\$\$\$	0.00%	75.27%	Not Inundated
4035.2	Alameda	5.07	\$\$	0.72%	100.00%	Not Inundated
5081.3	Contra Costa	4.21	\$\$\$	0.00%	49.61%	Not Inundated
5069	Contra Costa	2.54	\$\$	0.00%	100.00%	Not Inundated
5091	Contra Costa	1.99	\$\$\$	0.00%	0.00%	Not Inundated
5091.1	Contra Costa	1.74	\$\$\$	0.00%	0.00%	Not Inundated
5091.3	Contra Costa	1.62	\$\$\$	0.00%	0.00%	Not Inundated
5091.2	Contra Costa	1.55	\$\$\$	0.00%	0.00%	Not Inundated
5100	Contra Costa	1.12	\$\$	0.00%	100.00%	Not Inundated
9011	Marin	4.33	\$\$	0.00%	100.00%	Not Inundated
9075	Marin	3.77	\$\$\$\$	13.12%	26.26%	10% Inundated
9142	Marin	3.71	\$\$\$	67.33%	100.00%	10% Inundated
9093	Marin	2.60	\$\$\$	0.00%	4.97%	Not Inundated
9108.1	Marin	2.36	\$\$	0.00%	0.00%	Not Inundated
9072	Marin	2.29	\$\$	67.47%	87.52%	10% Inundated
7008	Napa	4.82	\$\$	0.00%	0.00%	Not Inundated
7005	Napa	3.84	\$\$\$	19.87%	30.26%	10% Inundated
7031.3	Napa	2.17	\$\$	0.00%	0.00%	Not Inundated
7031.1	Napa	2.05	\$	0.00%	0.00%	Not Inundated
7042	Napa	1.25	\$\$	68.40%	87.38%	10% Inundated
1026	San Francisco	4.45	\$\$\$	16.58%	79.37%	10% Inundated
1032	San Francisco	4.14	\$\$	0.00%	0.00%	Not Inundated
1001	San Francisco	2.97	\$\$\$	0.00%	3.12%	Not Inundated
2085	San Mateo	4.39	\$\$	66.78%	100.00%	10% Inundated
6047	Solano	5.13	\$\$	50.04%	100.00%	10% Inundated
6030	Solano	4.95	\$\$	6.23%	100.00%	Not Inundated
6012	Solano	3.28	\$\$\$\$	0.00%	0.00%	Not Inundated
6021	Solano	3.10	\$\$\$	0.00%	0.00%	Not Inundated
6006.1	Solano	2.48	\$\$	25.56%	33.05%	10% Inundated
6008.2	Solano	1.68	\$\$\$	0.00%	0.00%	Not Inundated

Table 6. Tier 4 Gaps: Lower Priority & Higher Cost

Note: Gaps within each tier are listed by county in descending priority

SEGMENT NUMBER	COUNTY	PRIORITY SCORE	COST ESTIMATE	PERCENT FLOODED WITH 1 METER (36") SEA LEVEL RISE	PERCENT FLOODED WITH 2 METERS (77") SEA LEVEL RISE	SCENARIO FIRST INUNDATED IN
4132	Alameda	5.32	\$\$\$\$\$	0.00%	38.21%	Not Inundated
4006	Alameda	4.76	\$\$\$\$\$	17.20%	53.80%	10% Inundated
4072	Alameda	4.70	\$\$\$\$\$	20.41%	67.95%	10% Inundated
4028	Alameda	4.58	\$\$\$\$\$	17.52%	87.20%	10% Inundated
4210	Alameda	4.51	\$\$\$\$	9.43%	10.65%	Not Inundated
4003	Alameda	4.08	\$\$\$\$	6.67%	65.30%	Not Inundated
4032	Alameda	3.59	\$\$\$\$\$	5.29%	14.35%	Not Inundated
4029	Alameda	3.34	\$\$\$\$\$	14.52%	80.53%	10% Inundated
4172	Alameda	3.03	\$\$\$\$\$	65.46%	93.96%	10% Inundated
5093	Contra Costa	4.64	\$\$\$\$\$	0.17%	5.00%	Not Inundated
5090	Contra Costa	3.96	\$\$\$\$\$	0.00%	0.00%	Not Inundated
5040	Contra Costa	1.37	\$\$\$\$\$	1.76%	6.78%	Not Inundated
9024	Marin	5.19	\$\$\$\$	0.64%	34.36%	Not Inundated
9030	Marin	5.01	\$\$\$\$\$	11.77%	42.93%	10% Inundated
9027	Marin	4.88	\$\$\$\$\$	10.39%	16.26%	10% Inundated
9107	Marin	3.47	\$\$\$\$	0.00%	0.00%	Not Inundated
9032	Marin	3.16	\$\$\$\$\$	16.67%	34.34%	10% Inundated
9079	Marin	2.91	\$\$\$\$	8.74%	22.28%	Not Inundated
9015	Marin	2.79	\$\$\$\$\$	17.36%	65.11%	10% Inundated
9073	Marin	2.73	\$\$\$\$\$	0.00%	3.17%	Not Inundated
9137	Marin	2.42	\$\$\$\$\$	67.22%	99.97%	10% Inundated
9005	Marin	2.23	\$\$\$\$	5.10%	84.19%	Not Inundated
9009.1	Marin	1.86	\$\$\$\$	0.27%	1.08%	Not Inundated
9000	Marin	1.80	\$\$\$\$\$	99.91%	99.91%	10% Inundated
9002	Marin	1.49	\$\$\$\$\$	72.99%	74.60%	10% Inundated
7047	Napa	4.27	\$\$\$\$\$	29.60%	95.93%	10% Inundated
7050	Napa	2.11	\$\$\$\$\$	17.61%	85.69%	10% Inundated
7051	Napa	1.06	\$\$\$\$\$	0.00%	0.00%	Not Inundated
2079	San Mateo	3.65	\$\$\$\$\$	34.32%	99.64%	10% Inundated
3035	Santa Clara	4.02	\$\$\$\$\$	0.00%	55.08%	Not Inundated
3014	Santa Clara	3.53	\$\$\$\$\$	54.63%	68.54%	10% Inundated
3046	Santa Clara	2.66	\$\$\$\$	70.92%	76.93%	10% Inundated
6023.1	Solano	5.38	\$\$\$\$\$	0.00%	21.68%	Not Inundated
6042	Solano	3.90	\$\$\$\$\$	38.73%	92.25%	10% Inundated
6014.1	Solano	3.40	\$\$\$\$	13.01%	26.35%	10% Inundated
6009	Solano	3.22	\$\$\$\$	0.00%	9.21%	Not Inundated
6020	Solano	2.85	\$\$\$\$\$	0.00%	0.00%	Not Inundated
8012.3	Sonoma	1.92	\$\$\$\$\$	81.92%	94.41%	10% Inundated
8006	Sonoma	1.43	\$\$\$\$\$	61.27%	77.17%	10% Inundated
8013	Sonoma	1.31	\$\$\$\$\$	32.78%	96.76%	10% Inundated
8012.1	Sonoma	1.18	\$\$\$\$\$	72.00%	100.00%	10% Inundated



Photo: Foster City, CA (Source: Zander Westbrook Design)



NEXT STEPS

Photo: Foster City, CA (Source: Zander Westbrook Design)



NEXT STEPS

This plan represents the culmination of significant efforts to engage with agency partners, community stakeholders and the public to ensure the analysis weighting matches and represents community values and investment priorities. The selected data sources were evaluated on a percentile ranking across the study area and combined using the associated weights identified in the previous section to develop the ranked lists of Bay Trail Gaps and Connector Trail Gaps. The resulting analysis identifies the highest priority gap closure projects across the entire study area and within each county. This helps to identify the top project in each of the nine counties within the study area. MTC intends to utilize the results as one of many criteria that may influence funding decisions. Local jurisdictions are encouraged to utilize the results to guide local funding decisions or in requests for funds from external grant sources.

The Bay Trail Gap Closure Implementation Study informs the following ongoing and future projects and initiatives:

1. Updating regional trail GIS data with a comprehensive review of connector trail alignments.
2. Revising the Bay Trail Design Guidelines and design standards.
3. Conducting a Bay Trail Needs, Operations, and Maintenance Assessment (in direct response to community input gathered during the BTGCIP engagement asking for improved access, amenities, and trail maintenance).
4. Leading a more in-depth sea level rise study to assess Bay Trail impacts and future adaptation and design strategies.
5. Coordinating more closely with the [Bay Area Trails Collaborative \(BATC\)](#).

Photo: Foster City, CA (Source: Zander Westbrook Design)



APPENDICES

Photo: Fremont, CA (Source: Zander Westbrook Design)

A

Inventory Methodology

D


**Cost Estimation and Sea Level Rise Plan
Memo**

B

Prioritization Methodology

C

Prioritization Results by County

A person is riding a bicycle on a paved path that runs along a rocky coastline. The path is on the right side of the frame, and the ocean is on the left. The sky is a clear, bright blue. The person is wearing a backpack and a helmet. The overall scene is peaceful and scenic.

APPENDIX A: INVENTORY METHODOLOGY



To: Joel Shaffer, MTC
From: Jeff Knowles, Alta Planning + Design
Date: May 22, 2023
Re: Bay Trail Inventory Data Collection Methodology

Introduction

As part of the MTC *Bay Trail Gap Closure Implementation Plan*, Alta will conduct an inventory of all existing designated Bay Trail segments as shown on finalized Existing Conditions project maps¹. Overall, the inventory will include about 300 miles of existing Class I facilities and 60 miles of other on-street facilities. The survey is expected to include one week of desktop inventory for one staff person and about 2 weeks of field work for two staff people assuming 8-hour days, which include travel to and from starting locations. The length of fieldwork days is subject to change during detailed logistics planning. Additionally, the inventory includes staff time for survey tool development, logistics planning and data cleaning. The task budget also includes time for one or two days of additional fieldwork if any Class I segments need to be visited for a second time. Connector Trail segments will be excluded from the inventory.

The intent is to identify segments that are built but are considered to be substandard when considering the *San Francisco Bay Trail Design Guidelines and Toolkit (Design Guidelines)* and best practices. The inventory will be conducted through a combination of fieldwork and desktop review. The deliverable will be a GIS database that identifies existing segments by facility type and location of features described in *Table 1: Attributes to be Collected During Field Work*. Inventory data will be either be assigned to the current Bay Trail GIS data or as point features (e.g., locations of water fountains and wayfinding signs). A future memorandum will discuss options for updating the inventory over time.

Inventory Methodology

The inventory methodology will be determined by facility type, as described below.

Existing Class II and Class IV Bicycle + Sidewalk Facilities

On-street Class II bicycle lanes and Class IV separated bicycle lanes and adjacent dedicated pedestrian facilities (e.g., sidewalks) will be inventoried via a desktop survey using GIS and aerial imagery. Pedestrian facility inventory will be constrained to missing adjacent sidewalks and pinch points that are sufficiently large to be identified during desktop review. Identification of insufficient curb ramps will only be completed during field review, as identification via aerial imagery is often difficult. Segments will be identified as deficient, incomplete, or updated under the following circumstances:

- **Bicycle facility type incorrectly identified** – this will result in an update to the underlying GIS data and then will be evaluated for completeness and/or deficiencies
- **Sidewalk is missing on one or both sides of the roadway** – i.e., on any given block of roadway designated as part of the Bay Trail, sidewalk is present and complete on at least one side of the road. Otherwise, the segment will be identified as incomplete.
- **Existing bicycle facilities are narrower than best practice minimum widths** – based on visual review of the data, if an existing Class II bike lane is less than five feet in width, an existing one-way Class IV separated bike lane is less

¹ The list of existing conditions map comments is still in development at the time. The list of comments will include all recommended map edits, including any changes to the designated trail segments will be completed prior to fieldwork.



than five feet in width (excluding buffer), and/or an existing two-way Class IV separated bike lane is less than eight feet in width (excluding buffer), it may result in measurement of dimensions during desktop review and identification of the segment as deficient. The intent of this review is to identify potential pinch points of existing infrastructure rather than exhaustively inventory the width of all on-street bicycle facilities that comprise the Bay Trail.

Existing Class I Facilities

Existing Class I Bay Trail segments will be inventoried through fieldwork utilizing [ESRI's QuickCapture](#) app. Data collection will be conducted via bicycle by Alta and Zander staff traveling in pairs. Each rider will have a unique version of the QuickCapture data collection app (Figure 1) to maximize the infrastructure attributes that are collected. Table 1 includes a detailed listing of the data collection scheme. See Appendix A for a visual glossary of data collected in the field. Additional attributes the team considered but did not prioritize include areas of bicycle and pedestrian separation, drainage grates (not safe for bicycles), tight turns, and trail amenities like benches. Substandard trail segments will be identified during field inventory or data post processing. Substandard trail segments may be less than 8 feet wide, have poor pavement quality or may be unbikeable for other reasons identified during field review. Any segments that were identified as existing but have not yet been constructed will be reclassified as proposed.

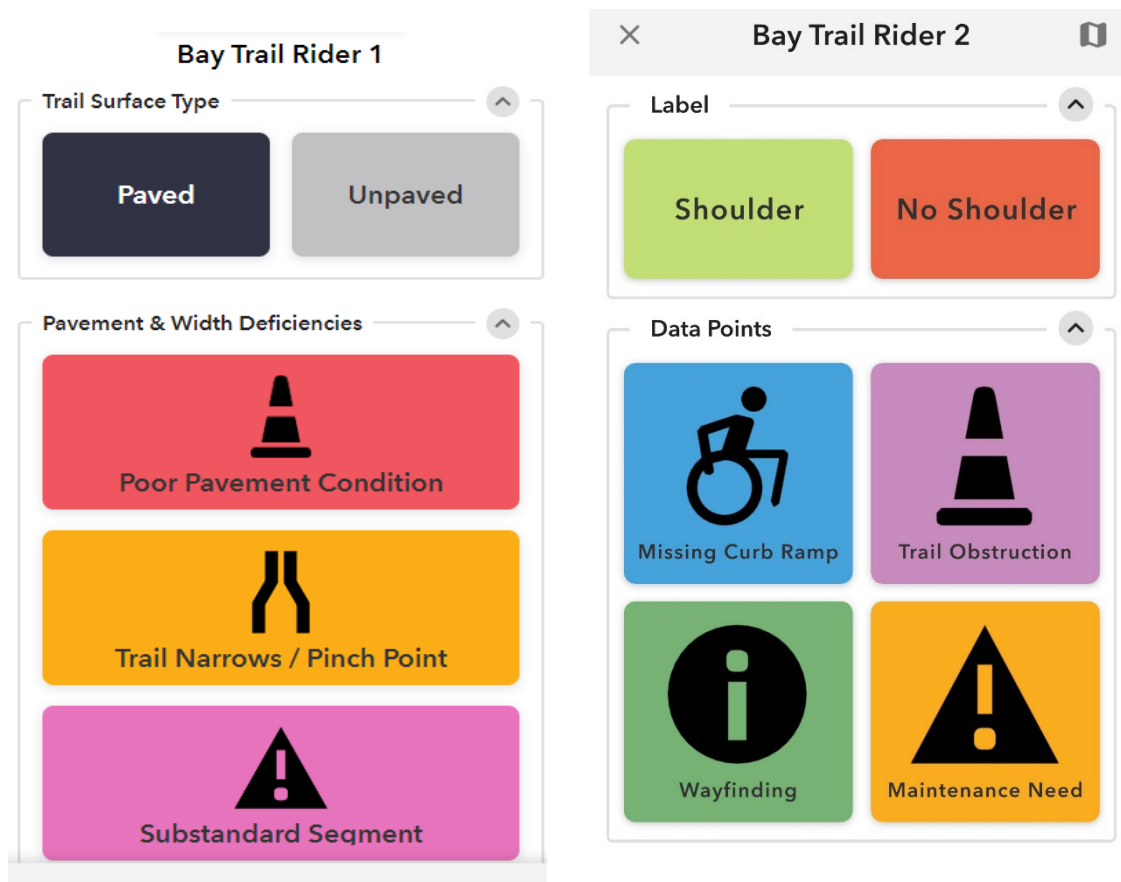


Figure 1. Field data collection for Class I Bay Trail segments will be conducted using the ESRI QuickCapture App.

Table 1. Attributes to be Collected During Fieldwork

Attribute	Definition	Values	Feature		
			Type	Rider 1	Rider 2
Surface type	Trail surface type.	Paved/Unpaved	Line	x	
Poor Pavement Condition*	Disruptions to trail surface noticeable by an average bicycle user including pavement uplifting, potholes, surface cracking, etc. Surveyors will mark a point at every defect, where possible.	Location	Point	x	
Trail Narrows/Pinch Point	Width of trail changes dramatically. Points mark the beginning and end of narrow sections if it extends beyond a brief stretch.	Point (width to be measured via desktop audit)	Point	x	
Shoulder Presence	Indicates if a trail has a gravel shoulder at least 3' wide.	Shoulder/No Shoulder	Line		x
Missing Curb Ramp	Lack of curb ramp - requires a bicyclist to dismount or 'hop' the curb to continue travel along the trail.	Location	Point		x
Trail Obstruction	Any vertical obstruction in the trail travelway or within three feet of the trail on either side that could present hazards to safe unimpeded trail use (e.g., bollards, curbs, vegetation, poles/posts, street furniture, etc.) Includes obstructions within the trail that are improperly marked according to the <i>Design Guidelines</i> .	Location	Point		x
Wayfinding	Location of Bay Trail branded wayfinding signs.	Location	Point		x
Maintenance Need	Indicates maintenance needs like trash dumping, broken branches, graffiti, encampments, etc.	Location	Point		x
Substandard Segment	<p>Segments that meet one or more of the following criteria. Segments can be identified during field review or during post processing.</p> <ul style="list-style-type: none"> • Have substantial pavement issues • Less than 8 feet wide • Not bikeable for some reason 	Location	Point	x	

* Data collected in the field will be post processed to identify trail segments where multiple deficiencies are noted, and a metric will be calculated to show the pavement condition relative to other trail segments. The intent is to identify areas priority areas for further review and potential improvements rather than identify every specific location in the network where pavement improvements may be necessary.

The inventory will be accompanied by a georeferenced photo inventory, which will be captured using a GoPro camera taking pictures along the trail in 5 second intervals. While the GoPro camera will also capture video, georeferencing the video stream in ArcGIS Pro requires purchase of the Imagery Analyst extension. Photos can be located and viewed in ArcGIS Pro or ArcGIS Online without purchasing additional software.



These items required for the photo inventory were purchased March 2023 and cost about \$600.

- **Camera type** – A GoPro Hero 11 to capture continuous georeferenced photos at 5 second increments.
- **Camera mount** – Either a handlebar or body mount.
- **Battery type/battery life** – A battery typically provides 1 to 2 hours of recording time with two external rechargeable batteries to support a full day of fieldwork.
- **Video resolution/video card size** – A 512GB microSD card with a minimum v30 or UHS-3 rating, which is sufficient for image collection over 1 to 2 days of fieldwork.

Next Steps




Once the field data collection is completed, Alta will undertake the following next steps:

- Post process data collected in the field to:
 - Conflate trail surface type (paved vs. unpaved) and shoulder (presence vs. absence) to the trail centerline
 - Calculate composite metrics to indicate relative pavement quality and maintenance need
 - Review pinch point data and determine whether data should be associated with trail segments or as a point feature class and finalize data
 - Identify substandard segments trail segments based on definition in Table 1 that were not identified during field work
 - Finalize point feature data associated with missing curb ramps, trail obstructions and wayfinding locations
 - Convert photo data into an ArcGIS 3.0 project file and associated file geodatabase(s)
- Advise on any remaining trail segments that were missed or need to be revisited
- Development of memo narrative which includes recommendations for keeping inventory and spatial data representing the trail up to date over time, which will be included in the Task 2 Existing Conditions Summary



Appendix A – Visual Glossary for Field Data Collection

Data Attribute and Notes Sample Photo

<p>Trail Surface - Paved</p>		
<p>Trail Surface - Unpaved</p>		
<p>Trail with Shoulder</p>		

Trail without Shoulder



Poor Pavement Condition



Trail Narrows / Pinch Point



Missing Curb Ramp



Maintenance Need



Trail Obstruction





Wayfinding Sign Types Include

Wayfinding – Branded Bay Trail Sign



Wayfinding – Map with Bay Trail Logo



Wayfinding – Old Bay Trail Sign



Wayfinding – Bay Trail Sign



A blue-tinted photograph of two people walking dogs on a path by the ocean. The person on the left is wearing a hat and a jacket, and the person on the right is wearing a backpack. The path is paved and runs along a rocky shoreline with waves crashing against the rocks. The sky is clear and blue.

APPENDIX B: PRIORITIZATION METHODOLOGY

Photo: Albany, CA (Source: Zander Westbrook Design)



To: Lily Brown

From: David Wasserman, Jeff Knowles, Kim Voros, Rohan Oprisko, Alta Planning + Design

Date: March 26, 2024

Re: Task 3.1 Final Evaluation Plan Memo

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Project Analysis & Priority List

The goal of this spatial analysis is to inform the prioritization of gap closure projects for the San Francisco Bay Trail and its connector trails. The analysis methodology is informed by preliminary evaluation criteria MTC staff have communicated in meetings with the project team as well as the project scope of work. This technical approach outlines key aspects of the analysis methodology to build consensus within the project team on the intended analysis outcomes.

Study Area Definition

This analysis assumes the trails to be scored will consist of 1) the Bay Trail and 2) Connector Trails that lie within the Bay Area Ridge Trail network surrounding the San Francisco Bay Area. For this analysis, the Bay Trail and Connector Trails are considered *separate* entities worthy of independent *prioritization scores*. Our approach is intended to maintain some flexibility in alignments and enable a method that works with projects of different sizes.

Unit of Analysis

The unit of analysis for prioritization analysis is often not heavily scrutinized as part of planning transportation networks. However, questions that can have subtle and cascading impacts on what projects are prioritized and how data analysis should be interpreted can arise without defining a unit of analysis. Different projects have different needs from their units of analysis, but where possible, Alta prefers to provide resilient and robust analysis outputs where underlying analysis metrics are assessed across entire networks. The considerations for different units of analysis include:

- **Whole Area Prioritization** – Alta can develop an “evaluation grid” consisting of a disaggregated hex grid¹. The goal of these grids is to score all general locations and enable average scores to show prioritization results by different geographies, such as by neighborhood or jurisdiction. The benefit of this unit of analysis is that each area under study is equal in size and has a uniform shape that is known to work well for spatial sampling. The approximate target size for hexagons is smaller than a typical traffic analysis zone (small neighborhood) but larger than one downtown block. These hexagons, once scored, can be used to score individual projects based on the average scores of hexagons within some proximity of them. This is a flexible approach that supports scoring on-street and new off-street facilities on a similar basis as equal area geographies are weighted equally to create average scores.
- **Whole Network Prioritization** – This approach considers both deficiencies and opportunities of the full transportation network based on data captured during the needs analysis of a project, regardless of the complexity or intensity of a proposed solution. This allows us to look at sections of the network and understand which blocks, corridors or larger areas have the greatest potential to positively impact the transportation system. The benefit of this approach is that it keeps analysis tightly related to the transportation system. It involves scoring every trail segment and treating the network with length normalization routines that split segments into roughly equal-length segments. While it provides similar advantages to a whole area prioritization, it would create scoring challenges for long gap trails in that the data that scores it would only be identified by existing network alignments that might be subject to change.
- **Gap/Project Prioritization** – Project prioritization can also incorporate project-specific characteristics such as feasibility, facility type, or other contextual features specific to the facility planned. This is a common strategy when agencies consider prioritizing facilities for funding. Its results, however, can be more fragile and less flexible. If the project changes in terms of cost or extent, some of the criteria for prioritization might not work.

¹ This hex grid will be based on either a [generated tessellation](#) or on using [H3](#). The main difference is the degree of control over the resulting geometry with generated tessellations having more custom patterns they can adhere to. H3 would be pulling from a global repository of hexagons at different scales. These hexagons have unique IDs, and are popular for spatial analysis because in theory any aggregation to H3 grids for other analysis could be easily joined in that they reference consistent spatial grids.

Multistage Prioritization & Phasing

Of the options available, Alta recommends pursuing a **hybrid approach** that leverages a **whole area approach** to score hexagons that are then used to **score projects as a secondary analysis stage**. Finally, we recommend looking at the projected costs alongside final prioritization scores as a **final stage to identifying the phasing of projects**. This phasing analysis will include some mapping and analysis of the Bay Trails exposure to different scenarios of sea level rise. The evaluation grid (hexagon layer) would be used to create consistent, contextual variables to score the Bay Trail Gaps and the Connector Trails separately. Project-specific characteristics (those derived from the qualities or specific alignment of a segment) will then be integrated into a secondary stage of scoring and screening for prioritization. After scoring, Alta proposes a phasing analysis that will look at the intersection of proposed project costs and prioritization scores. This evaluation will be contextualized by a scenario-focused review of different projects’ exposure to different levels of sea level rise.

Many of the datasets suggested are provided natively at the census block group level. We will use the [appropriate area-weighted sampling techniques to generate hexagonal scores in those cases](#).

Whole Area Prioritization Scoring

Whole area prioritization scoring would leverage metric scores associated to a hexagonal grid within $\frac{1}{4}$ mile of the existing adopted Bay Trail alignment, to score built and proposed segments. This means that the hexagon grid will have scores evaluated at the hex geometry level and then used to score segments regardless of their length or status. Many final scores of segments will be based on the average prioritization score for segments within some proximity of the alignment, so hexagons over water will have minimal impact on scoring. The prioritization scoring methods suggested for this analysis blend planning judgment and a percentile ranking of continuous data to a 10-point scale across scoring categories.

Equity Scoring

Alta will conduct an equity analysis using a data-driven approach that identifies concentrations of historically disadvantaged or vulnerable populations using public health and demographic indicators. MTC has done considerable work on both the framing and analysis required to have a multifaceted view of equity through their [Equity Priority Communities](#) layers. This analysis will score the segments based on MTC’s three severity levels. Other datasets that the team considered integrating into the equity analysis included CDC’s Social Vulnerability Index, CalEnviroScreen 4.0, California Healthy Places Index, the Opportunity Atlas, Justice40, CDC Places, and HUD’s Location Affordability Index. Each of these datasets could help provide some nuance beyond MTC’s EPCs. Still, Equity Priority Communities are comprehensive and regionally specific equity metrics and provide an acceptable basis for evaluating Equity in the San Francisco Bay Area. The average value of all hexagons within $\frac{1}{4}$ mile of trail would be used to evaluate facilities. The resulting facility-level metric will be percentile ranked and then scaled to form a 10-point score.

Table 1. Equity Priority Communities Classifications to Points

EPC Classes	Points
Highest	10
Higher	8
High	6
Other	0

Improve Access to Jobs & Housing Scoring

Demand represents the usage potential of a particular gap based on key community destinations it provides connections to (e.g., jobs, activities etc.), and, relatedly, its alignment with existing short trips or trips made via active transportation (i.e., walking or bicycling). Alta considered various options for these metrics ranging from BTS LATCH, MTC’s Travel Demand Model, OpenStreetMap, or the Smart Location database. The demand score will associate gross activity density (housing unit + job densities) from the Smart Location Database to the evaluation grid. The average value of all hexagons within ¼ mile of trail would be used to evaluate facilities. The resulting facility level metric will be percentile ranked and then scaled to form a 10-point score.

Improve Access to Parks

Improving access to parks is an important goal of the San Francisco Bay Trail so that there will be enhanced access to recreational opportunities and open space, with a special focus on waterfront parks. Alta will use the California Protected Areas Database ([CPAD](#)) and California Conservation Easement Database ([CCED](#)) to identify which hexagons include relevant parks in them (sites identified with open public access from both datasets). Only parks designated as ‘open access’ will be used in the analysis. The relative presence of a park within a hexagon will be used to determine improved access to parks scores. Parks that are within 0.10 miles of the bayfront will be designated as bayfront parks. Hexagons that contain a bayfront park will be awarded a score of 10. Hexagons that contain parks, but not bayfront parks, will be given a score of 3. The average value of all hexagons within ¼ mile of trail would be used to evaluate facilities. Trails that connect to or align with bayfront parks would be more highly scored.

Table 2. Park Hexagon Point Scoring

Park Hexagon Scoring	Points
Bayfront Park (<0.10 Mile from bayfront)	10
Park	3

Improve Access to Transit Rich & Connected Communities Scoring

Improving access to existing transit rich areas and connected communities that will support future development or planned infrastructure is an important goal for the Bay Trail. Many plans or data sources could be used to evaluate this goal, but [MTC’s Priority Development Areas](#) (PDAs), and Transit Rich Areas ([TRAs](#)), and [Transit Oriented Communities](#) ([TOCs](#)) represent places near transit that are planned for new homes, jobs, and amenities. We suggest the development of a coverage metric with the PDA/TOC/TRA geographies to the hexagons. The percentage of coverage with PDA, TRA, or TOCs will be used to score facilities. The average hexagon coverage value within ¼ mile of each planned facility will be used to determine improved access to transit rich and connected communities scores. The resulting facility-level metric will be percentile ranked and then scaled to form a 10-point score.

Proximity to Bay Scoring

With the Bay Trail's implicit goal of building a beautiful shoreline path for everyone to enjoy, Alta will explicitly preferentially score segments within a ½ mile of the bayfront. As this is a smaller distance than the other metrics used in this analysis, Alta will use a smaller hexagon layer for this specific metric. After consultation with the project team, Alta will create a modified version of the MTC Bay Water layer that accurately captures the "bayfront experience". Alta will use this layer in conjunction with an inverse weighted square formula, to determine the proximity to bay scores of each hexagon. The average hexagon coverage value within ¼ mile of each planned facility will be used to determine proximity to bay scores. The resulting facility-level metric will be percentile ranked and then scaled to form a 10-point score.

Project-Specific Scoring Criteria

Project-specific scoring criteria consider project-specific attributes of the planned facility.

Gap Closure

Gap closure that creates the greatest number of continuous miles of Bay Trail receives higher points. The Working Group identified this criterion as an important way to prioritize gaps that unlock existing trails. Gaps will be given points based on whether closing it would connect long trails defined as 3 or more miles on both ends. Long gap closures will receive 8 points. Closing gaps of short existing trails defined as less than 3 miles on both ends will receive 2 points. Gaps connected to a long trail (3 or more miles) on one end and a short trail (less than 3 miles) on the other end will receive a score of 4.

If the facility connects to a Connector trail, it gets a bonus point (1 point).

If the facility is within 3.5-miles of a major bridge corridor it gets a bonus point (1). Major bridge corridors include:

- Golden Gate Bridge
- Richmond-San Rafael Bridge
- Carquinez Bridge
- Benicia-Martinez Bridge
- San Francisco-Oakland Bay Bridge
- San Mateo-Hayward Bridge
- Dumbarton Bridge

Prioritization Scenarios

The final prioritization weights are identified in Table 3 (for whole-area criteria) and Table 4 (for project-specific criteria). These criteria will be applied to the Bay Trail and Connector Trails to create separate project prioritization score sets between them. If they are mapped together, they will use different heat map color schemes for each of their scores to make it clear they are considered separately. The prioritization criteria and their weighting are informed by Working Group and community input from Phase 1 outreach.

Table 3. Prioritization Criteria Summary: Whole-Area Criteria

Criteria	Measures	Data Source	Hexagon Scoring	Project Scoring	Weight
Equity	Equity index leveraging a combination of demographic and public health data to identify socially vulnerable populations with high investment need.	MTC’s Equity Priority Communities	Classifying by EPC Class with 10, 8, 6, 0 points allocated to highest, higher, high, and other categories respectively.	10-Point Scale – The average score of all hexagons within a range of a planned project percent ranked and rescaled.	25%
Improved Access to Jobs & Housing	Demand index leveraging EPA’s smart location database to identify areas of high residential unit and job densities that trails will better connect.	US Environmental Protection Agency Smart Location Database	Area-weighted average of gross activity density for each hexagon location.	10-Point Scale – The average gross density of all hexagons within a range of a planned project percent ranked and rescaled.	12.5%
Improved Access to Parks	A park index to identify trails that connect people to parks, with high priority for waterfront parks.	California Protected Areas Database (CPAD) & Conservation Easement Database (CCED) with “Open Access”	If a park was found within a hexagon, the hexagon was assigned a value of 3. If a park was within 0.10 miles of the Bay waterfront and found within a hexagon, the hexagon was assigned a value of 10.	10 Point Scale – The average score of all hexagons within a range of a planned project.	12.5%
Improved Access to Transit Rich & Connected Communities	Future alignment with regional planning goals based on the degree of overlap with PDAs, TRA & TOCs.	MTC Priority Development Areas/Transit Oriented Communities/Transit Rich Areas	The percentage coverage with PDAs/TRAs/TOCs.	10-Point Scale – The average percent of all hexagons within a range of a planned project percent ranked and rescaled.	12.5%
Proximity to Bay	An index identifying trails that are closer to the bayfront.	MTC Water Layer with project team input to determine a bayfront experience.	An inverse weighted squared score at every 1/10 th of a mile, ending at a ½ mile from the bayfront.	10-Point Scale – The average score of all hexagons within a range of a planned project percent ranked and rescaled.	12.5%

Table 4. Prioritization Criteria Summary: Project-Specific Criteria

Criteria	Measures	Data Source	Hexagon Scoring	Project Scoring	Weight
Gap Closure	Projects that close gaps that create the greatest length of continuous miles of trail.	Project Specific, Existing Built Trails	N/A	10 Point Scale – Based on whether gaps are closed between long trails (8 points), or close gaps in short trails (4 points). Bonus points (1) are given if connecting to a Connector trail <u>or</u> within 3.5-miles major bridge corridor.	25%

Notes:

Some scores, such as the one identified here, have an unknown statistical distribution. Percentile ranks tend to result in uniform distributions that can be useful for cross-metric analysis, but when metrics are being created with different distributions, their prioritization behavior can be erratic. For example, if values skew toward very low values, regardless of their weight, the impact of the metric on the final prioritization may be limited. For this reason, we may elect to percentile rank or do some type of normalization routine for this metric if we find its distribution impairs its role in a larger prioritization process.

Prioritizing Bay Trail Gaps

Alta will generate a ranked list of all Bay Trail gaps. In addition, relative scores will be made by county for each gap so that each county can know its top performance gaps to close. The county identified with a gap trail segment will be determined based on whether its centroid is located within that county. Alta will qualitatively identify where this selection method appropriately classifies a trail based on a map review. After segments are classified by county, a relative percent rank will be applied to the final prioritization scores that identifies the highest scores by county. These scores will be used as a supplement to the final prioritization scores during the course of this project and future analysis of the alignments.

Prioritizing Connector Trails

Alta will generate a regional list of prioritized connector trail gaps using the same criteria as Bay Trail gaps. In the “Gap Closure” criterion, a bonus point will be awarded for connecting to the Bay Trail replacing the point of a connector trail.

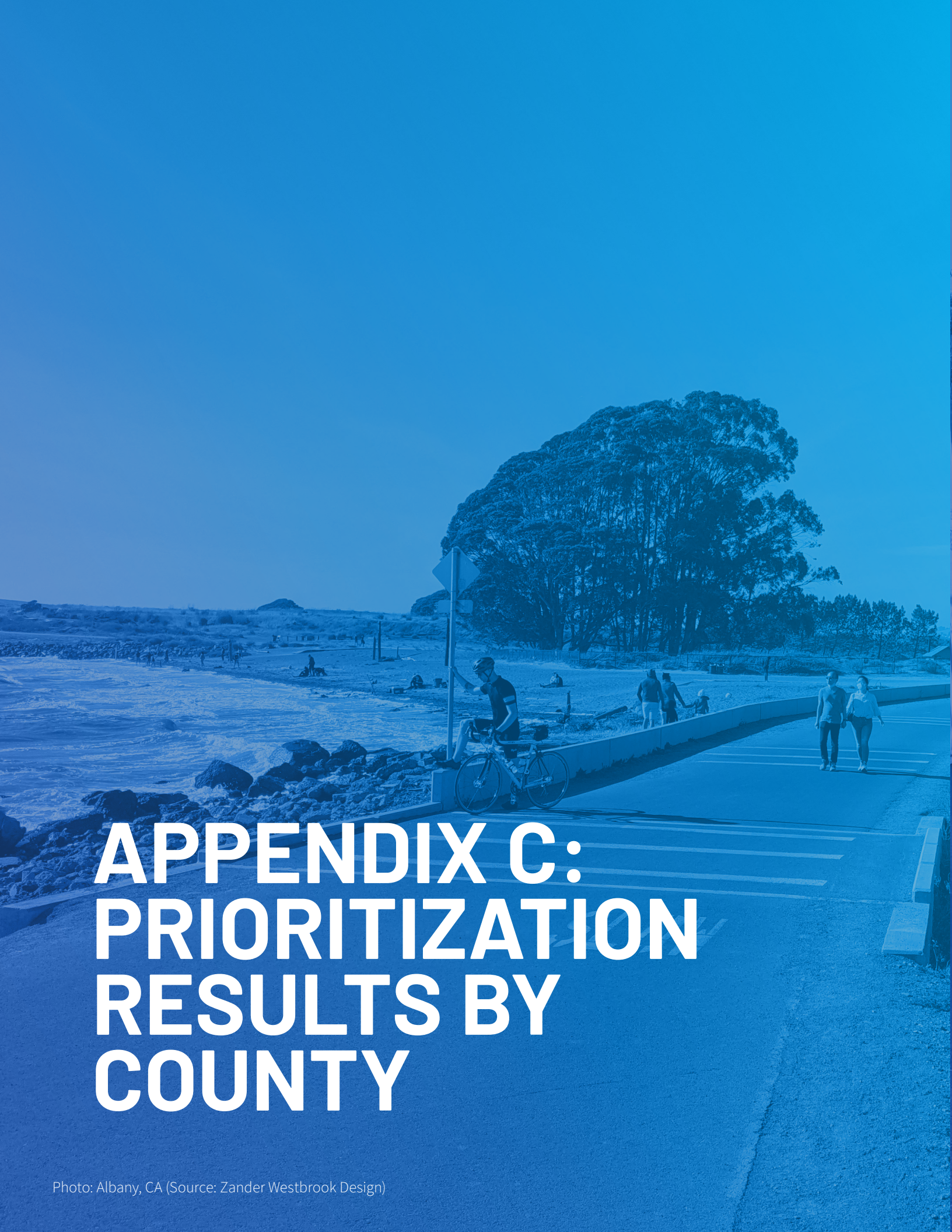
Sea Level Rise Scenarios

Sea Level Rise poses a growing threat to the San Francisco Bay Trail. While not used as a prioritization criterion, Alta will provide analysis for MTC and its partners to make future policy and design decisions. Evaluating exposure to sea level rise and other natural hazards could take a variety of approaches,² such as picking a high sea level rise scenario to provide a long-time horizon for the facility and provide a margin of safety for these investments. For example, some experts put the sea level rise margins of safety that 50–100-year investments should be [looking in the range of 2-3 meters of global sea level rise](#). Identifying how to integrate an evaluation of sea level rise for the Bay Trail system’s coastal segments is complicated by the fact that almost its entire length is exposed to even modest levels of sea level rise.

Alta proposes evaluating Sea Level Rise during project phasing where we propose examining different sea level rise scenarios intersection with the Bay Trail segments. During this phase, Alta will use [sea level rise](#) data to evaluate 1 & 2 meters of sea level rise across the trail system assuming no flooding and not included low lying areas. Alta will identify the proportion of each trail segment that would be inundated under each scenario of sea level rise. This will be tabulated as columns within the segment database, and then summarized in cross-tabulations. A sea level rise exposure score will be mapped based on the number of inundated miles at 2 meters of sea level rise and integrated into the phasing analysis as a contextual consideration.

² Other metrics Alta considered for this analysis included:

1. The degree of exposure to 18 natural hazards categories as indicated by the [National Risk Index’s \(NRI\) Expected Annual Loss values at the census tract level](#). The Bay Area generally is exposed to 14 of the 18 hazard types, with the top hazard categories including Earthquakes, Wildfire, Heatwaves, Tornadoes, Riverine Flooding, Drought, and Coastal Flooding. Different counties have different levels of exposure to different hazards.
2. Exposure to sea level rise from proposed trail segments embodied by exposure to sea level rise as indicated by inundation polygons provided by the [ART Bay Area Sea Level Rise and Shoreline Analysis \(ART Analysis\)](#).
3. Integrating [shoreline vulnerability index](#) prepared as part of a related analysis to the ART Analysis. One idea was to look at segment’s proximity weighted vulnerability score for parallel trail alignments.



APPENDIX C: PRIORITIZATION RESULTS BY COUNTY

Photo: Albany, CA (Source: Zander Westbrook Design)

Alameda County - Bay Trail Gaps

Segment Number	County	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Unranked Raw Priority Score	Regional Rank	Regional Order	County Rank	County Order	Miles
4159	Alameda	9.1	9.3	10	7.1	5	9.4	8	10	1 out of 146	10	1 out of 42	0.41
4122	Alameda	9.1	9	8.7	8.4	5	8.3	7.8	9.9	3 out of 146	9.8	2 out of 42	1.04
4116	Alameda	9.4	7.9	2.9	9.1	8	6.9	7.7	9.8	5 out of 146	9.5	3 out of 42	0.2
4151	Alameda	9.2	9.1	8.6	5.4	5	10	7.7	9.7	6 out of 146	9.3	4 out of 42	0.67
4057	Alameda	8.8	7.2	8.5	4.4	8	7.5	7.7	9.6	7 out of 146	9	5 out of 42	0.62
4126	Alameda	8.3	9.8	4.5	9.2	5	4.8	6.9	9.1	16 out of 146	8.8	6 out of 42	0.5
4212	Alameda	8.5	6.7	8	9.1	4	6.1	6.8	9	17 out of 146	8.6	7 out of 42	0.15
4046	Alameda	8.2	6.9	8.4	1.1	8	5.7	6.8	8.9	19 out of 146	8.3	8 out of 42	1.04
4096	Alameda	7.7	8.6	6.2	9.8	4	6.7	6.8	8.8	20 out of 146	8.1	9 out of 42	0.36
4117	Alameda	7.3	8.8	7.3	8.8	3	8.6	6.8	8.7	22 out of 146	7.9	10 out of 42	0.25
4194	Alameda	7	7.3	10	8.5	2	9.3	6.6	8.6	24 out of 146	7.6	11 out of 42	0.22
4095	Alameda	9.5	8	4.3	10	4	3.1	6.5	8.5	25 out of 146	7.4	12 out of 42	0.49
4201	Alameda	6.4	6.5	10	8.3	2	8.5	6.3	8.2	31 out of 146	7.1	13 out of 42	0.78
4198	Alameda	7.7	6.5	5.7	9.3	3	6.7	6.2	8.1	32 out of 146	6.9	14 out of 42	0.65
4017	Alameda	1.1	5.8	10	3.3	9	9.8	6.1	8	33 out of 146	6.7	15 out of 42	3.17
4180	Alameda	6.8	5.3	1.6	8.2	9	2.2	6.1	8	34 out of 146	6.4	16 out of 42	0.83
4205	Alameda	7.2	8.3	5.9	9.3	2	7	6.1	7.9	35 out of 146	6.2	17 out of 42	0.7
4066	Alameda	7.2	7.3	4.9	8.7	4	5.3	6.1	7.8	36 out of 146	6	18 out of 42	1.45
4174	Alameda	8.8	6.9	8.6	8.9	0	5.9	6	7.5	41 out of 146	5.7	19 out of 42	0.45
4029.1	Alameda	1.1	5.5	9.3	4.6	10	4.8	5.8	7.4	43 out of 146	5.5	20 out of 42	5.01
4080	Alameda	8.6	7.7	0.4	9.9	2	6	5.6	7.2	47 out of 146	5.2	21 out of 42	0.03
4090	Alameda	7	7.6	5.1	7.5	3	4.4	5.6	7	49 out of 146	5	22 out of 42	0.92
4069	Alameda	7.9	6.8	6.4	9.4	0	5	5.4	6.7	55 out of 146	4.8	23 out of 42	0.15
4206	Alameda	7.4	8.9	4	9.9	0	5.6	5.4	6.5	58 out of 146	4.5	24 out of 42	0.08
4182	Alameda	8.1	1.9	4.7	6.1	3	7.7	5.3	6.1	64 out of 146	4.3	25 out of 42	2.99
4184	Alameda	8.9	2	0.3	7.3	3	8.6	5.2	6.1	65 out of 146	4	26 out of 42	0.34
4062	Alameda	1.1	7.4	9.5	7.7	4	7.2	5.2	6	66 out of 146	3.8	27 out of 42	0.43
4209	Alameda	9.3	1.7	0.2	6.4	4	6.6	5.2	5.9	68 out of 146	3.6	28 out of 42	2.31
4217	Alameda	1.1	6.2	9.9	3.5	9	1.1	5.1	5.7	71 out of 146	3.3	29 out of 42	0.07
4022.1	Alameda	1.1	7.2	7.1	4.3	9	1.7	5	5.5	74 out of 146	3.1	30 out of 42	0.72
4045	Alameda	8	6.7	6.7	1.1	0	9.6	5	5.4	75 out of 146	2.9	31 out of 42	0.5
4132	Alameda	6.6	2.7	4.6	6.9	5	2.5	5	5.3	77 out of 146	2.6	32 out of 42	2.18
4139.1	Alameda	6.1	2.2	0.4	5.6	9	1.6	5	5.3	78 out of 146	2.4	33 out of 42	0.24
4035.2	Alameda	1.1	5.7	6.6	1.1	9	5.6	4.9	5.1	81 out of 146	2.1	34 out of 42	0.34
4006	Alameda	1.1	5.3	5.2	4.5	9	3.3	4.8	4.8	86 out of 146	1.9	35 out of 42	10.64
4072	Alameda	6.1	8.6	3.4	6	0	8	4.8	4.7	87 out of 146	1.7	36 out of 42	0.86
4028	Alameda	1.1	4.7	5.5	6.2	9	1.4	4.7	4.6	89 out of 146	1.4	37 out of 42	2.43
4210	Alameda	7.6	7.8	0.7	9.8	0	4.3	4.7	4.5	90 out of 146	1.2	38 out of 42	0.24
4003	Alameda	1.1	8.1	2	5.7	8	2.6	4.6	4.1	97 out of 146	1	39 out of 42	1.13
4032	Alameda	1.1	2.5	1.9	1.1	9	9.2	4.3	3.6	105 out of 146	0.7	13 out of 13	8.23
4029	Alameda	1.1	5.6	9.9	4	1	9.9	4.2	3.3	109 out of 146	0.5	41 out of 42	3.13
4172	Alameda	1.1	7	1.1	3.4	8	1.8	3.9	3	114 out of 146	0.2	42 out of 42	0.94

Alameda County - Connector Trail Gaps

Segment Number	Primary Trail Name	Trail Class	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Regional Rank	County	County Rank	Miles
2	Bay Area Ridge Trail	Class 1 bikeway	1	3.5	8.2	1	0	1	2.9	Alameda County	0.9	0.24
3	San Lorenzo Creekway	Class 1 bikeway	5.2	3	1.1	1	9	9.9	8.6	Alameda County	7.4	0.29
4	San Lorenzo Creekway	Class 1 bikeway	6.5	4.1	0.7	3	0	8.9	5.6	Alameda County	3.4	0.87
5	San Lorenzo Creekway	Class 1 bikeway	6.7	4.8	0.8	3.2	0	8.8	6.3	Alameda County	4.9	1.1
6	Hayward Foothill Trail	Class 1 bikeway	8.6	6.6	0	6.6	0	1	6.4	Alameda County	5	0.09
7	San Lorenzo Creekway	Class 1 bikeway	5.8	4	0.2	1	0	8.6	4.7	Alameda County	1.9	0.03
8	San Lorenzo Creekway	Class 1 bikeway	7.8	4.3	2.9	6.7	0	1	6	Alameda County	4.4	0.02
9	W Grand Ave Cycletrack	Class 4 bikeway	9	10	3	9.3	1	1	8.7	Alameda County	7.5	0.98
37	Emeryville Greenway	Class 1 bikeway	6.4	9.8	1.6	8.8	1	8.5	8.7	Alameda County	7.6	0.49
38	San Lorenzo Creekway	Class 1 bikeway	7.6	8.1	2.6	8.3	0	1	7.1	Alameda County	5.9	0.24
57	W Grand Ave Cycletrack	Class 4 bikeway	8.9	8.4	3	9.9	10	1	9.7	Alameda County	9.4	0.61
66	San Lorenzo Creekway	Class 1 bikeway	8	5.5	0.9	3.4	0	7.1	6.6	Alameda County	5.4	0.27
67	San Lorenzo Creekway	Class 1 bikeway	7.7	4.5	3	6.1	0	1	5.7	Alameda County	3.7	0.02
77	East Bay Greenway	Class 1 bikeway	9.2	9.9	3.3	9.6	1	8.4	9.4	Alameda County	9	5.17
78	East Bay Greenway	Class 1 bikeway	7.3	6.3	2.4	5.9	0	1	5.9	Alameda County	4.1	5.71
79	East Bay Greenway	Class 1 bikeway	7.1	8.6	3.2	9.6	1	7	8.9	Alameda County	8.1	1.27
80	East Bay Greenway	Class 1 bikeway	9.8	8	3.2	9.8	0	8	9.1	Alameda County	8.5	2.32
81	East Bay Greenway	Class 1 bikeway	8.4	8.3	2.2	8.1	0	1	7.5	Alameda County	6.2	3.45
82	East Bay Greenway	Class 1 bikeway	8.2	6	2.1	7	0	1	6.6	Alameda County	5.3	2.08
83	East Bay Greenway	Class 1 bikeway	1	3.7	3	4.7	0	1	2.5	Alameda County	0.4	1.9
84	East Bay Greenway	Class 1 bikeway	1	6.8	2.2	3.2	0	1	2.8	Alameda County	0.6	1.23
85	East Bay Greenway	Class 1 bikeway	6.6	9.5	3	9.5	1	7.2	8.8	Alameda County	7.9	0.97
86	East Bay Greenway	Class 1 bikeway	8.1	9.6	2.9	9.1	1	7.2	9	Alameda County	8.2	0.56
87	East Bay Greenway	Class 1 bikeway	8.7	7	0.4	8.2	0	1	7	Alameda County	5.7	0.21
88	East Bay Greenway	Class 1 bikeway	1	5.7	2	5.3	0	1	2.9	Alameda County	1	9.2
100	East Bay Greenway	Class 1 bikeway	9.7	6.6	2.4	9.7	0	1	8	Alameda County	6.8	1.54
109	San Leandro Creek Trail	Multi-use trail	9.4	8.3	4.8	6.6	9	7.8	9.8	Alameda County	9.6	1.08
110	San Leandro Creek Trail	Multi-use trail	9.3	7.8	3.3	7.3	0	1	7.8	Alameda County	6.6	0.04
114	To Be Determined	Class 1 bikeway	6.1	6.8	6.7	6.9	0	9.3	8.4	Alameda County	7.1	0.74
118	Dumbarton to Quarry Lakes Trail	To Be Determined	1	6.2	8.1	3.4	10	8.8	9.2	Alameda County	8.7	0.7
119	Sabercat Trail	Class 1 bikeway	1	5.8	2.7	8.9	0	1	3.8	Alameda County	1.5	0.55
120	East Bay Greenway Trail	Class 1 bikeway	1	7.5	1	5.8	0	8.2	4.5	Alameda County	1.8	1.1
121	Dumbarton to Quarry Lakes Trail	Class 1 bikeway	1	5.9	2.7	6.8	9	1	7.6	Alameda County	6.3	0.47
123	Cross Alameda Trail	Class 4 bikeway	5.2	6.5	10	7.1	3	9.9	9.2	Alameda County	8.8	0.16
124	Cross Alameda Trail	To Be Determined	5.9	7.6	6.1	8.2	0	9.5	8.6	Alameda County	7.2	1.15
130	San Francisco Bay Trail	Class 1 bikeway	6.7	7.7	1.3	9.3	3	9.5	9	Alameda County	8.4	0.08
131	San Lorenzo Creekway	Class 1 bikeway	6.1	5.4	2.5	5.4	0	1	4.8	Alameda County	2.1	0.45
132	San Lorenzo Creekway	Class 1 bikeway	4.8	5.3	1.7	4.6	0	1	4.2	Alameda County	1.6	1.47
133	San Lorenzo Creekway	Class 1 bikeway	5.5	6	2	7	0	1	4.9	Alameda County	2.4	0.04
139	Emeryville Greenway	Class 1 bikeway	6.9	9.3	0.7	7.7	10	8.4	9.6	Alameda County	9.3	0.18
140	Lake Merritt to Bay Trail Connection	Class 1 bikeway	9.2	9.2	8.1	7.5	10	9.7	10	Alameda County	9.9	0.17
146	Lake Merritt to Bay Trail Connection	Class 1 bikeway	9.3	9.4	8.2	7.9	10	9.6	10	Alameda County	10	0.18
148	Sabercat Trail	Class 1 bikeway	1	3.4	2.9	4.6	0	1	2.4	Alameda County	0.3	1.91
149	San Lorenzo Creekway	Class 1 bikeway	5.1	3.1	2	1	3	9.7	6.5	Alameda County	5.1	0.32
150	San Lorenzo Creekway	Class 1 bikeway	7.4	6.2	0.6	5	0	1	5.1	Alameda County	2.6	0.49
151	San Lorenzo Creekway	Class 1 bikeway	7.2	4.9	3	4.8	0	1	5.4	Alameda County	3.1	0.24
152	San Lorenzo Creekway	Class 1 bikeway	8.1	4.9	1.8	6.5	0	1	6	Alameda County	4.3	0.34
153	San Lorenzo Creekway	Class 1 bikeway	8.5	5.7	0.3	6.2	0	1	5.8	Alameda County	3.8	0.52
154	San Lorenzo Creekway	Class 1 bikeway	8.4	8.2	1.9	8.9	0	1	7.7	Alameda County	6.5	0.23
155	San Lorenzo Creekway	Class 1 bikeway	8.3	7.4	0.8	7.4	0	1	6.8	Alameda County	5.6	0.44
156	San Lorenzo Creekway	Class 1 bikeway	7.7	4.8	3	5.5	0	1	5.6	Alameda County	3.2	0.28
157	San Lorenzo Creekway	Class 1 bikeway	7.6	8.1	2.6	8.7	0	1	7.3	Alameda County	6	0.45
158	San Lorenzo Creekway	Class 1 bikeway	1	3.2	2.6	3.1	0	1	2.2	Alameda County	0.1	0.89
161	66th Ave Trail	Class 1 bikeway	9.7	8.7	6.5	9.1	9	9	9.9	Alameda County	9.7	0.94
167	Lake Merritt to Bay Trail Connection	Class 1 bikeway	9.4	9.4	7.1	8.5	1	9.4	9.5	Alameda County	9.1	0.06
168	Calaveras Connector Trail	Class 1 bikeway	1	6.6	2.8	4.3	9	7.5	8.3	Alameda County	6.9	0.91

Alameda County - Connector Trail Gaps

Segment Number	Primary Trail Name	Trail Class	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Regional Rank	County	County Rank	Miles
169	Stanford Ave	Class 4 bikeway	5.9	9.7	2.7	9.4	1	7.9	8.8	Alameda County	7.8	0.38
171	San Lorenzo Creekway	Class 1 bikeway	7.8	4.6	2.9	6.1	0	1	5.8	Alameda County	4	0.02
172	San Lorenzo Creekway	Class 1 bikeway	8.3	5.2	0.8	6.2	0	1	5.7	Alameda County	3.5	0.08
173	East Bay Greenway	Class 1 bikeway	1	3.2	5.4	4.1	0	1	2.8	Alameda County	0.7	0.48
176	To Be Determined	Class 2 bikeway	1	4.7	1.2	3.8	9	1	6.1	Alameda County	4.7	4.98
177	East Bay Greenway Trail	Class 1 bikeway	1	7.5	3.6	4.3	0	1	3.4	Alameda County	1.3	2.23
180	Dumbarton to Quarry Lakes Trail	Class 1 bikeway	1	4.4	5.7	4.4	0	1	3.2	Alameda County	1.2	1.75
181	San Lorenzo Creekway	Class 1 bikeway	5.6	6.1	1.8	7.2	0	1	5	Alameda County	2.5	0.07
182	San Lorenzo Creekway	Class 1 bikeway	6.2	7	1.6	6	0	1	5.3	Alameda County	2.9	0.7
183	San Lorenzo Creekway	Class 1 bikeway	6.3	6.3	1.1	6.7	0	1	5.1	Alameda County	2.8	0.32
184	San Lorenzo Creekway	Class 1 bikeway	6.8	5	3	4	0	1	4.8	Alameda County	2.2	0.03
185	San Lorenzo Creekway	Class 1 bikeway	7.9	4.5	2.9	6.4	0	1	6.1	Alameda County	4.6	0.08

Contra Costa County - Bay Trail Gaps

Segment Number	County	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Unranked Raw Priority Score	Regional Rank	Regional Order	County Rank	County Order	Miles
5108	Contra Costa	9.3	6.4	7.7	9.6	9	3.5	8	9.9	2 out of 146	10	1 out of 21	0.18
5021	Contra Costa	9	6.3	1.9	9.6	9	4.5	7.3	9.4	11 out of 146	9.5	2 out of 21	0.33
5076	Contra Costa	8.5	5.9	10	8.5	6	3.3	7.1	9.3	13 out of 146	9	3 out of 21	1.52
5077	Contra Costa	9.4	7.1	10	9.5	3	2.8	6.8	8.8	21 out of 146	8.6	4 out of 21	0.44
5039.1	Contra Costa	7.5	2.9	0.6	6.9	9	1.7	5.7	7.3	44 out of 146	8.1	5 out of 21	0.56
5051	Contra Costa	5.6	3.2	0.2	7.2	9	5.4	5.6	7.2	46 out of 146	7.6	6 out of 21	0.53
5048	Contra Costa	9.6	3.1	0.3	8.2	5	3.7	5.6	6.9	51 out of 146	7.1	7 out of 21	0.27
5006	Contra Costa	1.1	4.1	9.5	1.1	9	9	5.5	6.7	54 out of 146	6.7	8 out of 21	0.38
5060	Contra Costa	5.6	3.7	9	5.1	4	6.2	5.4	6.4	59 out of 146	6.2	9 out of 21	1.39
5030	Contra Costa	5.3	3.3	7.3	1.1	9	2.5	5.3	6.2	63 out of 146	5.7	10 out of 21	0.94
5068.2	Contra Costa	1.1	2.7	9.2	1.1	8	9.4	5.1	5.6	73 out of 146	5.2	11 out of 21	0.09
5093	Contra Costa	8.7	1.6	1.2	4.8	5	3.2	4.8	4.6	88 out of 146	4.8	12 out of 21	2.58
5081.3	Contra Costa	1.1	4.8	8.7	7.2	4	5.9	4.6	4.2	95 out of 146	4.3	13 out of 21	0.47
5090	Contra Costa	6	2.4	6.1	1.1	6	2.7	4.5	4	99 out of 146	3.8	14 out of 21	4.81
5069	Contra Costa	1.1	4.5	9.1	5	2	4.7	3.7	2.5	122 out of 146	3.3	15 out of 21	0.09
5091	Contra Costa	1.1	3.4	10	1.1	1	4.9	2.9	2	131 out of 146	2.9	16 out of 21	0.49
5091.1	Contra Costa	1.1	1.9	10	1.1	1	4.1	2.6	1.7	135 out of 146	2.4	17 out of 21	0.46
5091.3	Contra Costa	1.1	1.5	9.9	1.1	1	3.8	2.5	1.6	137 out of 146	1.9	18 out of 21	0.82
5091.2	Contra Costa	1.1	1.4	10	1.1	1	2.8	2.4	1.6	138 out of 146	1.4	19 out of 21	0.68
5040	Contra Costa	1.1	1.7	3.1	1.1	1	7.4	2.2	1.4	141 out of 146	1	20 out of 21	4.06
5100	Contra Costa	1.1	2.4	0	1.1	3	1.9	1.7	1.1	145 out of 146	0.5	21 out of 21	0.06

Contra Costa County - Connector Trail Gaps

Segment Number	Primary Trail Name	Trail Class	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Regional Rank	County	County Rank	Miles
1	Crockett to Crockett Hills Regional Park	To Be Determined	5.7	2.5	2.4	1	1	8.1	5	Contra Costa County	3.5	0.32
26	Martinez Shoreline to Pt.	Class 1 bikeway	1	2.1	0	1	1	7.7	2.6	Contra Costa County	0.5	0.6
34	Martinez Shoreline to Pt.	Class 1 bikeway	1	2.4	0	1	4	8	4	Contra Costa County	2	0.13
41	Wildcat Creek Trail	Class 1 bikeway	9.9	6.9	1	9.7	0	1	7.9	Contra Costa County	7.5	0.33
42	Wildcat Creek Trail	Class 1 bikeway	9.1	5.9	1.3	7.4	0	1	6.9	Contra Costa County	5.5	0.13
43	Wildcat Creek Trail	Class 1 bikeway	9.1	5.5	1.8	6.6	0	1	6.7	Contra Costa County	5	0.14
44	Wildcat Creek Trail	Class 1 bikeway	8.9	5.1	2.5	4.9	0	1	6.4	Contra Costa County	4.5	0.1
45	Wildcat Creek Trail	Class 1 bikeway	8.7	4.3	2.8	4	0	1	5.5	Contra Costa County	4	0.13
46	Wildcat Creek Trail	To Be Determined	10	7.7	3	9.4	0	1	8.2	Contra Costa County	9	0.36
47	Wildcat Creek Trail	Class 2 bikeway	6.8	3.3	3	3.7	0	1	4.6	Contra Costa County	2.5	0.43
48	Wildcat Creek Trail	Class 1 bikeway	9.6	6.5	0.6	9	0	1	7.5	Contra Costa County	6	0.18
49	Richmond Greenway	Class 1 bikeway	10	6.4	3	8.4	1	1	8.2	Contra Costa County	8.5	0.07
111	Wildcat Creek Trail	Class 1 bikeway	9.8	4.4	2.7	7.1	1	1	7.7	Contra Costa County	7	0.29
112	Wildcat Creek Trail	Class 1 bikeway	7.1	3.4	3	3.6	0	1	4.7	Contra Costa County	3	0.63
115	Wildcat Creek Trail	Class 1 bikeway	9.5	6.7	2.2	7.7	0	1	7.6	Contra Costa County	6.5	1.71
116	Pinole Creek Trail	Class 1 bikeway	4.6	2.6	2.6	3.7	0	1	3.5	Contra Costa County	1.5	1.72
141	Wildcat Creek Trail	To Be Determined	9.9	7.3	3	9.2	0	1	8.1	Contra Costa County	8	0.11
178	Refugio Creek Trail	Class 1 bikeway	1	3.7	3.6	5.9	9	8.9	8.4	Contra Costa County	9.5	1.39
186	Franklin Canyon Bikeway	Class 2 bikeway	1	2.1	3.2	1	1	7.3	3.2	Contra Costa County	1	6.02
188	San Pablo Ave	Class 2 bikeway	5.7	3.9	4.8	4.8	9	8.1	9.3	Contra Costa County	10	3

Marin County - Bay Trail Gaps

Segment Number	County	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Unranked Raw Priority Score	Regional Rank	Regional Order	County Rank	County Order	Miles
9055	Marin	9	9.2	0	5.9	5	8.7	6.5	8.5	26 out of 146	10	1 out of 30	0.24
9047	Marin	9.9	8.8	5	9.7	3	1.9	6.4	8.4	27 out of 146	9.7	2 out of 30	0.63
9062	Marin	8	9.1	3.7	7.8	5	3.8	6.3	8.3	28 out of 146	9.3	3 out of 30	2.02
9043	Marin	7.8	8.7	5.6	9	3	5.4	6.3	8.3	29 out of 146	9	4 out of 30	1.64
9103	Marin	5.7	8.4	9.6	5.6	5	5.2	6.3	8.2	30 out of 146	8.7	5 out of 30	3.74
9123	Marin	1.1	8.3	10	7.6	4	8.9	5.6	7.1	48 out of 146	8.3	6 out of 30	1.33
9065	Marin	1.1	8.2	9.9	7.9	4	8.3	5.5	6.9	52 out of 146	8	7 out of 30	0.24
9132	Marin	1.1	7.5	10	8.6	3	9.1	5.4	6.5	57 out of 146	7.7	8 out of 30	0.15
9119	Marin	5.1	5.1	10	6.2	2	7.5	5.4	6.4	60 out of 146	7.3	9 out of 30	0.88
9038	Marin	6.5	6.2	2.6	6.7	5	4.5	5.4	6.3	61 out of 146	7	10 out of 30	3.5
9083	Marin	1.1	6.6	10	6.8	4	7.3	5.1	5.7	70 out of 146	6.7	11 out of 30	0.45
9024	Marin	6.5	8	3.2	7.8	3	1.1	4.9	5.2	79 out of 146	6.3	12 out of 30	1.47
9030	Marin	5.5	4.8	5.7	5.5	4	4.1	4.9	5	82 out of 146	6	13 out of 30	3.19
9027	Marin	1.1	3	9.5	1.1	8	7.2	4.9	4.9	84 out of 146	5.7	14 out of 30	2.85
9011	Marin	1.1	4.6	8.4	1.1	8	4.6	4.6	4.3	93 out of 146	5.3	15 out of 30	0.16
9075	Marin	1.1	4.3	8.5	3.9	5	6.9	4.5	3.8	102 out of 146	5	16 out of 30	0.76
9142	Marin	5.7	8.2	3	7.7	2	1.1	4.4	3.7	103 out of 146	4.7	17 out of 30	0.03
9107	Marin	1.1	8.5	10	1.1	3	6.4	4.3	3.5	107 out of 146	4.3	18 out of 30	0.57
9032	Marin	1.1	1.6	3.9	1.1	9	5.3	4	3.2	112 out of 146	4	19 out of 30	2.23
9079	Marin	1.1	4.5	8.1	4.3	3	6.1	3.9	2.9	116 out of 146	3.7	20 out of 30	1.53
9015	Marin	5.2	4.6	4.1	6.1	2	1.5	3.8	2.8	118 out of 146	3.3	21 out of 30	3.64
9073	Marin	1.1	3.2	5.9	4.2	5	4.6	3.8	2.7	119 out of 146	3	22 out of 30	8.16
9093	Marin	1.1	3.7	7.5	3.6	2	8.8	3.7	2.6	121 out of 146	2.7	23 out of 30	0.31
9137	Marin	1.1	2.3	10	1.1	4	5.1	3.6	2.4	124 out of 146	2.3	24 out of 30	2.33
9108.1	Marin	1.1	8.5	10	1.1	1	3.9	3.5	2.4	125 out of 146	2	25 out of 30	0.33
9072	Marin	1.1	5.4	5.8	4.7	3	2.2	3.3	2.3	126 out of 146	1.7	26 out of 30	0.42
9005	Marin	1.1	3.9	6.9	3.8	4	1.1	3.2	2.2	127 out of 146	1.3	27 out of 30	1.41
9009.1	Marin	1.1	5	3	6.5	2	1.1	2.7	1.9	133 out of 146	1	28 out of 30	1.38
9000	Marin	1.1	1.4	9.1	1.1	0	7.8	2.7	1.8	134 out of 146	0.7	29 out of 30	0.15
9002	Marin	1.1	1.8	7.5	3.3	0	3.4	2.3	1.5	139 out of 146	0.3	30 out of 30	3.22

Marin County - Connector Trail Gaps

Segment Number	Primary Trail Name	Trail Class	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Regional Rank	County	County Rank	Miles
10	Cross - Marin Trail	To Be Determined	1	5.3	3	4.9	0	1	3	Marin County	3.8	0.01
11	Cross - Marin Trail	To Be Determined	1	5	3	4.2	0	1	2.7	Marin County	2.5	0.85
12	Cross - Marin Trail	To Be Determined	1	4.2	3	1	0	1	2	Marin County	1.2	0.16
13	Alto Tunnel Path	Class 1 bikeway	1	3.5	3	3.5	1	7.3	4	Marin County	7.5	0.68
25	SMART Pathway	Class 1 bikeway	1	4.6	1.8	8.6	0	1	3.3	Marin County	5	0.63
31	SMART Pathway	Class 1 bikeway	1	5.1	3	7.8	0	1	3.5	Marin County	5.6	0.2
32	SMART Pathway	Class 1 bikeway	1	3.6	1.1	8.5	0	1	3	Marin County	3.1	0.12
33	SMART Pathway	Class 1 bikeway	1	5.2	3	8.8	0	1	3.8	Marin County	6.9	0.15
50	SMART Pathway	Class 1 bikeway	1	1.8	3.9	3.8	0	8.3	3.7	Marin County	6.2	1.03
51	SMART Pathway	Class 1 bikeway	1	2.3	2.4	7.2	0	7.8	4.1	Marin County	8.1	0.77
55	SMART Pathway	Class 2 bikeway	1	1.4	0	1	0	1	1	Marin County	0.6	0.95
65	Highway 1 Trail	Class 1 bikeway	4.8	3.6	8.3	3.5	9	9	9.4	Marin County	10	3.77
117	SMART Pathway	To Be Determined	7.5	3.9	3	5.1	0	1	5.3	Marin County	8.8	0.37
147	SMART Pathway	Class 1 bikeway	1	2.8	3	3	3	1	3.2	Marin County	4.4	0.4
166	SMART Pathway	Class 1 bikeway	5.8	9.1	5	9	4	8.2	9.3	Marin County	9.4	0.26
179	SMART Pathway	Class 1 bikeway	1	3	3	5.2	0	1	2.5	Marin County	1.9	0.25

Napa County - Bay Trail Gaps

Segment Number	County	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Unranked Raw Priority Score	Regional Rank	Regional Order	County Rank	County Order	Miles
7008	Napa	5.9	3.8	9.2	3.8	4	2.3	4.9	4.8	85 out of 146	10	1 out of 8	0.32
7047	Napa	6.9	2.5	5.7	1.1	4	5.7	4.6	4.3	94 out of 146	8.8	2 out of 8	1.33
7005	Napa	6.2	3.5	9.2	3.7	2	3	4.5	3.8	101 out of 146	7.5	3 out of 8	0.52
7031.3	Napa	5.1	4.1	0	1.1	4	2.1	3.2	2.2	128 out of 146	6.2	4 out of 8	0.13
7050	Napa	1.1	2.1	5.6	1.1	4	6.5	3.2	2.1	129 out of 146	5	5 out of 8	5.45
7031.1	Napa	5.4	3.5	0	1.1	4	1.6	3.1	2	130 out of 146	3.8	6 out of 8	0.07
7042	Napa	1.1	2	7.4	1.1	0	3.5	2	1.2	143 out of 146	2.5	7 out of 8	0.63
7051	Napa	1.1	1.1	0.1	1.1	0	1.4	0.7	1.1	146 out of 146	1.2	8 out of 8	2.65

Napa County - Connector Trail Gaps

Segment Number	Primary Trail Name	Trail Class	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Regional Rank	County	County Rank	Miles
35	Highway 12 Trail	To Be Determined	1	1.7	0	1	0	1	1.1	Napa County	2	2.28
122	Vine Trail	Class 1 bikeway	6.3	2.3	4.2	1	3	9.4	7.3	Napa County	10	0.98
126	Vine Trail	Class 1 bikeway	4.7	2.2	1.1	3.6	3	8.7	6.2	Napa County	8	8.22
127	Vine Trail	Class 1 bikeway	1	2	0.7	1	0	1	1.2	Napa County	4	9.81
128	Vine Trail	Class 1 bikeway	6	1.9	1	1	0	1	3.1	Napa County	6	8.78

San Francisco County - Bay Trail Gaps

Segment Number	County	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Unranked Raw Priority Score	Regional Rank	Regional Order	County Rank	County Order	Miles
1048	San Francisco	5.9	10	10	7.3	6	8.5	7.5	9.6	8 out of 146	10	1 out of 13	0.09
1009	San Francisco	7.3	9.9	0.6	6.3	9	9.1	7.3	9.4	10 out of 146	9.2	2 out of 13	2.06
1025	San Francisco	9.9	6.1	9.8	9	4	5.1	7.2	9.3	12 out of 146	8.5	3 out of 13	0.21
1005	San Francisco	7.5	9.9	5	8.1	5	8.2	7	9.2	14 out of 146	7.7	4 out of 13	0.39
1050	San Francisco	8.3	7	10	8.8	2	6.8	6.7	8.6	23 out of 146	6.9	5 out of 13	1.45
1042	San Francisco	9.7	2.6	0	6.7	5	9.6	6	7.7	38 out of 146	6.2	6 out of 13	1.6
1027	San Francisco	9.6	3	5.9	8	2	8.2	6	7.7	39 out of 146	5.4	7 out of 13	4.46
1053	San Francisco	5.8	5.4	10	6.6	2	9.8	5.9	7.5	42 out of 146	4.6	8 out of 13	0.24
1045	San Francisco	9.8	2.8	0	7	3	8.8	5.5	6.8	53 out of 146	3.8	9 out of 13	0.69
1047	San Francisco	9.8	2.8	0	7	3	8.1	5.4	6.6	56 out of 146	3.1	10 out of 13	0.79
1026	San Francisco	1.1	5.7	10	7.5	2	7.9	4.7	4.5	91 out of 146	2.3	11 out of 13	0.25
1032	San Francisco	5.4	5.2	7.3	9.4	0	4	4.6	4.1	96 out of 146	1.5	12 out of 13	0.24
1001	San Francisco	1.1	4	8.7	1.1	5	5.5	3.9	3	115 out of 146	0.8	13 out of 13	0.58

Note: There are no Connector Trail gaps in San Francisco

San Mateo County - Bay Trail Gaps

Segment Number	County	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Unranked Raw Priority Score	Regional Rank	Regional Order	County Rank	County Order	Miles
2057	San Mateo	6.7	9.5	9.3	5.4	8	8	7.7	9.8	4 out of 146	10	1 out of 13	0.19
2042	San Mateo	6.4	9.6	5.7	4.8	8	9.9	7.4	9.5	9 out of 146	9.2	2 out of 13	0.55
2015.1	San Mateo	8.4	9.4	0	3.5	8	9.5	6.9	9.1	15 out of 146	8.5	3 out of 13	0.39
2018	San Mateo	8.6	9.4	0.1	4.1	8	7.7	6.8	9	18 out of 146	7.7	4 out of 13	0.78
2089	San Mateo	7.1	9	2.4	5.8	5	7	6.1	7.8	37 out of 146	6.9	5 out of 13	2.86
2102	San Mateo	1.1	9.6	9.8	6.4	8	4.3	6	7.6	40 out of 146	6.2	6 out of 13	0.18
2001	San Mateo	5.3	4.2	1.6	8.6	8	4.2	5.6	7.3	45 out of 146	5.4	7 out of 13	1.33
2066	San Mateo	1.1	6.4	6	3.7	9	8.4	5.6	7	50 out of 146	4.6	8 out of 13	1.89
2039	San Mateo	1.1	9.8	6.1	8.3	4	7.3	5.2	5.9	67 out of 146	3.8	9 out of 13	0.22
2028	San Mateo	6.2	7.5	3	8	4	2.4	5.2	5.8	69 out of 146	3.1	10 out of 13	3.22
2085	San Mateo	1.1	9.3	5.5	6.5	2	9.7	4.6	4.4	92 out of 146	2.3	11 out of 13	0.17
2079	San Mateo	1.1	7.8	3.2	5.9	4	7.8	4.4	3.7	104 out of 146	1.5	12 out of 13	1.15
4032	San Mateo	1.1	2.5	1.9	1.1	9	9.2	4.3	3.6	105 out of 146	0.8	13 out of 13	8.23

San Mateo County - Connector Trail Gaps

Segment Number	Primary Trail Name	Trail Class	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Regional Rank	County	County Rank	Miles
36	Bay-to-Sea Trail	Multi-use trail	5.6	9.7	1.6	7.8	3	9.2	8.9	San Mateo County	6.5	0.87
52	Ohlone-Portola Trail	Class 3 bikeway	1	2.6	3	1	0	1	1.7	San Mateo County	1.8	1.13
64	Tanforan Avenue	Class 1 bikeway	7.8	8.9	2.1	8	0	7.8	8.5	San Mateo County	5.9	0.31
89	Crystal Springs Regional	Class 1 bikeway	1	2.1	0.2	1	0	1	1.1	San Mateo County	0.6	0.93
93	Crystal Springs Regional	To Be Determined	1	2.8	3	1	0	1	1.8	San Mateo County	2.4	0.55
101	El Camino Real Cycletrack	Class 4 bikeway	8.2	9.2	2.5	6.4	0	7.6	8.5	San Mateo County	5.3	1.69
102	El Camino Real Cycletrack	Class 4 bikeway	6.6	4.2	0.6	6	0	1	4.6	San Mateo County	2.9	1.34
103	El Camino Real Cycletrack	Class 4 bikeway	5.1	9.3	2.5	8.9	0	1	6.5	San Mateo County	4.7	4.03
108	Bay-to-Sea Trail	Multi-use trail	7	6.4	2.3	4.4	10	8.5	9.5	San Mateo County	7.6	12
113	To Be Determined	Class 1 bikeway	4.9	3.8	9.7	3.3	0	1	5.2	San Mateo County	3.5	0.08
129	Bay-to-Sea Trail	Multi-use trail	9.6	6.7	9.2	3.9	10	10	9.9	San Mateo County	10	0.4
142	Shaw Road	Class 1 bikeway	8.8	8.9	1.7	5.7	3	8.7	9.1	San Mateo County	7.1	0.5
144	To Be Determined	Class 1 bikeway	7.9	7.9	8	4.5	9	9.1	9.8	San Mateo County	9.4	1.91
145	To Be Determined	Class 1 bikeway	8.9	8.9	1.4	5.1	9	8.9	9.6	San Mateo County	8.2	1.87
170	Foster City Levee Pedway	Class 4 bikeway	5.3	9.8	7.9	3.3	10	9.6	9.7	San Mateo County	8.8	1.27
174	Crystal Springs Regional Trail	To Be Determined	1	2.7	2.2	1	0	1	1.6	San Mateo County	1.2	3.63
175	El Camino Real Cycletrack	Class 4 bikeway	4.9	8.7	1.8	8.3	0	1	5.5	San Mateo County	4.1	1.4

Santa Clara County - Bay Trail Gaps

Segment Number	County	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Unranked Raw Priority Score	Regional Rank	Regional Order	County Rank	County Order	Miles
3009	Santa Clara	1.1	9.7	10	1.1	9	2	5.4	6.2	62 out of 146	10	1 out of 4	0.17
3035	Santa Clara	1.1	6.1	7.3	4.5	5	6.4	4.5	4	98 out of 146	7.5	2 out of 4	0.96
3014	Santa Clara	1.1	5.6	2	4	8	4.9	4.3	3.5	106 out of 146	5	3 out of 4	11.56
3046	Santa Clara	1.1	5.1	10	1.1	4	3.7	3.8	2.7	120 out of 146	2.5	4 out of 4	0.12

Santa Clara County - Connector Trail Gaps

Segment Number	Primary Trail Name	Trail Class	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Regional Rank	County	County Rank	Miles
14	Guadalupe River Trail	Class 1 bikeway	5	5.6	3	4.4	0	1	4.4	Santa Clara County	5.2	2.78
15	Stevens Creek Trail	Class 4 bikeway	1	3.8	1.5	2.9	0	1	2	Santa Clara County	2.6	1.78
27	Juan Bautista de Anza NHT (bicycle route)	To Be Determined	1	2.2	2.7	1	0	1	1.6	Santa Clara County	1.5	1.01
28	Guadalupe River Trail	Class 1 bikeway	5.3	8.5	2.9	6.3	0	1	5.5	Santa Clara County	6.3	1.36
29	Guadalupe Sub-regional	To Be Determined	1	1.8	2.6	1	0	1	1.4	Santa Clara County	0.9	1.35
30	Upper Guadalupe Trail Connector Trail	To Be Determined	1	1.3	1.9	1	0	1	1.2	Santa Clara County	0.2	3.36
40	Calaveras Connector Trail	Class 1 bikeway	1	2.4	1.8	3.2	0	1	1.8	Santa Clara County	2	2.07
53	Guadalupe River Trail	Class 2 bikeway	8.8	5.8	3	10	0	1	7.8	Santa Clara County	9.3	0.32
54	Guadalupe River Trail	Class 4 bikeway	8.5	5.6	3	9.2	0	1	7.4	Santa Clara County	9.1	0.25
58	Stevens Creek Trail	Multi-use trail	1	3.3	1.4	1	0	1	1.5	Santa Clara County	1.3	1.16
59	Stevens Creek Trail	Multi-use trail	1	2.5	2.8	1	0	1	1.7	Santa Clara County	1.7	1.17
60	Stevens Creek Trail	Class 1 bikeway	1	5.4	1.1	3.9	0	1	2.4	Santa Clara County	2.8	1.21
61	Stevens Creek Trail	Multi-use trail	1	1.6	3	1	0	1	1.5	Santa Clara County	1.1	1.67
62	Stevens Creek Trail	Multi-use trail	1	1.5	2.8	1	0	1	1.4	Santa Clara County	0.7	0.83
63	Stevens Creek Trail	Multi-use trail	1	1.5	1.7	1	0	1	1.3	Santa Clara County	0.4	3.15
68	Stevens Creek Blvd	Class 4 bikeway	1	9.5	2.1	7.9	0	1	4.2	Santa Clara County	4.8	2.35
70	Southern Pacific Rail Trail	To Be Determined	1	4.4	2.2	5.6	0	1	2.7	Santa Clara County	3.3	2.93
71	Stevens Creek Blvd	Class 4 bikeway	1	5.5	1	5	0	1	2.6	Santa Clara County	3	0.21
72	Stevens Creek Blvd	Class 4 bikeway	6.2	9	1.4	7.5	0	1	6.3	Santa Clara County	7	2.12
73	Los Gatos Creek Trail	Class 1 bikeway	4.7	9.9	3	9.8	0	1	6.7	Santa Clara County	7.4	0.62
74	Stevens Creek Blvd	Class 4 bikeway	1	7.9	2	6.9	0	1	3.7	Santa Clara County	4.1	1.98
75	Stevens Creek Blvd	Class 4 bikeway	6.9	8.4	2.2	8	0	1	6.8	Santa Clara County	7.6	1.64
76	Stevens Creek Blvd.	Class 4 bikeway	7.4	10	2.5	9.9	0	1	7.9	Santa Clara County	9.6	1.19
90	Central Bikeway	Class 4 bikeway	6.5	9.1	2.9	6.8	0	1	6.6	Santa Clara County	7.2	4.67
91	El Camino Real Cycletrack	Class 4 bikeway	1	8.5	2.7	5.2	0	1	3.6	Santa Clara County	3.7	2.77
92	El Camino Real Cycletrack	Class 4 bikeway	1	8.8	3	9.5	0	1	4.5	Santa Clara County	5.4	0.56
94	South 7th St	Class 4 bikeway	9	9	2.6	8.7	0	1	8	Santa Clara County	9.8	0.83
95	Southern Pacific Rail Trail - Joe's Trail at Saratoga de Anza	To Be Determined	1	2.9	2.4	2.8	0	1	1.9	Santa Clara County	2.4	0.23
96	Keyes St	Class 4 bikeway	9.5	7.1	3	5.6	0	1	7.4	Santa Clara County	8.9	0.39
97	Willow Street	Class 4 bikeway	5.4	7.8	2.9	5.5	0	1	5.2	Santa Clara County	5.9	1.31
98	Lincoln Avenue	Class 4 bikeway	5	7.1	2.3	6.5	0	1	4.9	Santa Clara County	5.7	0.52
99	Lonus Street	Class 3 bikeway	5.5	7.2	2.1	7.6	0	1	5.4	Santa Clara County	6.1	0.14
104	El Camino Real Cycletrack	Class 4 bikeway	1	8.6	2.9	8.1	0	1	4.3	Santa Clara County	5	1.3
105	El Camino Real Cycletrack	Class 4 bikeway	1	8.2	1.9	8.6	0	1	4.1	Santa Clara County	4.6	1.53
106	El Camino Real Cycletrack	Class 4 bikeway	1	8	1.7	8.4	0	1	3.9	Santa Clara County	4.3	1.62
107	El Camino Real Cycletrack	Class 4 bikeway	6	7.8	2.1	7.6	0	1	5.9	Santa Clara County	6.5	4.35
125	East Channel Trail	Class 1 bikeway	5.4	7.3	3.1	5.8	0	8.3	7.2	Santa Clara County	8.7	5.61
135	Juan Bautista de Anza NHT (bicycle route)	To Be Determined	1	4	3	1	0	1	1.9	Santa Clara County	2.2	0.68
136	Coyote Creek Trail	Class 1 bikeway	1	7.4	2.6	4.7	1	1	3.6	Santa Clara County	3.9	0.1
143	San Tomas Expressway Trail	Class 1 bikeway	1	6.9	2.8	5.7	0	1	3.4	Santa Clara County	3.5	1.3
159	Guadalupe River Trail	Class 1 bikeway	7.3	6.1	2.9	6.3	0	1	6.2	Santa Clara County	6.7	1.79
160	Juan Bautista de Anza National Historic Trail	Class 1 bikeway	1	4.7	10	2.9	3	9.2	7	Santa Clara County	8	0.08
162	Coyote Creek Trail	Class 1 bikeway	7.2	8.8	2.6	7.3	0	1	6.9	Santa Clara County	7.8	3.03
163	Guadalupe River Trail	Class 1 bikeway	8.6	9.6	3	10	0	1	8.1	Santa Clara County	10	0.42
164	Coyote Creek Trail	Class 1 bikeway	1	7.2	2.5	4.2	9	1	7.1	Santa Clara County	8.3	0.04
165	Penitencia Creek Trail	Class 1 bikeway	8	7.6	2.9	7.8	0	1	7.2	Santa Clara County	8.5	0.01

Solano County - Bay Trail Gaps

Segment Number	County	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Unranked Raw Priority Score	Regional Rank	Regional Order	County Rank	County Order	Miles
6034	Solano	8.2	3.8	5.1	5.7	3	3.6	5.1	5.6	72 out of 146	10	1 out of 12	2.68
6023.1	Solano	7.8	4.9	3.1	7.4	3	3	5	5.4	76 out of 146	9.2	2 out of 12	1.93
6047	Solano	1.1	7.7	8.5	5.3	3	9.3	4.9	5.1	80 out of 146	8.3	3 out of 12	0.24
6030	Solano	10	4.9	2	5.3	2	2.7	4.9	4.9	83 out of 146	7.5	4 out of 12	0.34
6042	Solano	6.3	2.2	4.2	4.1	2	9	4.5	3.9	100 out of 146	6.7	5 out of 12	8.75
6014.1	Solano	1.1	4.3	9.4	1.1	5	7.1	4.3	3.4	108 out of 146	5.8	6 out of 12	0.41
6012	Solano	1.1	4.4	9	1.1	5	6.3	4.1	3.3	110 out of 146	5	7 out of 12	0.86
6009	Solano	1.1	6	6.7	5.1	3	6.5	4.1	3.2	111 out of 146	4.2	8 out of 12	1.48
6021	Solano	6.9	3.3	0.8	4.9	3	2.9	4	3.1	113 out of 146	3.3	9 out of 12	0.8
6020	Solano	6.7	3.6	0.8	4.6	3	2.4	3.9	2.8	117 out of 146	2.5	10 out of 12	1.25
6006.1	Solano	1.1	5.9	5.6	5.2	3	4	3.6	2.5	123 out of 146	1.7	11 out of 12	0.21
6008.2	Solano	1.1	4	2	4.9	3	2	2.6	1.7	136 out of 146	0.8	12 out of 12	0.55

Solano County - Connector Trail Gaps

Segment Number	Primary Trail Name	Trail Class	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Regional Rank	County	County Rank	Miles
137	South Vallejo Riverwalk	Class 1 bikeway	7.5	4.1	2.9	5.3	4	10	8.9	Solano County	10	1.78
138	South Vallejo Riverwalk	Class 1 bikeway	6.4	3.2	2.8	5.4	4	9.3	8.3	Solano County	6.7	0.36
187	Mare Island Causeway	Class 1 bikeway	7	2.9	3.7	5.5	1	9.8	7.8	Solano County	3.3	0.5

Sonoma County - Bay Trail Gaps

Segment Number	County	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Unranked Raw Priority Score	Regional Rank	Regional Order	County Rank	County Order	Miles
8012.3	Sonoma	1.1	1.2	6.2	1.1	4	3.2	2.7	1.9	132 out of 146	10	1 out of 4	0.84
8006	Sonoma	1.1	1.1	3.1	1.1	2	6.2	2.2	1.4	140 out of 146	7.5	2 out of 4	11.07
8013	Sonoma	1.1	1.2	0.5	1.1	2	7.6	2.1	1.3	142 out of 146	5	3 out of 4	3.55
8012.1	Sonoma	1.1	1.3	4.1	1.1	0	5.8	1.8	1.2	144 out of 146	2.5	4 out of 4	1.52

Sonoma County - Connector Trail Gaps

Segment Number	Primary Trail Name	Trail Class	Equity Score	Access to Jobs & Housing Score	Access to Parks Score	Access to Transit Rich & Connected Communities Score	Trail Length Score	Providing a Bayfront Experience Score	Regional Rank	County	County Rank	Miles
16	Sonoma County Bay Trail	Class 1 bikeway	1	1.2	0	1	0	7.7	2.3	Sonoma County	4.6	0.62
17	Sonoma County Bay Trail	Class 1 bikeway	1	1.3	0	1	0	7.6	2.2	Sonoma County	3.8	0.32
18	Sonoma County Bay Trail	Class 1 bikeway	1	1.4	0	1	0	7.4	2.1	Sonoma County	3.1	0.35
19	Sonoma County Bay Trail	Class 1 bikeway	1	2	1.8	1	0	1	1.3	Sonoma County	0.8	2.14
20	Sonoma County Bay Trail	Class 2 bikeway	1	1	5.1	1	3	8.6	4.4	Sonoma County	10	0.74
21	Sonoma County Bay Trail	Class 2 bikeway	1	1	0.5	1	0	7.4	2.3	Sonoma County	5.4	0.51
22	Sonoma County Bay Trail	Class 2 bikeway	1	1.2	0	1	0	7.5	2.1	Sonoma County	1.5	0.4
23	Sonoma County Bay Trail	Class 1 bikeway	1	1.6	0	1	0	7.1	2.1	Sonoma County	2.3	1.52
24	Sonoma County Bay Trail	Class 2 bikeway	1	1	5.3	1	0	7.9	3.1	Sonoma County	6.2	1.32
39	Sonoma Valley Trail	Class 1 bikeway	5.5	1.9	0.9	3.1	0	1	3.3	Sonoma County	6.9	12.9
56	Sonoma Valley Trail	Class 2 bikeway	6.6	3.1	1.3	4.1	0	1	4.3	Sonoma County	8.5	1.97
69	SMART Pathway	Class 3 bikeway	1	2.7	4.6	4.5	0	9.1	4.4	Sonoma County	9.2	5.32
134	Petaluma Marsh Trail	Class 1 bikeway	1	1.7	6.7	1	0	9.8	3.9	Sonoma County	7.7	11.8



APPENDIX D: COST ESTIMATION AND SEA LEVEL RISE PLAN MEMO

Photo: Albany, CA (Source: Zander Westbrook Design)



To: Lily Brown

From: Jeff Knowles, David Wasserman, Rohan Oprisko, Alta Planning + Design

Date: June 28, 2024

Re: Task 4 Cost Estimation & Sea Level Rise Plan Memo

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Project Analysis & Priority List

The goal of the cost estimation and sea level rise exercise is to inform the prioritization of gap closure projects for the San Francisco Bay Trail. This technical approach outlines key aspects of the analysis methodologies to build consensus within the project team on how the results were created.

Study Area Definition

This analysis estimated a cost for each of the Bay Trail Gaps. Other connector trails or non-gap Bay Trail segments were not assessed for possible costs. In contrast to the cost estimation exercise, the sea level rise exercise was conducted on all segments of the Bay Trail, whether they were gaps or not. Connector trails were not included in the sea level rise analysis.

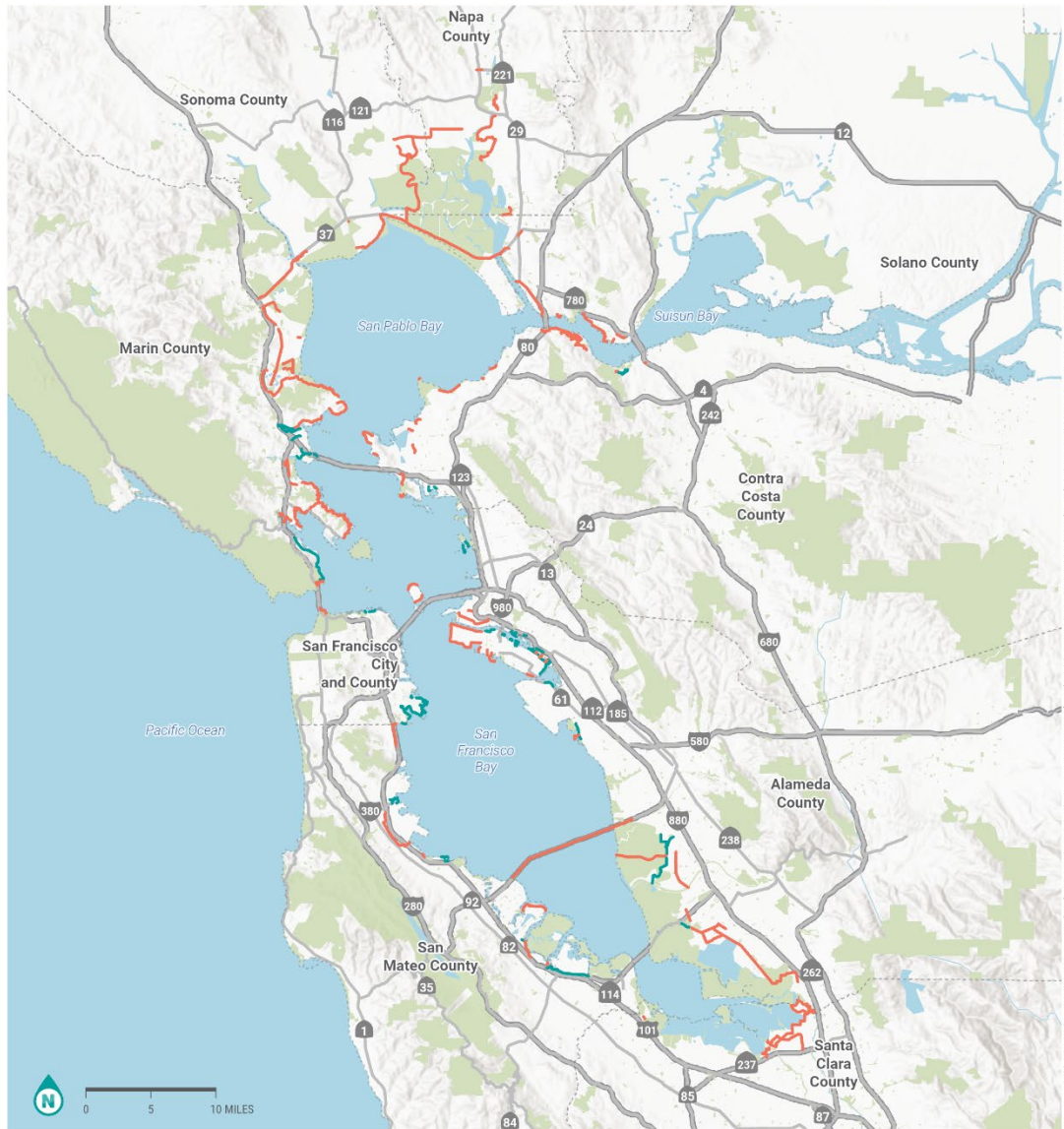
Alta believes cost assumptions could also be applied to completed Bay Trail segments, if MTC wishes to address segments that might be inundated by sea level rise some time into the future.

Cost Estimation Script and Specific Trail Assumptions

This effort involves updating an existing cost estimation tool from MTC and calculating new estimated costs to close Bay Trail Gaps that were identified in the Bay Trail Gap Implementation Plan Prioritization effort. Alta aims to modernize the script to make it simpler to understand and run within an ArcGIS Pro framework.

As part of this effort, the project team assigned specific cost attributes as script inputs to be used to create a total cost estimate. This was done in a two-fold process. First, the project team used the prioritization scores created in the first step of the Bay Trail Gap Implementation Plan Prioritization effort to split the Bay Trail Gaps into two categories: those in the top 25% and those in the bottom 75% of prioritized gaps. Next, those that were in the top 25% went through an extensive manual process to determine cost attributes. Those in the bottom 75% were assigned default assumptions. A map of which segments fell into which cost typology assumptions category is shown in **Figure 1**.

Figure 1: Cost Estimation Tool Typology Splits



**COST ESTIMATION TOOL
TYPOLOGY SPLITS**

**BAY TRAIL GAP CLOSURE
IMPLEMENTATION PLAN**

COST ESTIMATION SPLIT

- Bottom 75% Prioritized Gaps
- Top 25% Prioritized Gaps & Gaps with Previous Feasibility Studies

**DESTINATIONS &
BOUNDARIES**

- Park/ Open Space
- County Boundary
- Road
- Freeway

Attribute Categories for Cost Estimation Script

Table 1 identifies the input attribute categories used by the tool to calculate relative cost assumptions. Ratings are differentiated by construction type, construction general requirements, and construction components. Different categories are assigned different costs per linear foot, and some categories employ the use of lump sum values. To see the more detailed segment rating explanation please consult **Appendix B**.

Table 1: Cost Typology Categories for Cost Estimation Script

Criteria	Measure	Values
Segment Rating	The determined future facility type of a Bay Trail Gap segment.	Class 1 Multi-Use Trail: <ul style="list-style-type: none"> • Level Paved Surface (Easy) = 1A • Moderate = 1B • Difficult = 1C • Trail Constructed on Levee Surface = 1D Class 2 Bike Lane: <ul style="list-style-type: none"> • Vehicle Travel Lane Narrowing = 2A • Roadway Widening = 2B Class 4 Cycle Track (includes cost of sidewalk): <ul style="list-style-type: none"> • Separated Cycle Track = 1E
Bridge Rating	If determined necessary along a Bay Trail Gap, the future facility bridge type.	Pedestrian & Bicycle Load Only = A Prefabricated and Rated for Traffic-Light Vehicle/ Maintenance Load = B
Bridge Length	The specific length of the future bridge along a Bay Trail Gap segment if determined necessary. For example, if a segment is 1200 feet but a bridge segment is only 400 feet, this attribute would equal 400 feet.	Measured in Feet.
Boardwalk Length	The specific length of the future boardwalk along a Bay Trail Gap segment if determined necessary. The length attribute follows the same logic as the bridge length attribute.	Measured in Feet.
Environmental Plan	The determined environmental plan review and permitting type of a Bay Trail Gap segment, if an environmental plan is deemed necessary.	Low Sensitivity = A Moderate Sensitivity = B High Sensitivity = C
Railroad Crossing	The determined railroad crossing type of a Bay Trail Gap segment, if deemed necessary.	At-grade Crossing = A Under-crossing = B Overpass = C
Sidewalk Presence*	The determined presence of sidewalks along a Bay Trail Gap. Cost estimates were only calculated if the segment did not have a least a sidewalk on one side.	Complete = 2 One-Side Complete = 1 Partial values indicate the relative completeness of the segment.

Notes:

The script has the ability to bypass the cost estimation process if there is an existing feasibility study. In the cost estimation exercise, the project team deemed that every segment that had a feasibility study conducted in the year 2016 or after was valid.

**This category was only assessed for the segments in the top 25% of prioritized gaps, that are proposed Class II facilities.*

Cost Attribute Designation for Top 25% of Gaps

Alta worked with MTC to identify specific cost typologies for the top 25% of prioritized Bay Trail Gap segments shown in *teal* in **Figure 1**. This process involved assessing each gap segment individually. Furthermore, in instances where there was a feasibility study conducted in or after 2016, the project team decided to include the previously calculated cost estimate instead of assigning a new one.

Cost Attribute Designation Based on High – Level Cost Assumptions (Bottom 75%)

Alta developed high-level assumptions informed by GIS data to evaluate the cost estimation typologies of all trail segments not in the top 25% of prioritized gaps for the Bay Trail as shown in *orange* in **Figure 1**. These assumptions were tailored to be conservative estimations of costs, given the uncertainty of action costs that would come from a more detailed design evaluation. The list of high-level assumptions is included below:

- 1) All off-street facilities were classified as surface paths, but on-street facilities were classified as Class IV protected facilities.
 - This was determined by using the class attribute in the Bay Trail data. If a segment was identified as being Class I, it was assumed that this gap segment would be off-street. Gaps with a class attribute other than Class I were assigned a Class IV designation.
- 2) Trail segments intersecting with readily available railway data provided by the USDOT Geodata Platform were assumed to have a railway crossing. A manual review confirmed if a railroad crossing was necessary or not.
 - The specific railroad crossing cost estimation type assumed for the majority of crossings was *at-grade crossings*. If upon manual review the segment was determined to necessitate a different crossing type, the data associated with the segment was updated accordingly. If a gap segment crossed more than one railroad, each necessary crossing was taken into consideration when creating the final lump sum cost estimate.
- 3) Trails within wetlands are assumed to have a fixed-cost environmental review and require boardwalks as part of their construction.
 - Where a boardwalk was deemed necessary, the trail segment rating was changed to *trail constructed on levee surface*, and the environmental plan was assumed to be *high sensitivity*. To determine whether a segment was within a wetland, Alta employed the use of the National Hydrology Dataset¹, as well as MTC’s Bay Region Water data², buffering the datasets 50 feet and 5 feet respectively. These layers were then joined to create a single polygon layer. If a Bay Trail Gap segment intersected (came in contact) with the joined wetlands polygon layer, then the specific intersected length of the segment was deemed to necessitate a boardwalk. This was done to not penalize long segments that only have a portion of their length affected by wetlands. The project team did discuss only applying boardwalk costs to segments that have great than 0.25 miles of intersection with the wetland buffer. However, after further review by the internal cost estimation tool development team, it was determined that applying boardwalk costs to all segments that intersected with the wetland layer

¹ National Hydrology Dataset Plus Version 2.1 <https://www.arcgis.com/home/item.html?id=4bd9b6892530404abfe13645fcb5099a>

² MTC San Francisco Bay Region Water https://opendata.mtc.ca.gov/datasets/cc84a5ab0d2340b6be8e214bf352140b_0/explore?location=37.830722%2C-122.344500%2C9.09

was a superior approach. The relative feet of each impacted segment were determined to be the **Boardwalk Length** of that gap segment.

- 4) Trails that cross major water bodies, rivers, or streams are assumed to require bridges spanning at least 200 feet on either side of the water body.
 - Where a bridge was deemed necessary, the bridge rating was assumed to be *Prefabricated and Rated for Traffic-Light Vehicle/ Maintenance Load*. Similarly, to the wetland assumption, Alta employed the use of the National Hydrology Dataset³, as well as MTC’s Bay Region Water⁴ data to construct a polygon that represented major water bodies, rivers, and streams. However, for this exercise wetlands were excluded from this operation and no buffering took place. Using the ArcGIS Intersect geoprocessing tool, if a Bay Trail Gap segment intersected (came in contact) with the joined polygon layer, then that portion was split from the rest of the trail. A process of calculating the specific length in feet of this split segment then took place, and this number was joined to the original segment. If a Bay Trail Gap segment had multiple bridges along it, then the length in feet of each individual segment was added up and joined to the original whole segment. These calculations were used to inform the **Bridge Length** attribute.

Cost Estimate Tool Results

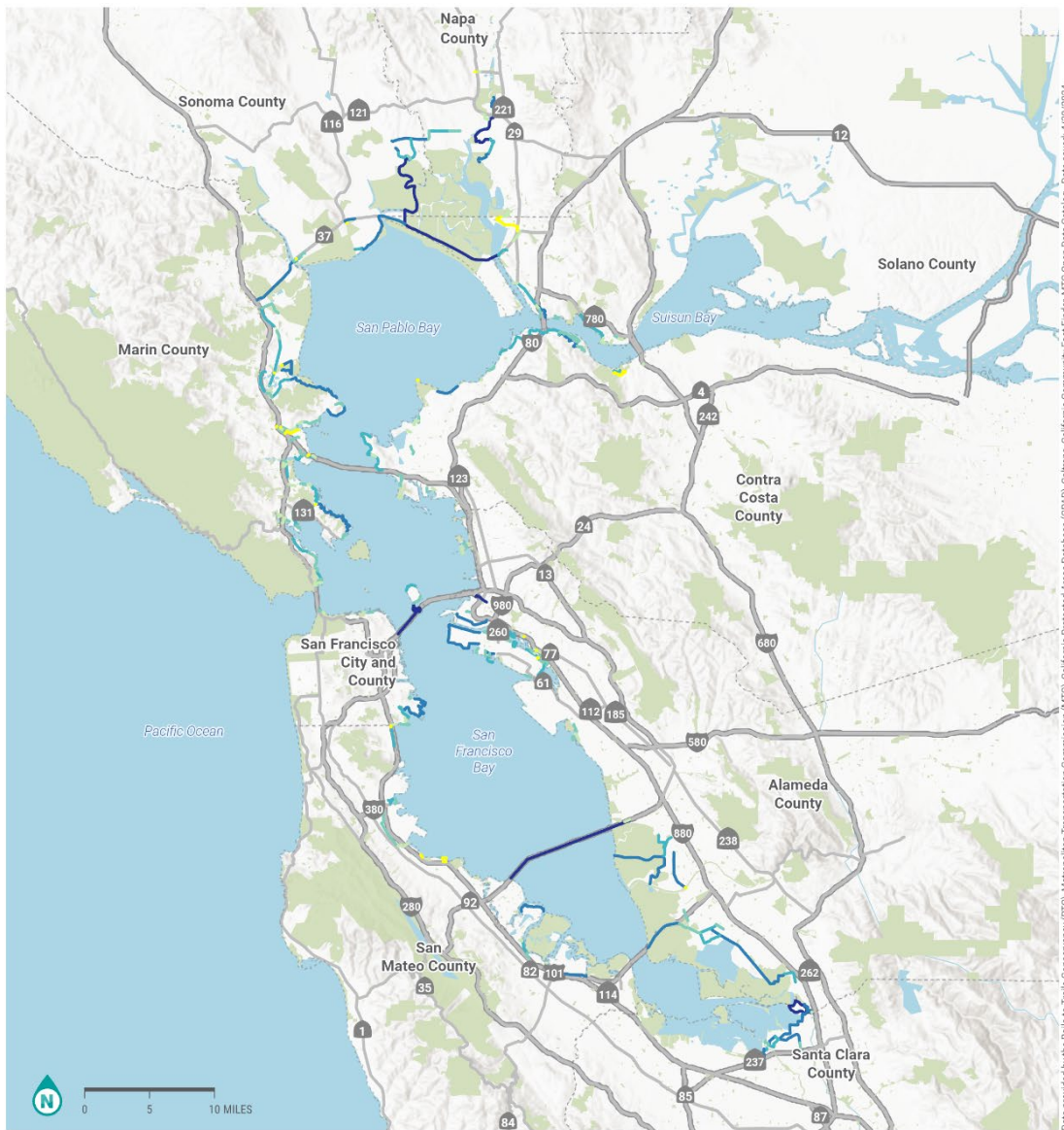
To modernize the script, the project team re-wrote 80% of the script in a more user-friendly Python format. After updating the cost estimation script and it’s ArcGIS python toolbox, the script was run on both sets of Bay Trail Gaps, (those in the top 25% and those under 75% priority). Cost estimates for the top 25% of prioritized gaps included more precise assumptions within the parameters of the tool. The results can be found in **Figure 2** and **Figure 3**. Cost Estimation results were created on a more disaggregated dataset than the prioritization results. As such, the results of the Cost Estimation results at an aggregated level (with prioritization scores) can be found in **Appendix A**.

³ National Hydrology Dataset Plus Version 2.1 <https://www.arcgis.com/home/item.html?id=4bd9b6892530404abfe13645fcb5099a>

⁴ MTC San Francisco Bay Region Water

https://opendata.mtc.ca.gov/datasets/cc84a5ab0d2340b6be8e214bf352140b_0/explore?location=37.830722%2C-122.344500%2C9.09

Figure 2: Cost Estimation Draft Results



**COST ESTIMATION TOOL
DRAFT RESULTS**

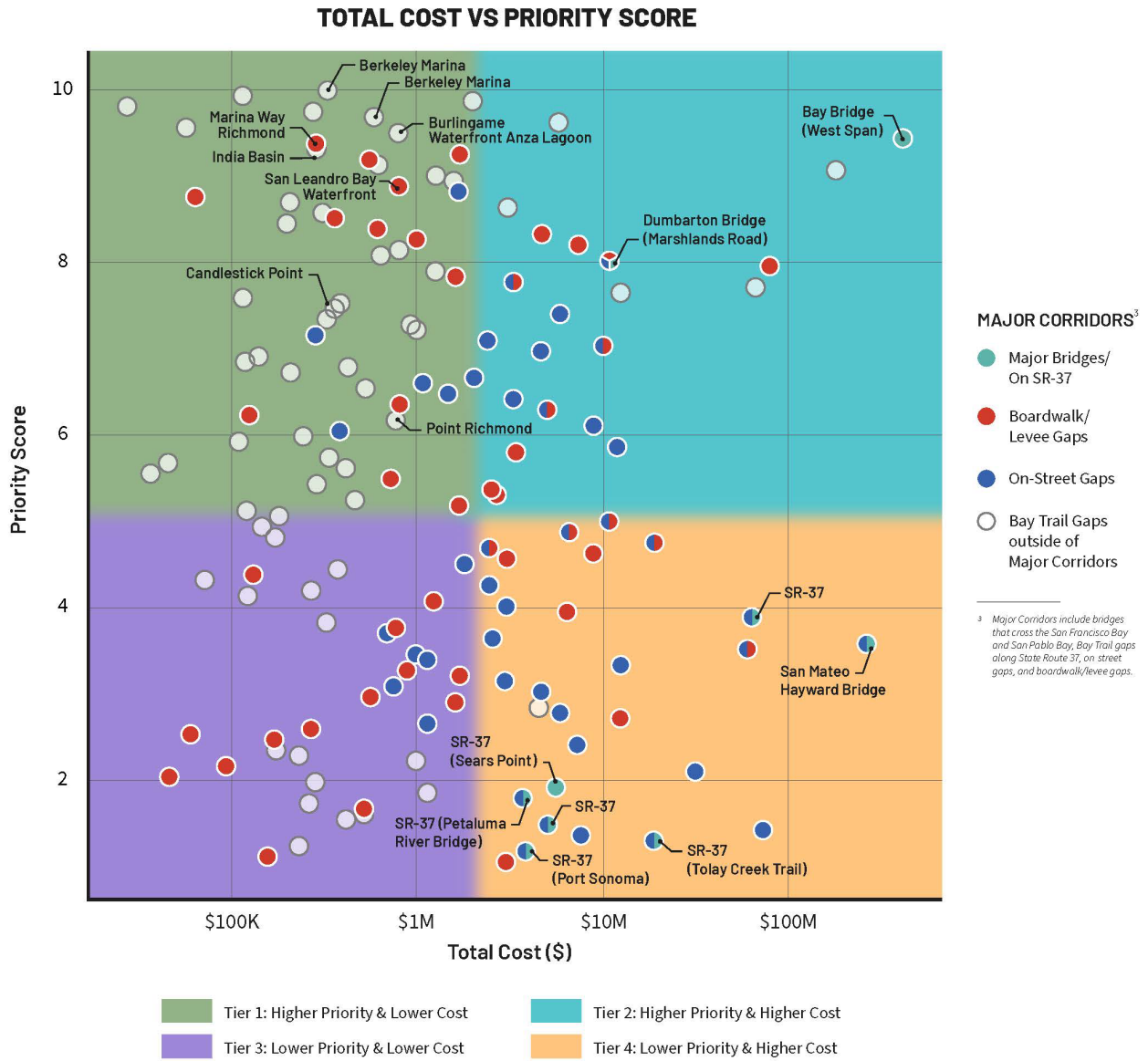
BAY TRAIL GAP CLOSURE
IMPLEMENTATION PLAN



- COST ESTIMATION ESTIMATES (\$)**
- >\$25 Million
 - \$5 Million to \$25 Million
 - \$2 Million to \$5 Million
 - \$750,001 - \$2 Million
 - \$200,001 - \$750,000
 - \$1,052 - \$200,000

- DESTINATIONS & BOUNDARIES**
- Park/ Open Space
 - County Boundary
 - Road
 - Freeway

Figure 3: Cost Estimation Results vs. Priority Score



Sea Level Rise Analysis

Sea Level Rise poses a growing threat to the San Francisco Bay Trail. While not used as a prioritization criterion, Alta wanted to provide analysis to MTC and its partners to make future policy and design decisions. Evaluating exposure to sea level rise and other natural hazards could take a variety of approaches,⁵ such as picking a high sea level rise scenario to provide a long-time horizon for the facility and provide a margin of safety for these investments. For example, some experts estimate that 50–100-year investments should be [planning for 2-3 meters of global sea level rise within that timeframe](#). Identifying how to integrate an evaluation of sea level rise for the Bay Trail system’s coastal segments is complicated by the fact that almost its entire length is exposed to even modest levels of sea level rise.

Alta examined different sea level rise scenarios intersection with the Bay Trail segments. During this phase, Alta used two different sea level rise data scenarios, [36”](#) and [77”](#) respectively. Alta then identified what proportion of each trail segment would be inundated under each scenario of sea level rise. This was done through running an ArcGIS Pro Intersect geoprocessing tool, which split a segment based on whether it intersected with each respective scenario polygon layer. The intersected miles of segment for each specific Bay Trail segment were then summed up.

Alta chose to analyze the data at the thresholds of 10% and 50% inundation, to illustrate how different thresholds are likely to indicate the degree of impact on trails. In *TRB’s Investing in Transportation Resilience: A Framework for Informed Choices*, a key aspect of resilience is the degree to which an asset remains functional when exposed to a hazard or disruption. Long-term inundation of a trail segment would mean those portions of a trail are likely not passable. Still, it is unclear whether an entire planned alignment is completely non-functional as an investment, if a small portion is inundated. The connections provided by that trail might be cut, but if the inundation is near an area with redundant low-stress connectivity, the disruption is likely not as severe. We used 10% as a threshold to indicate a significant portion of the trail is cut off and is enough to warrant the trail has lost function as a low-end and 50% as a high-end where the majority of a segment length is lost to sea level rise. We believe a lower threshold is a realistic depiction of lost functionality but think 10% is enough to adjust for geographic sampling error, uncertainty in the projections, and a good definition of significant inundation.

The respective percentage of Bay Trail that would be inundated at the 36” scenario at both 10% and 50% of the trail are displayed in **Figure 4** and **Figure 5**. These scenarios illustrate different methods to consider the number of trail segments impacted, assuming loss of function at 10% and most of its length at more than 50%. **Figure 6** illustrates the miles of inundated trail by flood category in a stacked bar chart.

⁵ Other metrics Alta considered for this analysis included:

1. The degree of exposure to 18 natural hazards categories as indicated by the [National Risk Index’s \(NRI\) Expected Annual Loss values at the census tract level](#). The Bay Area generally is exposed to 14 of the 18 hazard types, with the top hazard categories including Earthquakes, Wildfire, Heatwaves, Tornadoes, Riverine Flooding, Drought, and Coastal Flooding. Different counties have different levels of exposure to different hazards.
2. Exposure to sea level rise from proposed trail segments embodied by exposure to sea level rise as indicated by inundation polygons provided by the [ART Bay Area Sea Level Rise and Shoreline Analysis \(ART Analysis\)](#).
3. Integrating [shoreline vulnerability index](#) prepared as part of a related analysis to the ART Analysis. One idea was to look at segment’s proximity weighted vulnerability score for parallel trail alignments.

Figure 4: Sea Level Rise Analysis at 10% Inundation 36" Scenario



**SEA LEVEL RISE
INUNDATION ANALYSIS**

**BAY TRAIL GAP CLOSURE
IMPLEMENTATION PLAN**

**SEGMENT INUNDATION AT 10%
Sea Level Rise 36" Scenario**
 — Greater than 10%
 — Less than or Equal To 10%

**Under this scenario 113 Miles of Bay Trail are inundated.*

**DESTINATIONS &
BOUNDARIES**
 ■ Park/ Open Space
 □ County Boundary
 — Road
 — Freeway

Figure 5: Sea Level Rise Analysis at 50% Inundation 36" Scenario



**SEA LEVEL RISE
INUNDATION ANALYSIS**

**BAY TRAIL GAP CLOSURE
IMPLEMENTATION PLAN**

**SEGMENT INUNDATION AT 50%
Sea Level Rise 36" Scenario**

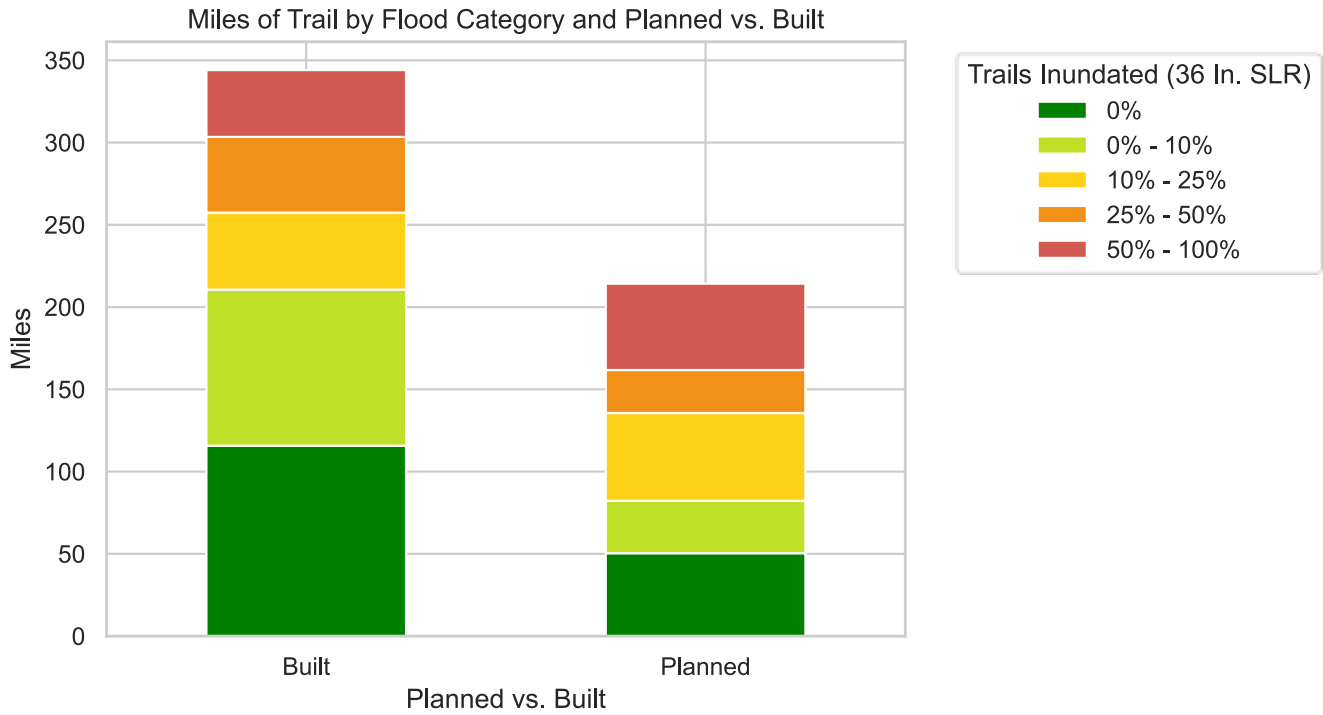
- Greater than 50%
- Less than or Equal to 50%

**Under this scenario 69 Miles of Bay Trail are inundated.*

**DESTINATIONS &
BOUNDARIES**

- Park/ Open Space
- County Boundary
- Road
- Freeway

Figure 6: Miles of Trail by Flood Category, Planned vs. Built 36"



The respective percentage of Bay Trail that would be inundated at the 77" scenario at both 10% and 50% of the trail are displayed in **Figure 7** and **Figure 8**. **Figure 9** illustrates the miles of inundated trail by flood category in a stacked bar chart:

Figure 7: Sea Level Rise Analysis at 10% Inundation 77" Scenario



SEA LEVEL RISE INUNDATION ANALYSIS

BAY TRAIL GAP CLOSURE IMPLEMENTATION PLAN

SEGMENT INUNDATION AT 10% Sea Level Rise 77" Scenario

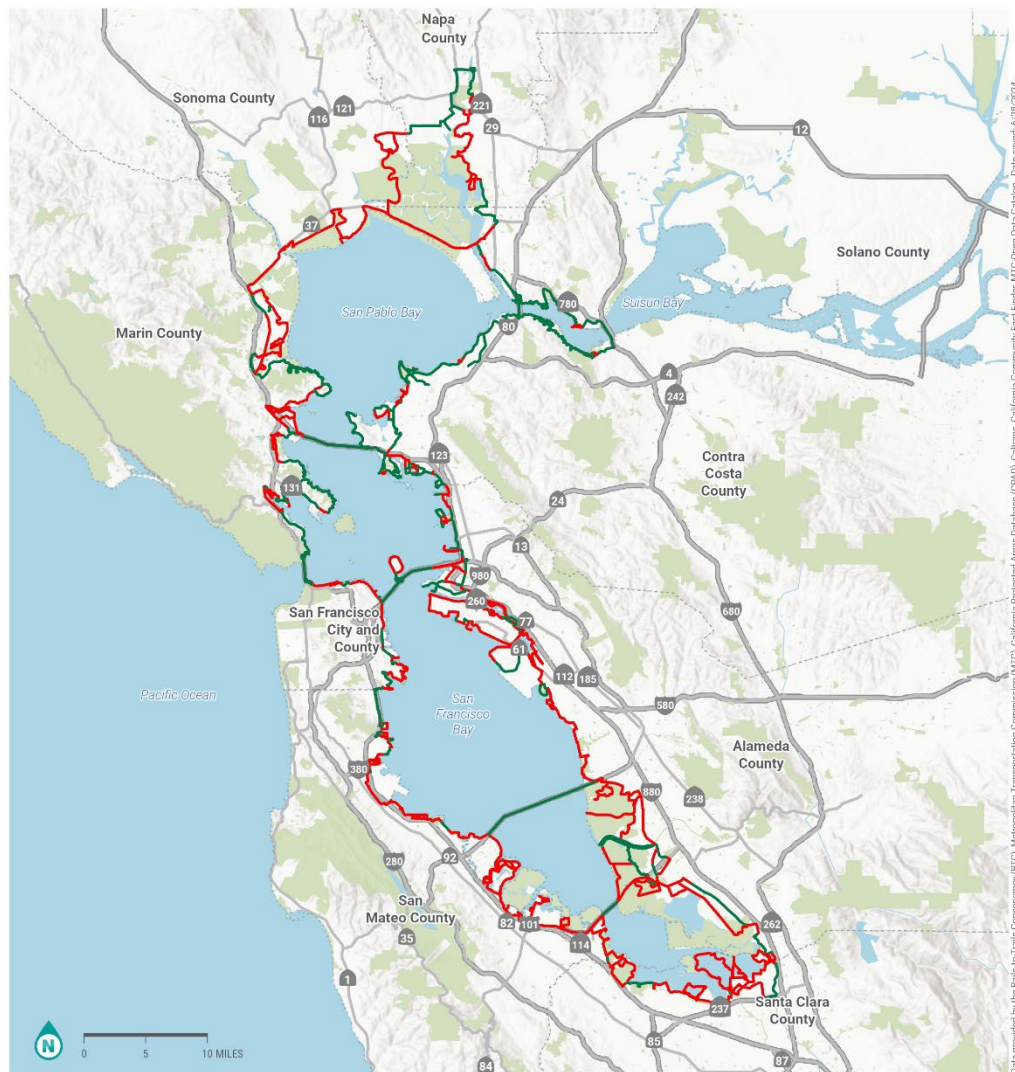
- Greater than 10%
- Less than or Equal to 10%

**Under this scenario 319 Miles of Bay Trail are inundated.*

DESTINATIONS & BOUNDARIES

- Park/ Open Space
- County Boundary
- Road
- Freeway

Figure 8: Sea Level Rise Analysis at 50% Inundation 77" Scenario



**SEA LEVEL RISE
INUNDATION ANALYSIS**

**BAY TRAIL GAP CLOSURE
IMPLEMENTATION PLAN**

**SEGMENT INUNDATION AT 50%
Sea Level Rise 77" Scenario**

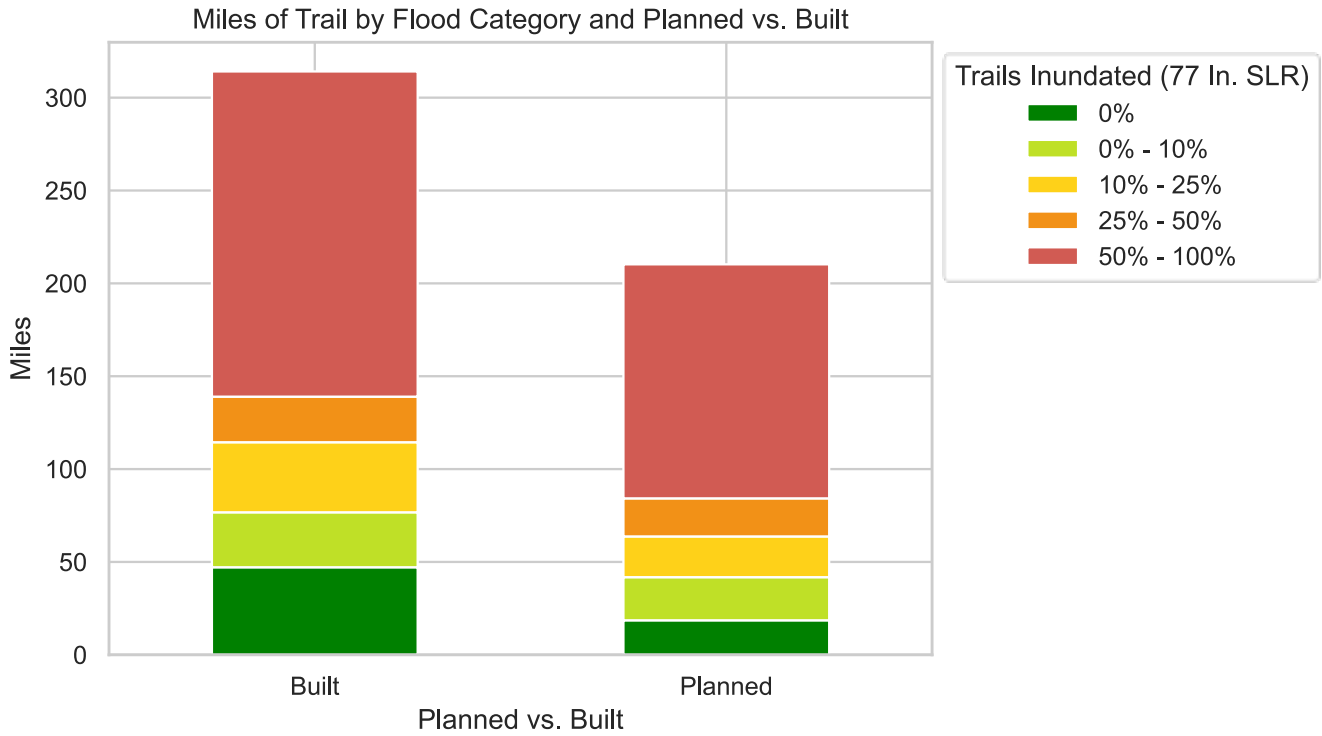
- Greater than 50%
- Less than or Equal to 50%

**Under this scenario 290 Miles of Bay Trail are inundated.*

**DESTINATIONS &
BOUNDARIES**

- Park/ Open Space
- County Boundary
- Road
- Freeway

Figure 9: Miles of Trail by Flood Category, Planned vs. Built 77"





Appendix A: Cost Estimation and Sea Level Rise Results Table

*The table displays the results of the cost estimation process, summed to the higher-level aggregated dataset containing the results from the prioritization and sea level rise analyses.



Segment Number	County	Total Cost Estimation Sum	Priority Score	36" SLR Percent Inundated	77" SLR Percent Inundated
1009	San Francisco	\$\$\$\$\$	9.45	0%	2%
4032	Alameda	\$\$\$\$\$	3.59	5%	14%
4126	Alameda	\$\$\$\$\$	9.08	33%	62%
4180	Alameda	\$\$\$\$\$	7.97	0%	64%
8006	Sonoma	\$\$\$\$\$	1.43	61%	77%
1042	San Francisco	\$\$\$\$\$	7.72	0%	0%
6042	Solano	\$\$\$\$\$	3.90	39%	92%
3014	Santa Clara	\$\$\$\$\$	3.53	55%	69%
7050	Napa	\$\$\$\$\$	2.11	18%	86%
4006	Alameda	\$\$\$\$\$	4.76	17%	54%
8013	Sonoma	\$\$\$\$\$	1.31	33%	97%
4029	Alameda	\$\$\$\$\$	3.34	15%	81%
1027	San Francisco	\$\$\$\$\$	7.66	14%	87%
9073	Marin	\$\$\$\$\$	2.73	0%	3%
4209	Alameda	\$\$\$\$\$	5.87	80%	97%
4017	Alameda	\$\$\$\$\$	8.03	28%	86%
9030	Marin	\$\$\$\$\$	5.01	12%	43%
4090	Alameda	\$\$\$\$\$	7.04	1%	33%
4182	Alameda	\$\$\$\$\$	6.12	67%	99%
5093	Contra Costa	\$\$\$\$\$	4.64	0%	5%
5040	Contra Costa	\$\$\$\$\$	1.37	2%	7%
9103	Marin	\$\$\$\$\$	8.21	0%	20%
9137	Marin	\$\$\$\$\$	2.42	67%	100%
9027	Marin	\$\$\$\$\$	4.88	10%	16%
5090	Contra Costa	\$\$\$\$\$	3.96	0%	0%
9015	Marin	\$\$\$\$\$	2.79	17%	65%
4029.1	Alameda	\$\$\$\$\$	7.41	71%	82%
4057	Alameda	\$\$\$\$\$	9.63	98%	100%
8012.3	Sonoma	\$\$\$\$\$	1.92	82%	94%
9002	Marin	\$\$\$\$\$	1.49	73%	75%
9038	Marin	\$\$\$\$\$	6.30	24%	61%
9062	Marin	\$\$\$\$\$	8.34	17%	23%
4172	Alameda	\$\$\$\$\$	3.03	65%	94%
2066	San Mateo	\$\$\$\$\$	6.98	47%	99%
6020	Solano	\$\$\$\$\$	2.85	0%	0%



Segment Number	County	Total Cost Estimation Sum	Priority Score	36" SLR Percent Inundated	77" SLR Percent Inundated
8012.1	Sonoma	\$\$\$\$\$	1.18	72%	100%
9000	Marin	\$\$\$\$\$	1.80	100%	100%
2028	San Mateo	\$\$\$\$\$	5.81	26%	50%
2089	San Mateo	\$\$\$\$\$	7.78	61%	100%
5060	Contra Costa	\$\$\$\$\$	6.42	1%	21%
1050	San Francisco	\$\$\$\$\$	8.64	18%	43%
4028	Alameda	\$\$\$\$\$	4.58	18%	87%
3035	Santa Clara	\$\$\$\$\$	4.02	0%	55%
7051	Napa	\$\$\$\$\$	1.06	0%	0%
9032	Marin	\$\$\$\$\$	3.16	17%	34%
4132	Alameda	\$\$\$\$\$	5.32	0%	38%
2079	San Mateo	\$\$\$\$\$	3.65	34%	100%
6023.1	Solano	\$\$\$\$\$	5.38	0%	22%
7047	Napa	\$\$\$\$\$	4.27	30%	96%
4072	Alameda	\$\$\$\$\$	4.70	20%	68%
9123	Marin	\$\$\$\$\$	7.10	89%	99%
4069	Alameda	\$\$\$\$\$	6.67	14%	41%
4122	Alameda	\$\$\$\$\$	9.88	36%	79%
4210	Alameda	\$\$\$\$\$	4.51	9%	11%
6009	Solano	\$\$\$\$\$	3.22	0%	9%
5076	Contra Costa	\$\$\$\$\$	9.26	4%	28%
9024	Marin	\$\$\$\$\$	5.19	1%	34%
4096	Alameda	\$\$\$\$\$	8.83	13%	75%
4066	Alameda	\$\$\$\$\$	7.84	24%	57%
9079	Marin	\$\$\$\$\$	2.91	9%	22%
2018	San Mateo	\$\$\$\$\$	8.95	5%	59%
4206	Alameda	\$\$\$\$\$	6.49	34%	40%
4212	Alameda	\$\$\$\$\$	9.01	13%	88%
4205	Alameda	\$\$\$\$\$	7.90	12%	45%
4003	Alameda	\$\$\$\$\$	4.08	7%	65%
3046	Santa Clara	\$\$\$\$\$	2.66	71%	77%
6014.1	Solano	\$\$\$\$\$	3.40	13%	26%
9009.1	Marin	\$\$\$\$\$	1.86	0%	1%
1047	San Francisco	\$\$\$\$\$	6.61	10%	93%
5051	Contra Costa	\$\$\$\$\$	7.23	1%	87%



Segment Number	County	Total Cost Estimation Sum	Priority Score	36" SLR Percent Inundated	77" SLR Percent Inundated
9043	Marin	\$\$\$\$	8.27	91%	100%
9005	Marin	\$\$\$\$	2.23	5%	84%
9107	Marin	\$\$\$\$	3.47	0%	0%
2001	San Mateo	\$\$\$\$	7.29	0%	0%
6012	Solano	\$\$\$\$	3.28	0%	0%
9119	Marin	\$\$\$\$	6.36	19%	68%
4201	Alameda	\$\$\$\$	8.15	78%	98%
4046	Alameda	\$\$\$\$	8.89	0%	97%
2042	San Mateo	\$\$\$\$	9.51	20%	80%
9075	Marin	\$\$\$\$	3.77	13%	26%
5030	Contra Costa	\$\$\$\$	6.18	0%	4%
6021	Solano	\$\$\$	3.10	0%	0%
4022.1	Alameda	\$\$\$	5.50	0%	40%
9142	Marin	\$\$\$	3.71	67%	100%
4198	Alameda	\$\$\$	8.09	21%	58%
2015.1	San Mateo	\$\$\$	9.14	47%	100%
9047	Marin	\$\$\$	8.40	84%	100%
4151	Alameda	\$\$\$	9.69	0%	6%
1001	San Francisco	\$\$\$	2.97	0%	3%
1005	San Francisco	\$\$\$	9.20	0%	100%
9132	Marin	\$\$\$	6.55	100%	100%
6008.2	Solano	\$\$\$	1.68	0%	0%
5091.3	Contra Costa	\$\$\$	1.62	0%	0%
4139.1	Alameda	\$\$\$	5.25	0%	75%
1045	San Francisco	\$\$\$	6.79	12%	94%
5091.2	Contra Costa	\$\$\$	1.55	0%	0%
6034	Solano	\$\$\$	5.62	0%	49%
4174	Alameda	\$\$\$	7.53	0%	74%
4184	Alameda	\$\$\$	6.05	0%	41%
1026	San Francisco	\$\$\$	4.45	17%	79%
4095	Alameda	\$\$\$	8.52	0%	0%
1053	San Francisco	\$\$\$	7.47	4%	67%
9083	Marin	\$\$\$	5.75	0%	54%
4159	Alameda	\$\$\$	10.00	0%	93%



Segment Number	County	Total Cost Estimation Sum	Priority Score	36" SLR Percent Inundated	77" SLR Percent Inundated
5039.1	Contra Costa	\$\$\$	7.35	0%	1%
7005	Napa	\$\$\$	3.84	20%	30%
4194	Alameda	\$\$\$	8.58	1%	86%
4045	Alameda	\$\$\$	5.44	0%	92%
1025	San Francisco	\$\$\$	9.32	4%	28%
5021	Contra Costa	\$\$\$	9.38	0%	0%
4080	Alameda	\$\$\$	7.16	0%	0%
5091	Contra Costa	\$\$\$	1.99	0%	0%
4116	Alameda	\$\$\$	9.75	39%	100%
5081.3	Contra Costa	\$\$\$	4.21	0%	50%
9093	Marin	\$\$\$	2.60	0%	5%
5091.1	Contra Costa	\$\$\$	1.74	0%	0%
4062	Alameda	\$\$\$	5.99	80%	100%
9072	Marin	\$\$	2.29	67%	88%
7042	Napa	\$\$	1.25	68%	87%
5006	Contra Costa	\$\$	6.73	34%	57%
4117	Alameda	\$\$	8.71	56%	100%
9055	Marin	\$\$	8.46	6%	79%
4035.2	Alameda	\$\$	5.07	1%	100%
9108.1	Marin	\$\$	2.36	0%	0%
7008	Napa	\$\$	4.82	0%	0%
6006.1	Solano	\$\$	2.48	26%	33%
5100	Contra Costa	\$\$	1.12	0%	100%
6030	Solano	\$\$	4.95	6%	100%
5048	Contra Costa	\$\$	6.92	0%	31%
2085	San Mateo	\$\$	4.39	67%	100%
3009	Santa Clara	\$\$	6.24	100%	100%
1032	San Francisco	\$\$	4.14	0%	0%
6047	Solano	\$\$	5.13	50%	100%
9065	Marin	\$\$	6.86	77%	100%
2102	San Mateo	\$\$	7.60	0%	100%



Segment Number	County	Total Cost Estimation Sum	Priority Score	36" SLR Percent Inundated	77" SLR Percent Inundated
5108	Contra Costa	\$\$	9.94	0%	67%
2039	San Mateo	\$\$	5.93	25%	100%
7031.3	Napa	\$\$	2.17	0%	0%
9011	Marin	\$\$	4.33	0%	100%
5077	Contra Costa	\$\$	8.77	1%	61%
5069	Contra Costa	\$\$	2.54	0%	100%
1048	San Francisco	\$\$	9.57	0%	10%
7031.1	Napa	\$	2.05	0%	0%
4217	Alameda	\$	5.68	40%	91%
5068.2	Contra Costa	\$	5.56	0%	0%
2057	San Mateo	\$	9.82	0%	100%



Appendix B: Bay Trail Cost Assumption Summary Table

*The table below represents categorical descriptions of the cost attributes. For this current iteration of the cost estimation process, where deemed necessary, cost prices were adjusted manually and/or were adjusted for inflation.

Appendix B: Bay Trail Cost Assumption Summary Table

	Facility Type	Rating	Construction Type	Construction Type General Requirements	Construction Components	Cost per Lineal Foot	Typical Section
1.	Class I Multi-Use Trail	A	Trail – Level paved surface	<ol style="list-style-type: none"> Existing path, roadway or levee location requiring minor leveling/grading Aggregate base, paving, and shoulders for 12' trail width and 3' shoulder (ea.) width, 18' total 	<ol style="list-style-type: none"> Earthwork Asphalt pavement and decomposed granite shoulders with aggregate base 18' wide Pavement striping Traffic sign Wayfinding sign 	\$280	<p>Diagram showing a cross-section of a trail with a 12' paved width and 3' shoulders on both sides. The total width is 18'. The diagram labels 'Aggregate Base as required' and 'Existing Unpaved Surface var. width'.</p>
2.	Class I Multi-Use Trail	B	Trail – Moderate hillside location or other moderate engineering challenge for implementation	<ol style="list-style-type: none"> Grading to create trail bench w/ minor cut/fill Aggregate base, paving, and shoulders for 12' trail width and 3' shoulder (ea.) width, 18' total Drainage as required 	<ol style="list-style-type: none"> Earthwork Engineered Fill Asphalt pavement and decomposed granite shoulders with aggregate base 18' wide Pavement striping 24" or less retaining wall Drainage as required Traffic sign Wayfinding sign 	\$350	<p>Diagram showing a cross-section of a trail on a hillside with a 12' paved width and 3' shoulders on both sides. The total width is 18'. The diagram includes an 'Erosion Control' structure on the left, a '2' Gravel Shoulder' on the right, a '2% Cross slope', and a 'Slope 2% - 10% ±'. Labels include 'Aggregate Base as required' and 'Drainage as required'.</p>

Appendix B: Bay Trail Cost Assumption Summary Table

	Facility Type	Rating	Construction Type	Construction Type General Requirements	Construction Components	Cost per Lineal Foot	Typical Section
3.	Class I Multi-Use Trail	C	Trail – Difficult hillside location or other complex engineering challenge for implementation	<ol style="list-style-type: none"> Grading to create trail bench w/ substantial cut and/or cut/fill Retaining walls, structure, or piles required Aggregate base and paving for 12' trail width Drainage as required. <p>NOTES: Structural solutions cost minimum \$130 per lineal foot it is assumed that for any given segment, no greater than 50% of the total length classified as "C" will require structural solutions.</p>	<ol style="list-style-type: none"> Earthwork Engineered Fill Asphalt pavement with Aggregate Base 12'-wide Pavement striping 3' engineered retaining wall Drainage as required Traffic sign Wayfinding sign 	\$570	
4.	Class I Multi-Use Trail	D	Existing Levee with new Trail constructed on levee surface.	<p>Assume levee is already existing, and/or construction of levee is not part of cost estimate; this consists of surface improvements only.</p>	<ol style="list-style-type: none"> Earthwork (minor) Pervious pavement and decomposed granite shoulders with aggregate base 18' wide Geosynthetic layer Field fencing Wayfinding Sign 	\$293	


Appendix B: Bay Trail Cost Assumption Summary Table

	Facility Type	Rating	Construction Type	Construction Type General Requirements	Construction Components	Cost per Lineal Foot	Typical Section
5.	Class IV	A	Separated cycle track with new 6'-wide sidewalk	<ol style="list-style-type: none"> Existing stripe grinding/removal Lane striping both sides of roadway and new separated bikeway Tubular bicycle railing on concrete barrier with 3' buffer between vehicle and bicycle lanes New concrete curb and 6'-wide concrete sidewalk Pavement markers Signage 	<ol style="list-style-type: none"> Earthwork New asphalt pavement or overlay of separated bikeway Concrete curb Concrete sidewalk with aggregate base Tubular bicycle railing Concrete barrier Pavement striping and marking Traffic signage Wayfinding signage 	\$420	<p>The diagram shows a cross-section of a roadway with a 3-foot wide barrier on the left, a 12-foot wide barrier-separated bikeway in the center, and a pedestrian path on the right. A new concrete vertical curb is shown at the edge of the sidewalk. A new 6-foot-wide concrete sidewalk with aggregate base is also shown.</p>
6.	Class II Bicycle Lane	A	Vehicle travel lane narrowing through re-striping of existing roadway surface to accommodate Caltrans minimum or greater width Class II bicycle lanes, applicable to urban or suburban streets or outlying roadways with existing paved shoulder.	<ol style="list-style-type: none"> Existing stripe grinding/removal Lane striping both sides of roadway Pavement markers (bike lane symbol and turn arrows as req'd) Signage Does not account for parking stall removal or replacement in urban or suburban setting. 	<ol style="list-style-type: none"> Pavement striping Asphalt surface treatment existing road surface Pavement marking and lane signage Traffic sign Wayfinding sign 	\$30	<p>The diagram shows two examples of a Class II bicycle lane. The left example is labeled 'Example with Curb/Gutter' and shows a 1.5 M min. bike lane with a .9 M min. width. The right example is labeled 'Example without Curb/Gutter' and shows a 1.2 M min. bike lane. The diagram also shows a 'New 150 MM Solid White Stripe' and 'Edge of Pavement'. The text 'Motor Vehicle Lanes Restriped as Required' and 'Two-Lane or Multi-Lane Highways' is also present.</p>

Appendix B: Bay Trail Cost Assumption Summary Table

	Facility Type	Rating	Construction Type	Construction Type General Requirements	Construction Components	Cost per Lineal Foot	Typical Section
7.	Class II Bicycle Lane	B	Roadway widening including drainage channel fill, retaining wall, or other structural element to obtain additional width for Class II bicycle lanes.	<ol style="list-style-type: none"> 1. Drainage or retaining wall construction as required. See NOTE. 2. Roadway shoulder paving both sides of roadway, 4' minimum on each side of roadway assumed 3. Lane striping both sides of roadway to create shoulder bicycle lane 4. Pavement markers (bike lane symbol and turn arrows as req'd) 5. Striping both shoulders <p>NOTE: Structural roadway accommodations cost minimum of \$130 per lineal foot. It is assumed that no more than 50% of given project distance will require structural treatment at the roadway edge.</p>	<ol style="list-style-type: none"> a. Earthwork b. Asphalt pavement with aggregate base, 8' wide c. Asphalt surface treatment d. Engineered fill e. Retaining wall up to 24" f. Drainage as required g. Pavement striping h. Pavement marking and lane signage i. Traffic sign j. Wayfinding sign 	\$345	

Appendix B: Bay Trail Cost Assumption Summary Table

	Facility Type	Rating	Construction Type	Construction Type General Requirements	Construction Components	Cost per Lineal Foot	Typical Section
8.	Sidewalk	N/A	Standard sidewalk with ADA accessible ramps, new curb and gutter, stormwater drainage	<ol style="list-style-type: none"> 1. Temporary roadway/access closure for construction, traffic detours and signage using Construction Traffic Management Plan (CTMP) 2. Use of Construction Best Management Practices for erosion, sediment, and pollution control 3. Sidewalk construction using Caltrans Highway Design Manual Standard Plans and other jurisdictional design guidance 	<ol style="list-style-type: none"> a) Demolition b) Excavation c) Equipment d) Mobilization e) Sidewalk construction f) Dust control 	\$150	


Appendix B: Bay Trail Cost Assumption Summary Table

	Facility Type	Rating	Construction Type	Construction Type General Requirements	Construction Components	Cost per Lineal Foot	Typical Section
9.	Trail Bridge	A	12'-wide Bridge Structure – Prefabricated pedestrian/bicycle load only (not rated for vehicles)	<ol style="list-style-type: none"> 1. Abutment engineering/construction 2. Transport of structure to site 3. Bridge structure installation and surfacing 	<ol style="list-style-type: none"> a. Earthwork b. Concrete bridge abutments c. Piers d. Pre-constructed clearspan bridge, pedestrian rating e. Traffic Sign f. Wayfinding Sign 	\$1,761	<p>Section</p> <p>Elevation</p>
10.	Trail Bridge	B	12'-wide Bridge Structure – Prefabricated and rated for traffic--light vehicle/maintenance load	<ol style="list-style-type: none"> 1. Abutment engineering/construction 2. Transport of structure to site 3. Bridge structure securing and surfacing 	<ol style="list-style-type: none"> a. Earthwork b. Concrete bridge abutments/piers c. Pre-constructed clearspan bridge, vehicle load rating d. Traffic Sign e. Wayfinding Sign 	\$3,228	<p>Section</p> <p>Elevation</p>



Appendix B: Bay Trail Cost Assumption Summary Table

	Facility Type	Rating	Construction Type	Construction Type General Requirements	Construction Components	Cost per Lineal Foot	Typical Section
11.	Trail Boardwalk		12'-wide Boardwalk – Pedestrian/bicycle load only	<ol style="list-style-type: none"> Boardwalk abutment engineering/construction Pile engineering and construction Decking securing and surfacing 	<ol style="list-style-type: none"> 12' wide boardwalk Concrete piles/footings or helical piles where concrete is not suitable Traffic sign Wayfinding sign 	\$1,761	
12.	Fencing		Security Fencing	<ol style="list-style-type: none"> 6' min. cyclone/chain link fencing Support posts and gate as required 	<ol style="list-style-type: none"> Construct 6' chain link fence Emergency access gate every 1000 LF 	\$50	

Appendix B: Bay Trail Cost Assumption Summary Table

	Facility Type	Rating	Construction Type	Construction Type General Requirements	Construction Components	Cost per Lineal Foot	Typical Section
13.	Railroad Crossing	A	At-grade crossing	<ol style="list-style-type: none"> 1. Existing path or roadway location requiring minor leveling/grading 2. Aggregate base, paving, and shoulders for 12' trail width and 3' shoulder (ea.) width, 18' total 3. ADA compliant crossing with signs, signals, gates, and warning strips 	<ol style="list-style-type: none"> a. Precast concrete crossing panels for the track b. CPUC Standard 9 (flashing light signal assembly with automatic gate arm) warning devices on all crossing approaches c. CPUC Standard 9-E (flashing light signal assembly with automatic gate installed on the departure side of the at-grade crossing, also known as an exit gate) warning devices on the eastbound and westbound crossing exits d. Americans with Disabilities Act (ADA) compliant sidewalk on each side of the crossing with ADA detectable warning strips on each approach located a minimum of 12 feet from the centerline of the nearest track e. A traffic pre-signal for traffic at the crossing and the adjacent intersection. The traffic signal will be interconnected with the railroad warning devices using pre-emption f. California Manual on Uniform Traffic Control Devices (CA MUTCD) compliant signage and striping 	\$300K (lump sum)	

Appendix B: Bay Trail Cost Assumption Summary Table

	Facility Type	Rating	Construction Type	Construction Type General Requirements	Construction Components	Cost per Lineal Foot	Typical Section
14.	Railroad Crossing	B	Under-crossing	<ol style="list-style-type: none"> 1. Boring and shoring to excavate tunnel under existing railroad tracks 2. Grading to create trail underpass w/ substantial cut 3. Structural concrete square culvert tunnel, retaining walls, wing walls, or piles required 4. Aggregate base and paving for 12' trail width 5. Drainage as required 6. Tunnel lighting 	<ol style="list-style-type: none"> a. Earthwork b. Engineered Fill c. Asphalt pavement with Aggregate Base 12'-wide d. Pavement striping e. 3'-10' engineered retaining walls f. 9'x12' I.D. minimum structural concrete square culvert for tunnel structure g. Drainage as required h. Tunnel lighting system 	\$750K (lump sum)	
15.	Railroad Crossing	C	Overpass	<ol style="list-style-type: none"> 1. Abutment and approach ramp engineering/construction 2. Transport of structures to site 3. Bridge structure securing and surfacing 4. Security fencing 5. Landing plaza 	<ol style="list-style-type: none"> a. Earthwork b. Concrete bridge abutments/piers and approach ramps c. Pre-constructed clearspan bridge, bicycle/pedestrian load rating only d. Traffic Sign e. Wayfinding Sign f. Landing plaza concrete flatwork g. Landing plaza furnishings 	\$20M (lump sum)	

Appendix B: Bay Trail Cost Assumption Summary Table

	Facility Type	Rating	Construction Type	Construction Type General Requirements	Construction Components	Cost per Lineal Foot	Typical Section
16.	Design/Construction Management	A	Engineering design for all facilities associated with subject segment	1. 20% of total project cost of facilities	a. Engineering design b. Construction management and observation	20% project construction budget	N/A
17.	Environmental Review/Permitting	A	Low Sensitivity - Environmental review and permitting/clearances for	1. 5% of total project cost for Checklist/IS	a. CEQA Initial Study Checklist	5% project construction budget	N/A
18.	Environmental Review/Permitting	B	Moderate Sensitivity -Environmental review and permitting/clearances	1. 10% of total project cost for IS/MND or focused EIR	a. CEQA Initial Study Checklist b. Focused analysis of some issues c. Permitting assistance d. Mitigated Negative Declaration/ Focused EIR completion	10% project construction budget	N/A
19.	Environmental Review/Permitting	C	High Sensitivity - Environmental review and permitting/clearances	1. 15% of total project cost of facilities for complete EIR	a. CEQA Initial Study Checklist b. Focused analysis of major issues c. Agency coordination d. Complex permitting issues e. Mitigation and Monitoring Program f. Post construction observation/ monitoring	25% project construction budget	N/A

NOTES:

- Project costs were calculated based on existing project studies, Mean's Construction Costs, CalTrans data, Ace, Bay Trail Feasibility studies, and recent trail installation projects. For lump sum items, a percentage cost was assigned relative to total project cost. Other cost items are based on an average of current costs for each construction component for the type of trail to be built. Individual project components such as structural walls, access ramps, concrete sidewalks and stairs, bank stabilization, wetland mitigation, culvert and drainage systems, urban design elements, lighting, play components, artwork and other unique project items are not included in this estimate and would be identified on an individual basis.
- For cost determination using cost estimating handbooks and databases, engineers did not use average cost, but estimated probable cost based on geographic variables and Bay area construction experience.
- Cost database references used: *RS Means Site Work and Landscape Cost Data 2005*, 24th annual edition; *Architects Contractors Engineers Guide to Construction Costs, 2004 Edition, Volume 35*; and <http://www.dot.ca.gov/hq/esc/oe/awards/2004CCDB/2004ccdb.pdf> (State of California, Business, Transportation, and Housing Division, Department of Transportation Contract Cost Data 2004).
- Bay Trail costs are based on average of costs of projects identified in Bay Trail Feasibility Studies.

