

Marsh Creek Corridor Multi-Use Trail Feasibility Study

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FEHR  PEERS



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Executive Summary

The Marsh Creek Corridor Multi-Use Trail Feasibility Study was initiated to assess the opportunity to develop a new multi-purpose recreational facility along the Marsh Creek and Marsh Creek Road corridor. As ultimately envisioned, the trail would create a new major non-motorized thoroughfare for expanded commuting and recreational opportunities. The purpose of the trail is to provide a safe, useful, and enjoyable transportation corridor that supports multiple forms of non-motorized travel, including pedestrians, bicyclists, and equestrians.

The goals of the study include:

- Evaluate the potential for a multi-modal trail providing connectivity from the trail system in the City of Clayton to the Round Valley Regional Preserve
- Conduct extensive public engagement to understand the needs and concerns of groups including residents, advocacy groups, and rural and disadvantaged communities
- Develop a trail alignment that minimizes impacts to private property and retains privacy for residents
- Identify restoration opportunities along Marsh Creek to occur in conjunction with trail development opportunities
- Assess environmental constraints and impacts that may constrain trail development
- Identify a phased approach for implementation

Public Engagement

Throughout the plan process, public outreach to the surrounding communities was critical to ensure trail development and feasibility included the needs and considerations of community members and property owners along the corridor. Engagement undertaken as part of the study included the formation of a technical advisory committee, pop-ups events at public locations for community members to provide feedback, direct outreach to property owners, field visits, public workshops, and online engagement tools.

Feedback provided through these channels was used to develop initial trail alignments, revise these alignments to reduce impacts to property owners, and ultimately arrive at a set of recommendations for trail design, phasing, and implementation considerations for Marsh Creek Trail.

Additional details on public engagement activities can be found in Chapter 2.

Environmental Assessment

Given the sensitive ecological nature of the Marsh Creek corridor and its inclusion in the Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP, particular attention was paid to

developing trail alignments that avoided sensitive ecological areas to the extent feasible. A natural resources inventory was completed early in the process to examine the distribution of common and sensitive vegetation communities, aquatic habitat, and special-status species (further details in Chapter 1). Given the constrained topography of the study corridor, there are multiple instances where the trail alignment will fall within the preferred creek setback outlined in the HCP/NCCP. This presents an opportunity to conduct creek restoration activities during trail construction.

Subsequent to the development of alignments, a Phase 1 Environmental Site Assessment was conducted to identify environmental conditions along the alignments that may represent hazards. No Recognized Environmental Conditions (RECs), Historical Recognized Environmental Conditions (HRECs), or Controlled Recognized Environmental Conditions (CRECs) were observed relative to hazardous materials, hazardous waste, or chemical use, storage, or disposal. A summary of the Environmental Assessment can be found in Chapter 6, while the full assessment can be found in Appendix E.

Development of Alignments

The development of potential trail alignments was shaped by the project goals and public feedback received throughout the study. Alignments were developed with consideration for a multitude of factors, which included:

- A public lands first approach, beginning with identifying opportunities to link sections of land currently under public control, or in conservation through Save Mount Diablo
- A strong desire from the public to minimize encroachment upon private property, except where necessary to link parcels of publicly dedicated land
- An alignment that roughly follows the curvature of the creek and Marsh Creek Road
- Minimize the number of roadway crossings to reduce user exposure to vehicular traffic
- Consideration of an on-road option in some locations to accommodate road cyclists and to avoid areas where significant disruption to private lands or environmental settings would otherwise occur
- Use of existing fire roads, access roads, and trail segments where possible to minimize impacts to undisturbed land

Implementation and Phasing

A phased approach to implementation is recommended to complete the Marsh Creek Corridor Trail. The first phase would stretch from Clayton to just past Morgan Territory Road. This section offers a near-term opportunity to link the existing trail system in Clayton to proposed trails under consideration by the East Bay Regional Parks District (EBRPD) on the Clayton Ranch Property.

With the least number of topographical constraints, the recommended second phase of the project would link existing trails in Round Valley Regional Preserve to the Clayton Palms Community. Similar to the first

phase, this would capitalize on existing non-motorized facilities to provide expanded recreational access for residents and visitors.

The third phase of the project would fall in the middle of the Marsh Creek Road corridor, in the area locally referred to as Dark Canyon. As the name suggests, this section of trail is faced with the greatest number of topographical constraints, which may require the trail to be developed with a larger number of retaining walls or in closer proximity to the creek and/or roadway. The completion of the third phase would allow for a complete non-motorized facility connection from Round Valley Preserve to the Clayton City Limits, for a total trail length of approximately 13 miles.

Chapter 6 provides additional detail on implementation, including resources for funding, as well as liability, maintenance, and management considerations.

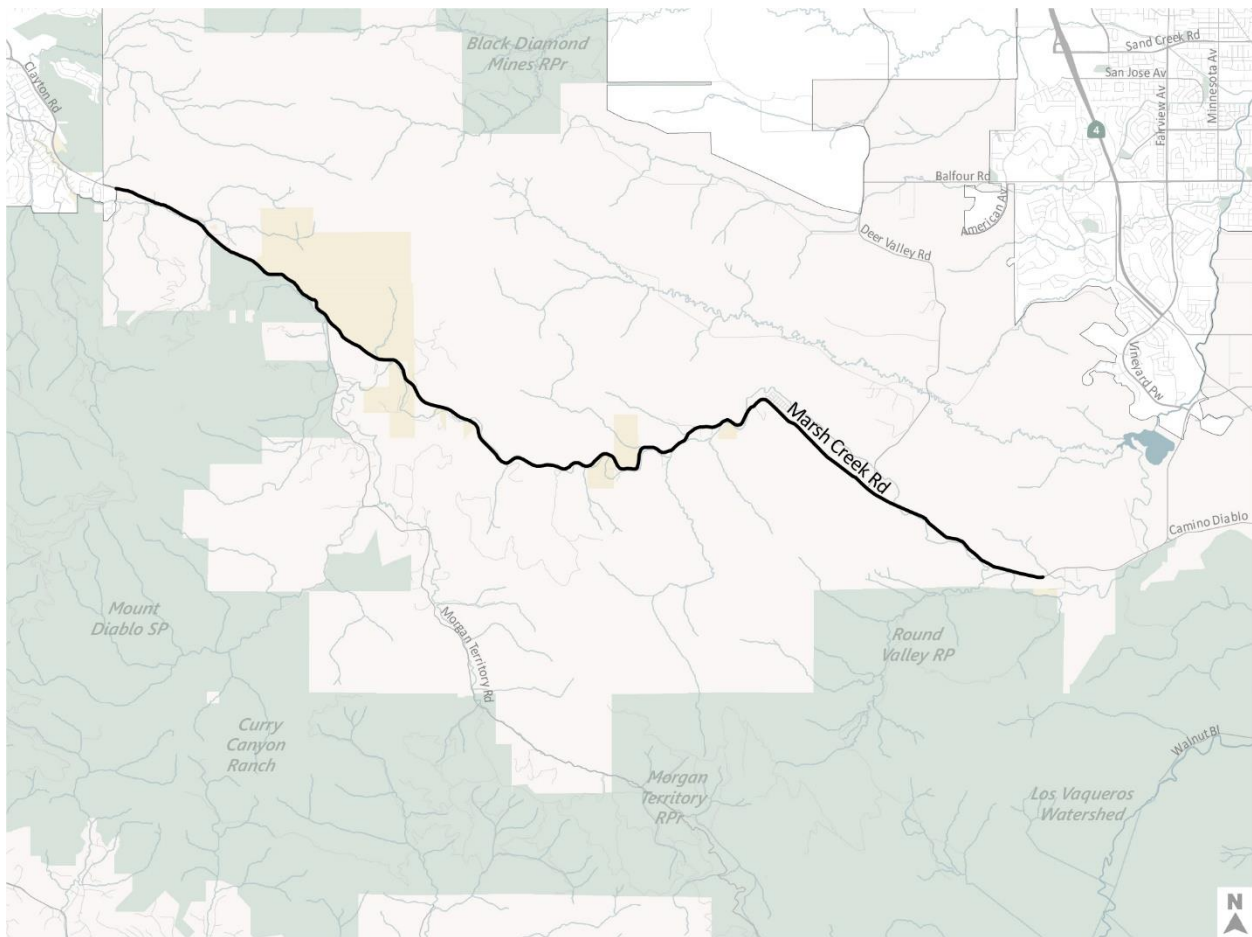


Big Bend (Marsh Creek 8) property; photo courtesy of Save Mount Diablo

1. Existing Conditions

The approximately 12.5-mile Marsh Creek corridor travels through rolling hills between the communities of Clayton on the west and Brentwood on the east. The creek corridor is adjacent to numerous state and regional parks, and currently includes mostly rural residences, ranches and farms, open space, and parks, with two small denser areas of residential parcels. The creekshed is home to multiple habitat types, including agricultural lands, grasslands, various oak woodlands, and a riparian corridor along the creek. The proposed Marsh Creek trail alignment would create a new public connection from the eastern edge of the City of Clayton to the Round Valley Regional Preserve at the eastern end of the corridor.

Marsh Creek Corridor Multi-Use Trail – Study Area



Marsh Creek Road roughly traces the path of the creek and is a major east-west thoroughfare connecting Central and East Contra Costa County. In the present state, the roadway is a winding two-lane rural road that passes through scenic ranch lands and open space on the flank of Mount Diablo. The roadway's cross section varies with the terrain it traverses but is generally a two-lane roadway with limited to no shoulder along much of the corridor. Marsh Creek Road has limited intersections but provides access to private

property at driveways along the corridor. There is no roadway lighting along much of the corridor. The posted speed limit ranges from 45 to 50 mph. Sight distance is limited at several locations due to the horizontal curvature of the road and topography that blocks views.

Within the city limits of Clayton, Marsh Creek Road has an existing Class II Bicycle Lane, which provides connection to numerous trails and other bicycle and pedestrian facilities. In the eastern portion of the County, a segment of the existing Marsh Creek Trail connects the Big Break Regional Shoreline to the southern limits of Brentwood. A project to extend the trail from the Brentwood city limits to Round Valley Regional Reserve is currently in progress. The Marsh Creek Road corridor serves primarily vehicular traffic but does see some limited use by bicyclists.

Most of the land use along the corridor is dedicated to agricultural, open space, and parks and recreation. Several parks and destinations for recreational activities exist along the corridor. Access to Mt. Diablo State Park is provided via multiple staging areas and trailheads along Marsh Creek Road and Morgan Territory Road. Round Valley Regional Preserve is accessed via a staging area and parking lot located at the eastern end of the study corridor. Marsh Creek Road also provides access to Morgan Territory Road and the Morgan Territory Regional Preserve.

Diablo View Middle School is located along Marsh Creek Road at the western end of the corridor. Near the corridor's eastern end, several schools are located within the City of Brentwood's southern limits.

Summary of Existing Plans and Data

Available information relating to the Marsh Creek Trail Feasibility Study was reviewed on existing conditions, relevant plans and policies, and emerging best practices. Several sources of information were reviewed, including the 2018 Contra Costa Transportation Authority (CCTA) Countywide Bicycle and Pedestrian Plan (CBPP), county policy and design standards, as well as other available baseline data such as as-built drawings, right-of-way drawings, parcel maps, GIS data, and usage/data reports.

CCTA Bicycle and Pedestrian Plan

The 2018 update to the CBPP includes an extensive review of local and countywide policies as well as best practice design guidelines. Much of the information found within the report may prove useful in helping to inform the trail feasibility study for the Marsh Creek corridor.

The 2018 CBPP proposes a network of bicycle facilities that when completed, "will provide facilities to connect Contra Costa's communities and key destinations, serve all ages and abilities by addressing the barriers created by high-stress arterials and collectors, and create a regional "backbone" that connects and supports more local bikeways." This Countywide Bikeway Network (CBN) identifies potential corridors to be prioritized for the planning of bicycle facilities, as well as existing facilities that will help make connections throughout the network. The CBN will consist of only "regionally significant" facilities that operate at low Levels of Traffic Stress (LTS), LTS 1 or 2. The Marsh Creek Trail is included in the CBN's roughly 513 miles of proposed bicycle facilities.

Information on the CBPP can be found at <https://ccta.net/projects/countywide-bicycle-and-pedestrian-plan/>.

Level of Traffic Stress

The 2018 update to the CBPP introduced a new metric used to evaluate the level of comfortability bicyclists experience along a roadway. Levels of Traffic Stress are assigned to a roadway based on several stress-inducing factors, including vehicle speed, number of vehicles, number of lanes, and the presence and width of bicycle facilities. LTS rankings range from 1 (low stress) to 4 (high stress). The category of “Interested but Concerned” cyclists comprise a majority of potential bicyclists, and are most likely to make use of bicycle facilities that operate at LTS 1 or 2. It is for this reason the CBPP designates all routes within the CBN to be LTS 1 or 2. A more detailed description of these Levels of Traffic Stress are provided below:

LTS 1: Physically separated from traffic or low-volume, mixed-flow traffic at 25 mph or less. Bike lanes are six-feet-wide or more. Intersections are easy to approach and cross. The facility is comfortable for children.

LTS 2: Bike lanes are 5.5-feet-wide or less, next to 30 mph vehicular traffic. Unsignalized crossings of up to 5 lanes at 30 mph exist. The facility is comfortable for most adults. This ranking is typical of bicycle facilities in the Netherlands.

LTS 3: Bike lanes are next to 35 mph auto traffic or mixed-flow traffic at 30 mph or less. The facility is comfortable for most current U.S. riders. This ranking is typical of bicycle facilities in the United States.

LTS 4: No dedicated bicycle facilities are present. Traffic travels at speeds of 40 mph or greater. The facility is comfortable only for the “strong and fearless” riders, also known as “vehicular cyclists”.

Marsh Creek Road has an existing LTS ranking of 4. The CCTA CBPP identifies Marsh Creek Road as part of the CBN with a ranking of LTS 2, but does not identify a specific facility type for the corridor. Generally, the higher the speed and volume of a road, the more protective the recommended bikeway should be to achieve the desired LTS. Given the high speed of traffic along Marsh Creek Road, an on-road separated facility (such as a Class IV separated bikeway) would likely be the recommended treatment to achieve LTS 2, while a fully separated facility (such as a trail or Class I Path) would likely achieve LTS 1.

East Bay Regional Parks District Master Plan

Most recently updated in 2013, the East Bay Regional Parks District (EBRPD) Master Plan provides guidance, policies, and descriptions of the programs undertaken by EBRPD to guide the stewardship and development of parks within the district. Covering all of Alameda and Contra Costa counties, the district is the primary provider of regional park facilities and activities for the area. Two EBRPD properties, the Round Valley Regional Preserve and Clayton Ranch, abut the Marsh Creek Corridor study area. Round

Valley is open to the public for hiking, horseback riding, and bicycling (with some restrictions), while Clayton Ranch is identified as a future regional preserve and is not currently accessible to the public.

The master plan can be viewed at <https://www.ebparks.org/master-plan>.

Contra Costa County General Plan

Contra Costa County is currently in the process of updating their general plan. The General Plan outlines the County's goals for physical growth, conservation, and community life in the unincorporated area, and contains the policies and actions necessary to achieve those goals. County staff members use the general Plan to guide decisions about zoning, permitted development, provision of public services, and transportation improvements. The County's current General Plan was adopted in 1991 and updated twice; once for 1990 – 2005 and again for 2005 – 2020. The updated General Plan, titled "Envision Contra Costa 2040", will respond to current concerns about sustainability, environmental justice, and affordable housing, while carrying forward enduring County values like balancing growth and conservation.

More information on the General Plan update can be found at <https://envisioncontracosta2040.org/>.

CCTA Countywide Transportation Plan (2017)

The Countywide Transportation Plan (CTP) provides the overall direction for achieving and maintaining a balanced and functional transportation system within Contra Costa County while strengthening links between land use decisions and transportation. Adopted by CCTA in 2017, Volume 1 of the CTP provides the county's vision, goals, and strategies surrounding the countywide transportation network, a review of issues facing the transportation system, and an overview of the cooperative planning process. Volume 2 contains a summary of the CTP Action Plans, along with a performance and equity evaluation of major projects; those costing more than \$25 million.

Relevant projects identified in the CTP include the Marsh Creek Road Curve Realignment project, which would realign certain curves on segments between Aspara Drive and Deer Valley Road to improve safety and operations.

East County Action Plan for Routes of Regional Significance (2017)

Tiering off of the CTP, the Regional Transportation Planning Committees generated updated Action Plans for Routes of Regional Significance. The Action Plans identify a series of Regional Routes that provide the main connections throughout and between Contra Costa's Communities. In the East County Action Plan, completion of unbuilt segments of regional multipurpose trails (including the Marsh Creek Trail) is noted as an implementing action under the goal of improving multimodal mobility and decreasing single-occupant vehicle travel.

The CTP and associated Action Plan can be found at <https://ccta.net/planning/2017-countywide-transportation-plan/>.

Contra Costa Vision Zero Action Plan and Systemic Safety Analysis Report

The purpose of Contra Costa County's Vision Zero Action Plan (adopted in 2022) is to identify opportunities to enhance safety for all modes through implementation of a Safe System approach. The report builds upon the engineering-focused Systemic Safety Analysis Report (SSAR) to provide a comprehensive, multidisciplinary and holistic approach to safety. The goal of the Action Plan is to eliminate fatalities and severe injuries through existing efforts and programs, along with implementation of additional recommendations.

Based on collision data from 2014 through 2018 (the latest available years at the time of the study), the SSAR identified a High-Injury Network to spotlight roadways with a high concentration of severe injuries and fatalities, laying the framework for the development of targeted collision profiles and priority project locations. Marsh Creek Road was identified as part of the HIN, with 8 collisions where a victim was killed or severely injured in the timeframe analyzed. Ten priority projects focused on infrastructure improvements were recommended, with the Action Plan also providing further non-infrastructure recommendations to cover a range of Safe System elements, such as safe roads, safe road users, safe speeds, and post-crash care.

Safety improvements on Marsh Creek Road from west of Deer Valley Road to Clayton city limits were one of the ten priority "Tier One" projects identified in the Action Plan. The collision history includes seven vehicle-involved KSIs (two DUI hit object, one speeding and overturned, two improper turning hit object, two wrong-way driving), and one bicycle-involved vehicle improper passing KSI. Recommended improvements include curve-warning signs, rumble strips, speed feedbacks signs, and other roadway improvements that would benefit both motorists and bicyclists. Trimming vegetation and installing lighting to provide more visibility is also recommended, with intersection lighting at Morgan Territory Road specifically identified as a potential improvement. The recommended improvements also include installation of paved pullout areas for traffic enforcement, including locations near Morgan Territory Road, Sycamore Springs Road, and Deer Valley Road.

Improvements on Marsh Creek Road from Deer Valley Road to Camino Diablo are identified as one of the twenty Tier Two projects, representing a priority or important location for which future funding and prioritization will be considered following the implementation of Tier One projects.

Additionally, rural roadway contexts such as Marsh Creek Road are one of the focal points of the collision profiles of emphasis within the Plan, which identified safety issues including roadway departure collisions, vehicles crossing into opposing lanes, and bicycles and pedestrians being struck due to the lack of dedicated bike facilities or sidewalks.

The recommended improvements identified in the SSAR and Vision Zero Action Plan are consistent with the goal of this study to improve safety for all users. The full Vision Zero Action Plan and preceding Systemic Safety Analysis Report can be found at <https://www.contracosta.ca.gov/8532/Vision-Zero>.

Contra Costa Active Transportation Plan

Contra Costa County's Active Transportation Plan (ATP) focuses on developing safe, comfortable, and feasible walking and biking projects throughout unincorporated Contra Costa County. Adopted in April of 2022, the ATP provides a set of comprehensive, grant-ready projects that the County can put directly into action. Within the plan and in keeping with this study, Marsh Creek Road is identified as a potential location for both Class II bicycle lanes and a Class I bicycle and pedestrian multi-use facility.

The adopted ATP can be found at <https://www.contracosta.ca.gov/8533/Active-Transportation>.

Natural Resources Inventory

A natural resources inventory was conducted along the project corridor to examine the distribution of common and sensitive vegetation communities, aquatic habitat (creeks, ponds, and seasonal wetlands) and special-status species. This inventory consisted of a two-step approach including a desktop review and field assessment of sensitive biological resources within the approximately 12-mile trail study corridor. Full results from this inventory can be found in **Appendix A**.

Staff stopped at numerous locations along the corridor during a field assessment of the Marsh Creek Road corridor, including a 300-foot buffer zone around the roadway. The field assessment verified habitat classification, creek and drainage locations, water presence, identified seasonal ponds and wetlands, mapped invasive plant species, and determined potential suitable habitat for special-status species. Data from this inventory was used to inform the selection of trail alignment concepts as well as the initial environmental assessment presented in later sections of this report.

Base Map Development

To establish a blueprint of the physical environment, an extensive dataset was developed and used to create a series of maps for the trail corridor. Components evaluated during the base map effort included:

- **Utilities:** mapping of existing utilities to identify conflicts with potential trail alignments and associated cost implications. This included the locations of water, wastewater, electrical, and phone utilities
- **Topography and Planimetric Features:** a topographic model of contours and elevations, including features such as buildings, roads, fences, vegetation, and trees that were relevant to the study area
- **Intersections and Access Points:** a GIS map series was developed to address existing intersections, access points, and future opportunities for vehicular, pedestrian, bicycle, and wildlife crossings, and equestrian access to and through the corridor
- **Right of Way Assessment:** public and private land ownership was mapped throughout the corridor, as well as existing transportation facilities
- **Physical and Natural Resources:** including potential protected species habitats, drainage and erosion control conditions and issues, and soils information

The basemapping effort and compilation of several data sources resulted in a set of maps that best represents the current conditions and potential constraints with which to plan a new trail alignment along the corridor. The maps were used to identify opportunities, barriers, and concerns for trail alignments in subsequent tasks.

Demand Analysis

The proposed trail corridor is in a predominantly rural landscape and would connect a small suburban community to a mid-sized suburban community, with many agricultural land uses and parklands in between. A demand analysis was conducted to assess whether there is demand for a trail along this corridor, and if so, the potential usage when and if it is completed.

Data was collected on the location, number, and type of origins and destinations along the trail; the current use by pedestrians and bicyclists of the corridor and adjacent areas; and the number and type of users along trails with similar characteristics. This information was used to understand the number, type (recreational vs. commuting), and activity (hiking, walking, bicycling, horseback riding, etc.) of trail users that should be expected along the trail. Currently, there are low levels of walking and bicycling along the existing roadway due to the lack of designated facilities for these uses.

The demand analysis found that due to the scenic nature of the corridor, the number of regional parks, existing travel patterns in the area, and the size of adjacent communities, there is significant demand for a trail along Marsh Creek. However, each user type and activity have specific design and connectivity-related demands, which must be accommodated during the future phases of trail design for significant trail use to be actualized. These needs have informed the recommendations found in the Corridor Design Considerations section of this report, and include the need for trailside amenities, separation from the roadways and shade for user comfort, connections to parks and recreational centers, and the need for a parallel natural surface to facilitate equestrian use.

It is anticipated that the proposed Marsh Creek Trail would be a well-used and appreciated trail if designed to safely and attractively accommodate all users. The full demand analysis, including case studies of other trails, can be found in **Appendix B**.

2. Public Engagement

Throughout the plan process, public outreach to the surrounding communities was used to ensure trail development and feasibility included the needs and considerations of community members and property owners along the corridor. This Chapter provides an overview of this outreach.

Technical Advisory Committee

A project steering committee was established and consulted at key points throughout the project. Consisting of agency, community, and technical stakeholders, the group provided valuable insights early in the project. In addition to departmental staff from Contra Costa County, participants included representatives from a mix of public and non-profit entities, including:

- East Bay Regional Park District
 - The East Bay Regional Park District is a special district operating in Alameda County and Contra Costa County. It maintains and operates a system of regional parks which is the largest urban regional park district in the United States, including over 125,186 acres and 73 regional parks, recreation areas, wilderness, shorelines, preserves and land bank areas.
- Save Mount Diablo
 - Save Mount Diablo is a nationally accredited land trust and conservation organization founded in 1971, with a mission to forever preserve the remaining natural lands on and around Mount Diablo, and to connect Mount Diablo to its sustaining Diablo Range.
- Bike East Bay
 - Bike East Bay is a Californian non-profit organization that has worked since 1972 toward "promoting bicycling as an everyday means of transportation and recreation" in Alameda and Contra Costa counties in California's East Bay.
- Greenbelt Alliance
 - Greenbelt Alliance is a San Francisco Bay Area nonprofit organization founded to help the region handle growth in a way that protects precious open spaces while focusing equitable, climate-smart growth within existing urban areas.
- California Department of Parks and Recreation
 - More commonly known as California State Parks, the system manages the California state parks system with a goal of preserving biological diversity, protecting natural and cultural resources, and creating opportunities for high-quality outdoor recreation.
- Contra Costa Resource Conservation District

- Formed in 1941, CCRC is a non-regulatory special district of the state whose mission is to facilitate conservation and stewardship of natural resources in Contra Costa County.

Project Website

A project page, housed on the County's website, was created to help inform the general public of the Project's purpose, progress and resources and gave an opportunity to provide feedback. An online web-map was used to gather specific feedback from the public regarding potential trail alignments. The tool was useful in gathering information regarding any potential constraints or concerns seen by the corridor's users and residents, and the information received helped inform the final trail alignment alternative. The project page can be viewed at http://www.contracosta.ca.gov/MCT_Study.



Pop-Up Events

Part of the project team's public outreach efforts included attendance at two Farmer's Markets; one held in Brentwood and one in Clayton. At both events, consultants and County staff occupied an informational booth with handouts, flyers and other visuals to help promote the Marsh Creek Corridor Feasibility Study. In addition to learning about the project and its envisioned alignment, members of the public had opportunities to provide feedback and suggestions via written comment cards and conversations with the project team.

The project received positive feedback from community members who supported the idea of better bicycle and pedestrian facilities in the area, and the opportunity for greater connectivity between local and regional recreational facilities (for example, from Clayton to the Marsh Creek corridor). The outreach events also provided a valuable opportunity to hear the concerns of property owners throughout the corridor who may be potentially affected by the trail's alignment. Property owners expressed concerns about liability implications, fire safety, impacts to cattle ranching operations, and personal safety. Property owners also provided valuable feedback on constraints and existing conditions in the corridor. Comments and feedback provided at the pop-up events were reflected in the approach to and development of preliminary trail alignments.



Trail Alignment and Property Owner's Workshop

Following the development of draft trail alignments, a workshop was held with property owners along the Marsh Creek corridor, as well as the general public. The goal of the workshop was to provide an overall update on the project, solicit feedback on the draft trail alignment maps, and inform property owners about the status of the study and results of early deliverables, such as environmental considerations. Due to the Covid-19 pandemic, the workshop was hosted via Zoom.

Attendees were invited to submit comments on the draft alignments. An online web-commenting tool was developed to allow for location specific comments on specific alignment segments. Comments received focused mainly around concerns on the impacts to specific property; for example, where the trail was seen to pass too close to a residence, or where there was local knowledge to indicate a concern with the surrounding topography. This feedback directly informed updates and modifications to the draft trail alignments.

Field Visit

In conjunction with the property owner’s workshop, the project team was invited to do a field review and meeting with a handful of property owners in the eastern section of the project area. Participants shared their concerns about the impacts to local ranching operations, fire-safety and personal liability concerns, and knowledge about the seasonal variations in water heights and banks that regularly occur in the creek shed. The field visit supported the modifications made to the alignments following the previously discussed workshop, which emphasized moving the trail away from private residences.



Draft Plan Workshop

The public draft of this plan was released for comment and review in November 2022. A virtual public workshop was held to review the plan and solicit comments and questions. Eighteen comment letters were also received via e-mail directed to County staff. Details on these comments are summarized in **Appendix F**. The plan was then presented to the Transportation, Water, and Infrastructure Committee of the Board of Supervisors in December of 2022.

In response to comments, adjustments were made to the conceptual trail alignment, and clarifications were provided to address concerns around fire risk, liability, and maintenance of the proposed trail. These items would be addressed in greater depth in a trail management plan, when an operator is selected if the project proceeds to construction.

3. Development of Trail Alignments

This section provides an overview of the process used to identify potential trail alignments.

The development of potential trail alignments for the purposes of identifying opportunities and constraints was shaped by a multitude of factors, which included:

- A public lands first approach, beginning with identifying opportunities to link sections of land currently under public control, or in conservation through Save Mount Diablo
- A strong desire from the public to minimize encroachment upon private property, except where necessary to link parcels of publicly dedicated land
- An alignment that roughly follows the curvature of the creek and Marsh Creek Road
- Minimize the number of roadway crossings to reduce user exposure to vehicular traffic
- Consideration of an on-road option in some locations to accommodate road cyclists and to avoid areas where significant disruption to private lands or environmental settings would otherwise occur
- Use of existing fire roads, access roads, and trail segments where possible to minimize impacts to undisturbed land

The alignments are shown in **Appendix C** and went through multiple iterations. The development included a project team design charrette to identify initial alignments that would link public lands. These alignments were further modified to minimize impacts following review from Save Mount Diablo, public feedback through a workshop and online map as detailed in the previous chapter, and a review of potential environmental and natural resource impacts.

It is anticipated that additional refinements to the trail alignments will be necessary to capture specific, nuanced topographical, environmental, and construction considerations as sections move forward into implementation. The trail may also be adjusted if additional parcels of land become publicly held or move into conservation.

4. Trail Design Principles

Many segments of the Marsh Creek Trail study corridor feature rugged terrain with grasslands, oak woodlands, riparian vegetation, and chaparral. This calls for a trail design (width, slope, turn radii) that accommodates the widest range of users balanced with potential environmental effects including ground disturbance, removal of trees and related habitat, and trail construction and maintenance costs. Design considerations and their relative trade-offs are described in this chapter.

Trail Design Standards and Guidelines

Contra Costa County Trail Guidelines

The *Contra Costa County Trail Design Resource Handbook* (2001) is focused on paved bicycle trails and the configuration of roadway crossings for these trails, including signage. It does not address trails in challenging topographic or environmental settings.

Caltrans Bicycle and Pedestrian Standards and Guidelines

Providing ADA-accessible bicycle and pedestrian connections is typically a Caltrans requirement. This usually means meeting standards for a Class I Bike Route/shared use path as defined in the Caltrans *Highway Design Manual*: Chapter 1000 Bicycle Transportation Design (2015).

Chapter 1000 requires a paved surface, a maximum 5% gradient, or 8.33% gradient on ramps with regular level resting intervals, and typically a minimum 10-foot clear width. However, segments of Marsh Creek Trail, such as the northern steep slope trail connection, will be an unpaved recreational trail unconnected to ADA-accessible trails, parking, or other facilities. This portion cannot be expected to comply with full ADA access or "Class I" shared use path standards, though the design should strive to meet trail guidelines described below.

Caltrans design guidelines recognize several federal ADA guidelines specific to trails. In the Caltrans Design Information Bulletin concerning ADA access, Section 4.3.18 on Trails refers to and adopts as design standards trail guidance provided within Sections 1016 through 1018 of the federal "*Outdoor Developed Areas*" guidelines.

Federal ADA Trail Guidelines

The federal Architectural Barriers Act (ABA) *Accessibility Guidelines; Outdoor Developed Areas* (AGODA), are a set of standards adopted by the Architectural and Transportation Barriers Compliance Board and are included in the 2015 ABA Standards. These standards apply to trails built by federal agencies or on federal lands. While non-federal agencies may choose to adopt these guidelines, they are example guidelines for trail construction by non-federal agencies. Under AGODA, recreational trails have an established set of criteria that allows for deviance from the ABA trail standards that apply to the "path of travel" between developed facilities. These recreational trail guidelines respond to natural conditions and constraints.

Similarly, access routes between developed facilities, such as picnic areas and overlooks, permit higher trail gradients in a prescribed manner at specific situations; however, the intent should be to align these features as much as feasible with the ABA standards.

Section 1017.1 of these guidelines for trails lists two types of exceptions based on whether it is "impracticable" for a portion of the trail or the entire trail to comply:

1017 Trails

1017.1 General. Trails shall comply with 1017.

EXCEPTIONS: **1.** When an entity determines that a condition in 1019 [see below] does not permit full compliance with a specific provision in 1017 on a portion of a trail, the portion of the trail shall comply with the provision to the extent practicable.

2. After applying Exception 1, when an entity determines that it is impracticable for the entire trail to comply with 1017, the trail shall not be required to comply with 1017.

The Outdoor Developed Area standards for trails contained in 1017 include the following key features:

1017.2 Surface – Firm and stable.

1017.3 Clear Tread Width – 36 inches minimum.

1017.4 Passing Spaces – 60 x 60 inches at intervals of 1,000 feet maximum.

1017.5 Tread Obstacles – Not to exceed 1/2 inch

1017.6 Openings – Does not allow the passage of a sphere more than 1/2 inch in diameter.

1017.7 Slopes – Not more than 30 percent of the total length of a trail shall have a running slope steeper than 1:12 (8.33%). The running slope of any segment of a trail shall not be steeper than 1:8 (12%). Where the running slope of a segment of a trail is steeper than 1:20 (5%), the maximum length of the segment shall be in accordance with Table 1017.7.1, and a resting interval complying with 1017.8 shall be provided at the top and bottom of each segment.

Table 1017.7.1 Maximum Running Slope and Segment Length

Running Slope of Trail Segment		Maximum Length of Segment
Steeper than	But not Steeper than	
1:20 (5%)	1:12 (8.33%)	200 feet
1:12 (8.33%)	1:10 (10%)	30 feet
1:10 (10%)	1:8 (12%)	10 feet

1017.8 Resting Intervals – 60 inches long minimum; at least as wide as the widest segment of the trail tread leading to the resting interval; slopes not steeper than 1:48 in any direction.

The guidelines make it clear that trail project managers should consider Exception 1 first if only a portion of the trail is impracticable to make standard, or make a case for Exception 2 if it is indeed “impracticable” for the entire trail to comply with Section 1017, based on conditions described in Section 1019, below:

1019 Conditions for Exceptions

1019.1 General. Exceptions to specific provisions in 1011, 1013, 1014, 1015, 1016, 1017, and 1018 shall be permitted when an entity determines that any of the following conditions does not permit full compliance with the provision:

1. Compliance is not practicable due to terrain.
2. Compliance cannot be accomplished with prevailing construction practices.
3. Compliance would fundamentally alter the function or purpose of the facility or the setting.
4. Compliance is limited or precluded by any of the following laws, or by decisions or opinions issued or agreements executed pursuant to any of the following laws:
 - Endangered Species Act (16 U.S.C. §§ 1531 et seq.);
 - National Environmental Policy Act (42 U.S.C. §§ 4321 et seq.);
 - National Historic Preservation Act (16 U.S.C. §§ 470 et seq.);
 - Wilderness Act (16 U.S.C. §§ 1131 et seq.); or
 - Other federal, state, or local laws the purpose of which is to preserve threatened or endangered species; the environment; or archaeological, cultural, historical, or other significant natural features.

ABA Section 1019, Conditions for Exception, provides exceptions to compliance with the technical standards identified in 1017 Trails. For the northern steep slope trail segment, compliance with the running slope requirements of 1017.7.1 is not feasible due to terrain and would likely be precluded by the National Environmental Policy Act, California Environmental Quality Act, and other state or local laws with the purpose of preserving threatened or endangered species, the environment, and significant natural features.

Along the Marsh Creek Corridor, terrain is a limiting factor as land ownership constraints require the trail to be aligned at a particularly steep location.

AASHTO Guidelines

The American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities* (2012) and *Guide for the Planning, Design, and Operation of Pedestrian Facilities* (2004), contain further recommendation for the design of these facilities.

Guide for the Development of Bicycle Facilities, 4th Addition (2012).

This is the authoritative national standard for designing on-street bicycle facilities and shared-use paths (trails). It includes chapters on bicycle planning, bicycle operations and safety, the design of on-road and shared use paths, bicycle parking, maintenance and operations. It provides design specifications for shared used paths including widths, clearances, design speeds, grades, stopping sight distances, bridges and underpasses, drainage, lighting, turn radii, intersection design (path to path and path to street), pavement markings, signs, and signals. (An updated 2019 version is under development.)

The Guide recommends that shared-use paths be 12 feet or wider in areas with high use and a mix of pedestrians and bicyclists. A minimum of ten feet is acceptable in low-use areas and eight feet is acceptable for short distances where there are physical constraints (the *Shared Use Path Level of Service Calculator* is recommended to determine path width). Additional width is recommended along steep slopes and through curves. To accommodate all users, a maximum running slope of 5% is recommended. Path curvature should safely accommodate the fastest design speeds — typically bicyclists. These range from a 30 mph design speed (on hills) with a recommended minimum radius of 166 feet to a 12 mph design speed on flat natural surface path with a recommended minimum radius of 27 feet. Trails should be crowned or designed with a 1% minimum cross slope in the direction of the existing terrain. Where considerable run-off or freezing temperatures exist, a ditch should be placed on the uphill side.

Guide for the Planning, Design, and Operation of Pedestrian Facilities (2004)

This Guide provides nationally recognized recommendations on the planning, design and operation of pedestrian facilities with a focus on identifying effective measures for accommodating pedestrians on public rights-of-way. The Guide includes chapters on design regulations and guidelines, pedestrian characteristics and planning strategies, school and development design, traffic calming, designing roadways for safe pedestrian use, sidewalk design, intersection design, mid-block and grade-separated crossings, pedestrian-related signals and signage, sidewalk maintenance, and pedestrian accommodation in work zones.

The Guide notes that two people walking side-by-side or passing one another require about five feet of space. For Shared Use Paths, the Guide notes that the *Guide for the Development of Bicycle Facilities* should be used, and that those guidelines also serve the needs of pedestrians. The Guide highlights the need for paths to be accessible and recommends consulting with the *Guidelines for Outdoor Developed Areas* (AGODA), which note that it may not be feasible to design all paths to accessibility standards (due to terrain, etc.), but it is desirable to remove as many barriers as possible and to post signage noting steep grades, narrow widths, or uneven surface conditions.

Trail User Types and Trail Design Preferences

There is a wide variety of types of trails, in which some types have specific standards, such as Caltrans Class I bike routes that are defined as multi-use paths, Americans with Disabilities Act (ADA) federal

standards and guidelines for access routes between developed facilities, and for trails that are destinations in their own right.

The Marsh Creek Trail should be designed to adapt to its setting. In less constrained areas, where there is ample right-of-way and level ground, a Class I paved multi-use path up to 14 feet wide (at least eight feet wide to meet minimum standards) is appropriate, meeting ADA standards for accessibility. Such trails accommodate both wheelchairs and road bikes as well as pedestrians – the widest range of potential users. Ideally, an unpaved sidepath would be provided for equestrians and mountain bikes. In other settings it may be a narrow, rugged hiking/equestrian/mountain biking trail. In some cases, both trail types exist in parallel.

An important objective of the current trail study and public engagement is to assess the demand for different user types and the public’s desire to accommodate them. Additional details on this are provided in **Appendix B**, Demand Analysis. There is a diversity of trail users, and people can’t necessarily be “pigeon-holed,” but there are some general categories of users:

Wheelchair users and others with mobility constraints – ADA standards are intended to accommodate wheelchairs, but there are wheelchair athletes who tackle rough trails, and others who may be challenged to negotiate an ADA-compliant ramp. Some users have powered wheelchairs or other devices. This category includes seniors and others who may use walkers, crutches, canes, and other assistive devices.



Casual walkers/hikers – people who prefer an easier, more developed trail, often because they are with family members or others who have a range of abilities, such as babies in strollers, young children, or seniors. They tend to walk side-by-side. These users tend to prefer not to be close to bikes moving at higher speeds. For these users wider, smoother, and gentler tends to be better.



Serious hikers and trail runners – tend to prefer a narrower, steeper, more challenging trail and the associated more natural setting.



Road bicyclists – skinny tires typically require pavement, wider turns, and gentler grades than recreational trails. Serious road bicyclists tend to avoid multi-use trails, so they don't have to contend with slower users. Marsh Creek Road experiences some touring cyclists, who may choose to ride on roadway shoulders and share the lane with motor vehicles where there is no shoulder. Casual road bicyclists, including those with young children, tend to travel at a slower pace and prefer dedicated bicycle facilities with a greater degree of separation from motor vehicles, especially on high-speed roadways.



Mountain bicyclists – experienced riders tend to prefer technical single-track (narrower) trails; beginners may prefer wider, gentler unpaved roads, but those tend to contribute to speed, which creates more conflict with other users.



Equestrians – may be able to handle narrow, steep, challenging trails, but most riders prefer gentler, wider trails. Horses need to avoid surprises and need other users such as hikers and bicyclists to go to one side of the trail to allow them to pass. Many equestrians would prefer wider, gentler trails with more room for passing. Also, pavement isn't good for horses – they require an unpaved surface or sidepath.



Multi-Use Trail Design Principles for Natural Settings

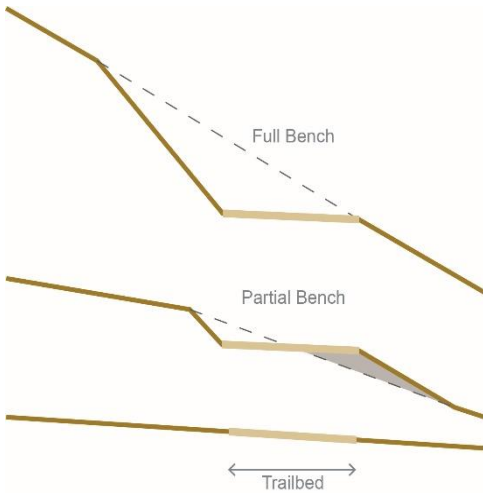
Laying out and designing trails in natural settings is both a science and an art. It takes a team experienced in trail planning, design, and construction to create a trail that is environmentally compatible and sustainable, and enjoyable by users. Basic principles are outlined in Figures 4-1 and 4-2. In combination, they help to meet key objectives:

- Manage soil impacts – compaction, displacement and erosion
- Keep water off the trail
- Take people where they want to go with an enjoyable trail experience
- Provide a gradual but varied route
- Adapt to the existing slopes and drainage patterns
- Protect natural resources
- Manage bike speed by avoiding long straight steep sections

For multi-use trails mixing hikers, bicyclists and potentially equestrians, it is important to maintain sight distance ahead to avoid surprise encounters, and to provide regular passing spaces at least six feet wide if the trail is narrower than this. Emergency access should be factored into design and is easier on a Class 1 path. Amenities and support features, such as wayfinding signage, map boards, and benches, are also important features for use and enjoyability.



Follow Natural Contours: Trails that follow natural contours shed water easily and are more functional for a broad range of users.



Use a full bench trail on steep slopes: If feasible, use full bench (not partial bench) trail construction on steep side slopes.

The outside tread is much less likely to fail or be worn away. Partial bench trails are typically feasible only on slopes of 20% or less.

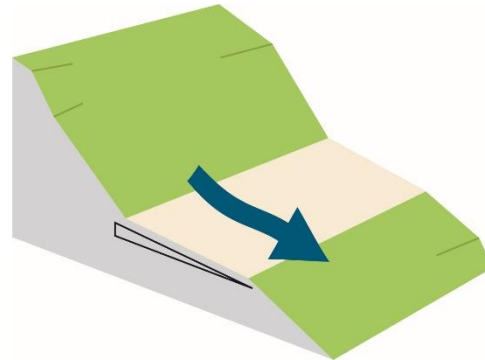


Close and Reclaim Unsustainable Trails: Where existing trails cannot be improved, the entire route should be obliterated, and a suitable replacement route provided.



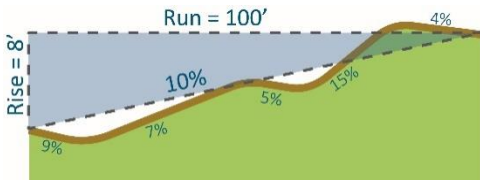
Follow the "Half Rule:" A trail's slope should not be any greater than half the grade of the hillside it contours along.

For example, if the slope of the hill the trail runs along is 16%, then the grade of the trail should be no more than 8%. This will allow water to flow across the trail, off the trail and continue down the slope. This is especially important along gentle slopes.



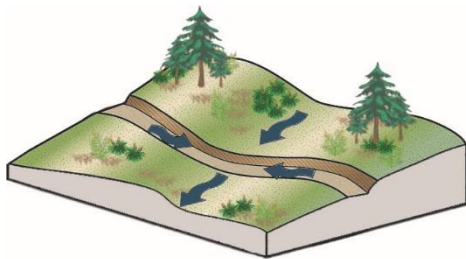
Outslope the Tread: The trail tread should be outsloped (sloped away from the hillside) at 3 to 4%. This will allow water that comes on to the trail to flow off downhill and not be channeled down the trail.

Figure 4-1: Trail layout and design principles

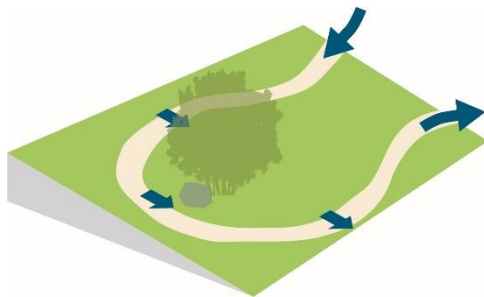


10% Average Grade, Maximum: An average trail grade of 10% or less will be most sustainable, on most soils and for most users.

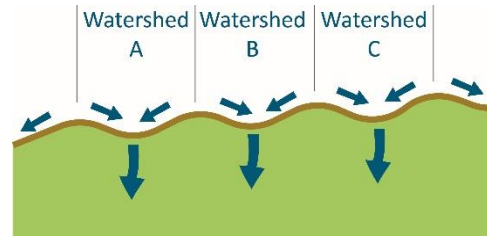
For ADA compliance, and for accommodating the maximum range of users in a public setting where the terrain allows it, a maximum gradient of 5% is desirable, though ADA standards for trails allow steeper sections for compliant trails.



Design with a Rolling Grade: Rolling grade trails climb slopes using a series of climbs and subtle drops. The change in grade allows water to drain off the trail tread. The series of curves and dips makes the trail more interesting for users, and provide short periods of downhill during long climbs. The curves also provide visual separation between groups of trail users.

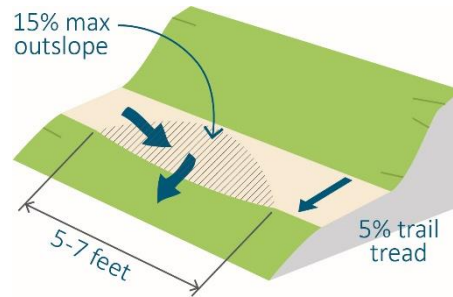


Avoid Switchbacks: Use climbing turns where feasible. If switchbacks are required, space them far enough apart to reduce visual impact and shortcutting. Crown switchbacks to improve drainage.



Tread Watersheds and Grade Reversals: To avoid concentrating water on the trail, reverse grade often with a series of dips and crests.

Dividing the trail tread into smaller watersheds minimizes erosion caused by water flowing along the tread. Small scale erosion will remain a problem within each watershed, but the problems will be more manageable. Depending on soil type and annual rainfall, a low point should occur every 20 to 50 linear feet.



Use Drainage “Knicks” and “Rolling Dips:” Drainage “knicks” and “rolling dips” help drain water from the tread surface where rolling grades are not feasible. “Knicks” are used on gently sloped trails. “Rolling dips” are used on steeper slopes.

Figure 4-2: Trail layout and design principles, continued

Trail Design Considerations for Steep Slopes

Where a trail must traverse or climb up or down a steep slope there are important considerations and trade-offs for design of the trail to accommodate the widest range of users while preserving the most natural resources, and limiting cost and maintenance to a practical level.

Trail Width

A wider trail will accommodate a wider variety and volume of users. However, construction and maintenance costs, site disturbance, and tree removal tend to increase exponentially along with trail width. A consistent trail bench (relatively flat graded surface) width of six feet tends to yield a net trail width of four feet due to raveling of the cut and fill edges and encroachment of vegetation and tree litter. A wider trail bench would require an exponential increase in grading and expansion of ground disturbance, as illustrated in Figure 4-3. In many locations, particularly at climbing turns, high retaining walls would be required to maintain a stable trail and avoid more tree removal and graded area.

Trail Gradient

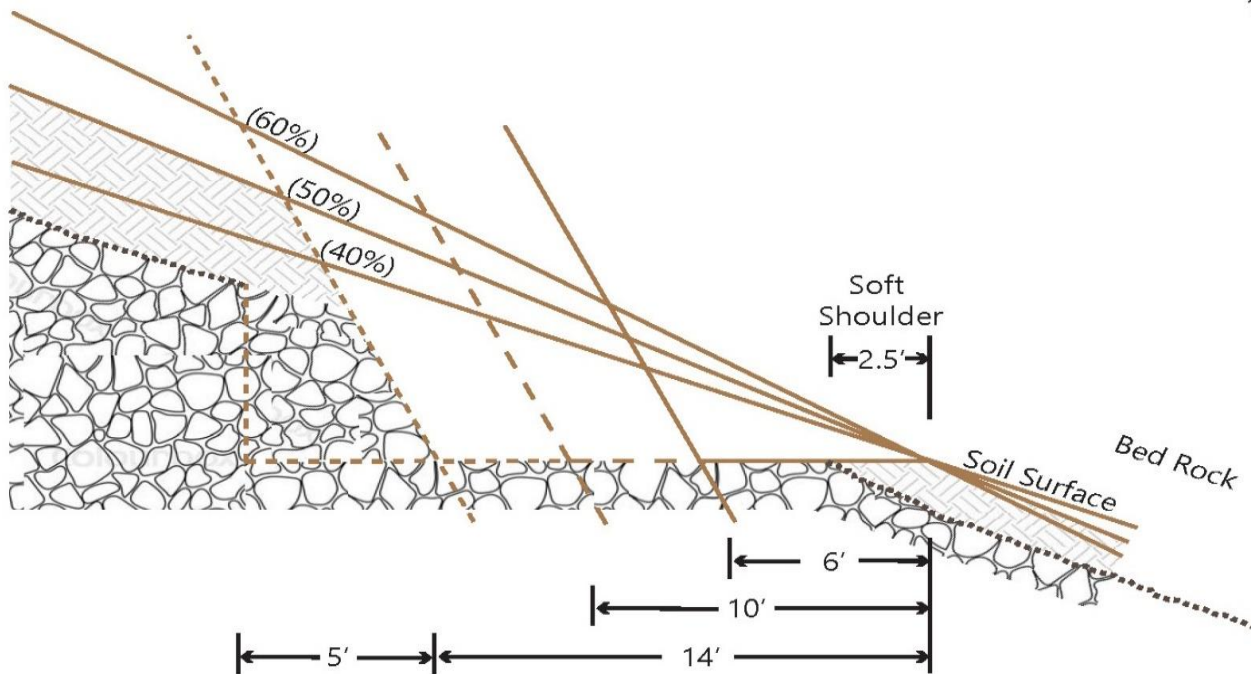


Figure 4-3. Example of different trail widths on steep slope and the exponential increase in soil removal

As the grade (or steepness) of the trail increases, the variety of people who are able to use the trail decreases. For example, people in wheelchairs and many people on bicycles would find it hard to use a trail where the grade is greater than eight percent. However, as the grade of the trail changes, the length of the trail alignment increases exponentially, as shown in Figure 4-4 and Figure 4-5.

To meet accessibility requirements stated in the California State Parks Accessibility Guidelines, which take into consideration both federal and state regulations, whenever a route of travel exceeds a slope of 5%, a ramp must be provided. Should a ramp be required, it cannot exceed 8.3% in gradient and must have landings for every 30" of vertical gain, which equates to every 35' of trail.

The landings must be level (no more than 2% gradient), and no less than 60" wide in all directions. The guidelines are intended to allow all users to comfortably climb elevation and have adequate space to rest.

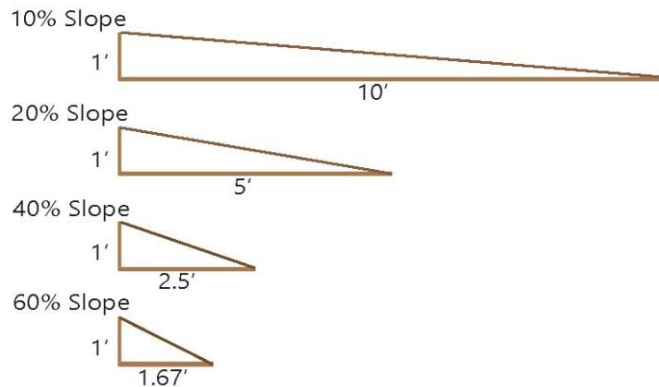


Figure 4-4. Illustration of trail length at various slope percentages

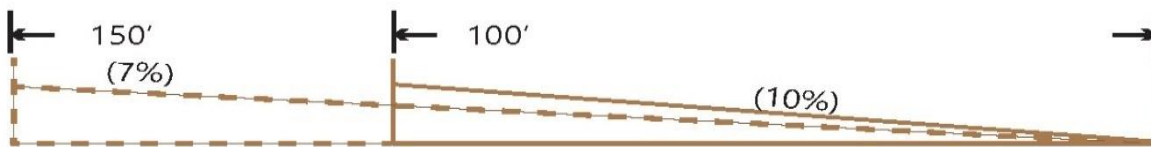


Figure 4-5. Change in length of trail needed to rise 10 feet at gradients of 7%, 10%

California State Parks Accessibility Guidelines state that if a trail segment has a slope greater than 5% but not steeper than 8.33%, it cannot exceed 200' in length and must have landings on either side of the segment. If the slope is greater than 8.33% but no steeper than 10%, the segment must be no longer than 30' between landings. If the slope is between 10%-12% the maximum length of the trail between landings is 10'. No trail can exceed a 12% gradient if it is to be designated as accessible.

Table 42-1 Maximum Running Slope and Segment Length

Running Slope of Trail		Maximum Length of Trail
Steeper than	But not Steeper than	
0%	5%	None
5%	8.33%	200'
8.33%	10%	30'
10%	12%	10'

Figure 4-6: Trail gradient requirements from California State Parks Accessibility Guidelines (2015)

Trail Surfacing

The trail surface can be composed of a variety of materials including material found on-site. Types of surface materials can include compacted base rock, quarry fines, or decomposed granite (DG) with a polymer binder such as the proprietary Park Tread surface used on trails in the Golden Gate National Recreation Area. This accommodates a wider range of users but increases construction and maintenance costs. An asphaltic concrete (AC) trail would require further trail bed and hillside stabilization and have additional environmental impacts. If Park Tread were used it would likely require periodic maintenance to recondition the surface where any erosion of the surface or settlement of the subgrade had occurred. An asphaltic concrete (AC) trail would have a brittle surface that would require further trail bed grading, compaction, and hillside stabilization if asphalt cracking and settlement were to be avoided, and such work would have further environmental impacts during construction.



Figure 4-7. Example of Park Tread surface near Golden Gate Bridge



Figure 4-8. Example of an asphaltic concrete (AC) trail



Figure 4-9. Example of base rock surfaced multi-use trail in Marin County

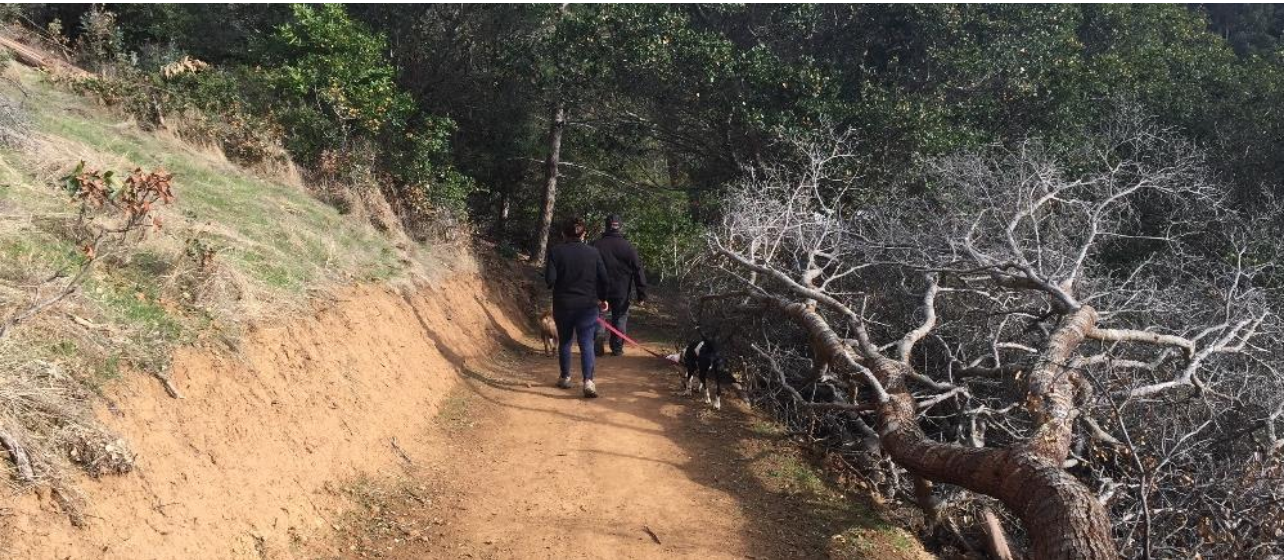


Figure 4-10. Example of new natural (dirt) surfaced trail in Marin County

Midpeninsula Regional Open Space District has had success on their access roads using a special base rock mixture, with smaller sized rock than the standard road base mixture, and treated with lime to help it bind and compact (see Figure 4-11 and 4-12). This could be installed with much less subgrade preparation than pavement. It would be much less expensive at the outset (on the order of a fourth to a third the cost of asphalt pavement) but it would require more annual maintenance. Figure 4-12 shows an Open Space District Road after a few years of wear, including use by cattle (similar to horse impacts). This surface would not be as smooth and stable as asphalt and would be more challenging/uncomfortable for some users (i.e., people using strollers or wheeled walkers) but given the steep slopes, unstable soils, and

remote locations of portions of the trail the benefits of paving for access are reduced. This lime-treated base rock mixture is a reasonable compromise given the significant cost savings compared to asphalt.



Figure 4-11. Lime-treated base rock surface



Figure 4-12. Lime-treated base rock surface after use and weathering

Retaining Walls

Retaining walls are often needed when a trail is built within a steep slope. A wider trail on a steeper slope will require higher retaining walls. If taller and/or more robust retaining walls were required, they would likely need to be cast in place concrete with deep footings or concrete pier foundations, driving up construction cost and access impacts. **Figure 4-15** shows the type of wall that might be necessary.

An alternative to concrete walls in more remote trail settings where wooden retaining walls are more practical would be engineered “sutter” type walls, with vertical steel beams retaining timber segment walls (see Figure 4-16). These are typically four to six feet high or higher. They often feature “tie-back” anchors drilled into the slope.

In some areas along the trail corridor, for shorter walls (less than four feet high) stacked rock walls

(see Figure 4-17) could be used to retain cuts, and potentially fills, at climbing turns. This would blend into the natural environment and be simpler to engineer and construct.

Finally, there is the option of concrete masonry unit (CMU) walls, as illustrated in Figure 4-18. These are typically more practical to build in an urban, accessible setting. They may be a good alternative to stacked rock walls supporting the downhill side of a switchback or climbing turn, where they can be hidden by burying in soil.



Figure 4-15. Concrete retaining wall



Figure 4-16. Sutter-type retaining wall for trail on a steep slope



Figure 4-17. Stacked rock retaining wall



Figure 4-18. Concrete masonry unit retaining wall (could be covered with soil and planted on

Creek Setback Requirements

Contra Costa County zoning codes require a 30-foot setback for roads or paved trails from the top of a creek bank, but the Marsh Creek corridor is subject to the requirements of the adopted Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP). The HCP/NCCP is intended to provide regional conservation and development guidelines to protect natural resources, while improving and streamlining the permit process for endangered species and wetland regulations.

Environmental Science Associates (ESA), who are responsible for researching environmental constraints for this study, documented the pertinent standards for this report. Stream setback requirements are described in Chapter 6 Conditions: Conservation Measure 1.7 of the HCP/NCCP:

“Project proponents are encouraged to site trails and access roads outside the required setback to reduce disturbance to wildlife that use adjacent streams and riparian habitats. When roads and trails cannot be sited outside the required setback, they must be sited as far from the stream channel as practicable, must adhere to limitations on exceptions to stream setback requirements described in Table 6-2, and must mitigate additional impacts as described below. Project proponents are encouraged to use permeable or semi-permeable surfaces on roads and trails within stream setbacks as long as they are consistent with safety and zoning limits. If such surfaces are used, the project may be eligible for fee reductions.”

Table 6-2 from the HCP/NCCP is replicated below (the last row applies to Marsh Creek): for the mainstem of Marsh Creek within the HCP area, there is a dedicated 75-foot setback, not the County’s 30-foot setback. There is a 300 linear-foot limit on exceptions to the setback requirements that “may” be granted. This exemption covers bridges and outfalls; the paragraph above implies it could cover roads and trails, but these are not explicitly included in Table 6-2. The document also states that, “All covered activities must also meet County and city setback requirements, where applicable.”

Based on this, it appears that if the project wants to use the HCP/NCCP to cover special-species impacts, it will need to demonstrate compliance with local setback requirements and the HCP setback requirements where feasible, and potentially be subject to additional mitigation fees. Due to the natural topography of the study area, it is likely that the trail will frequently fall within the proposed setback area. To minimize impacts to the creek in these instances, it is recommended that the trail be constructed in keeping with the recommended permeable and semi-permeable surfaces as described above, and that opportunities for creek and habitat restoration be conducted as part of trail construction.

Table 6-2: Stream Setback Requirements for Streams within the Urban Development Area

Stream Reach Type and Location	Buffer Objective/ Function (from Figure 5-11)	Example Sites in Inventory Area	Required Setback (from top of bank measured in aerial perspective)	Limitations on Exceptions to Setback Requirements That May Be Granted by Local Agencies			Comments
				Maximum allowable Linear Impact to Streams (per project)	Activities Eligible for Streams Impact Exemption	Maximum Allowable Area of Impact within Setback (per project)	
1st and 2nd order ⁵ ephemeral reaches in urban and agricultural areas	N/A	Multiple unnamed tributaries to intermittent and perennial reaches	Avoidance and minimization measures for drainages must be documented but no setback is required	No limitations ³	Any activities	No limitations ⁴	These reaches are located in dense urban and intensive agricultural areas, and provide low habitat function for covered species. Avoidance and implementation of Conservation Measure 1.10 will minimize impacts to water quality and hydrologic functions.
Concrete-lined channels	Enhance water quality; retain restoration potential	Reaches of Kirker Creek	20 ft	No limitations ³	Any activities	No limitations ⁴	These reaches are located in dense urban areas and provide low habitat function for covered species. A minimal buffer width will reduce sediment and nutrient inputs from surface flows, retain some potential for stream restoration, and provide for recreational opportunities.
1st and 2nd order ⁵ ephemeral reaches in natural areas	Erosion and nutrient control;	Multiple unnamed tributaries to intermittent and perennial reaches	25 ft	No limitations ³	Any activities	No limitations ⁴	Although ephemeral streams play a limited role in providing habitat to covered species, these systems represent the first point of entry for sediment and other contaminants into downstream reaches. Thus, unlike the stream types below, the primary objective of the setback for ephemeral streams is to filter out sediment and contaminants before they degrade downstream habitat.
Perennial, intermittent, or 3rd or higher order ⁵ ephemeral streams in urban areas except Marsh Creek mainstem	Enhance water quality; retain restoration potential	Lower Willow Creek, Lower Kirker Creek	50 ft	300 feet ³	Necessary bridges and outfalls	Up to 15% of setback area ⁴	These reaches are located mostly in dense urban areas and provide low habitat function for covered species. However, potential may exist for restoration of riparian vegetation and minimal floodplain areas. In addition, a minimal buffer width will reduce sediment and nutrient inputs from surface flows and provide for recreational opportunities.

Stream Reach Type and Location	Buffer Objective/ Function (from Figure 5-11)	Example Sites in Inventory Area	Required Setback (from top of bank measured in aerial perspective)	Limitations on Exceptions to Setback Requirements That May Be Granted by Local Agencies			Comments
				Maximum allowable Linear Impact to Streams (per project)	Activities Eligible for Streams Impact Exemption	Maximum Allowable Area of Impact within Setback (per project)	
Perennial, intermittent, or 3rd or higher order ⁵ ephemeral streams in agricultural or natural areas and Marsh Creek mainstem	Enhance water quality; retain restoration potential	See examples below ⁶	75 ft	300 feet ³	Necessary bridges and outfalls	Up to 15% of setback area ⁴	These reaches retain the greatest habitat value and potential for restoration within the Urban Development Area. The buffer will filter sediment and other contaminants, maintain habitat for covered species, allow for restoration of riparian vegetation and some small floodplain areas, as well as providing recreation opportunities.

Source: Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP), <https://www.cocohcp.org/221/Final-HCP-NCCP>

Notes:

1 Location parameters (e.g., “agricultural areas”, “natural areas”, etc.) describe the setting of the stream at the time of completing this HCP/NCCP and refer to the fee zones and urban landcover shown in Figure 9-1.

2 Where native woody riparian vegetation is present, minimum setbacks must extend to the outer dripline of the riparian vegetation or the specified number of feet measured from top of bank, whichever is greatest. Riparian vegetation is defined broadly to include oaks and other woody species that function as riparian corridors. Setbacks must also meet minimum setback requirements of the applicable local land use agency. Contra Costa County has an ordinance regulating impacts near unimproved earthen channels. This Ordinance requires a “structure setback line” that varies between approximately 30 feet and 50 feet from top of bank depending on the height of top of bank above the channel invert (County Code Title 9, Division 914-14.012).

3 Mitigation is required for all impacts to streams, as described in Chapter 5. Restoration requirements are summarized in Tables 5-16, 5-17, and 9-5. Preservation requirements are summarized in Tables 5-5a and 5-5b and may be accomplished through payment of the development fee described in Section 9.3.1 or through provision of land in lieu of fees.

4 Restrictions will be measured as a percentage of the setback area excluding the area of the stream channel. Impacts within setbacks must be mitigated through:

a) payment of the development fee described in Section 9.3.1 over the entire property including the setback and the stream channel; and b) through payment of the riparian impact fee (see Table 9-5) for every acre of impact within the setback or through direct performance of riparian restoration at a 0.5 to 1 ratio on-site or offsite.

5 Stream order refers to the numeric identification of the links within a stream network. This document follows the stream ordering system of Strahler (1964). In this system, a first order stream is a stream with an identifiable bed and bank, without any tributary streams. A second order stream is formed by the confluence of two first order streams. A third order stream is formed by the confluence of two second order streams, and so on. Addition of a lesser order stream does not change the stream order of the trunk stream.

6 Perennial streams in agricultural or natural areas within the Inventory Area consist of the following:

- Mount Diablo Creek, Russelman Creek, Peacock Creek upstream of the Oakhurst Country Club property, and tributaries to Mount Diablo Creek within Mount Diablo State Park;
- Kellogg Creek in the Foothills/Upper Valley and Delta geomorphic zones;
- Brushy Creek in the Delta and Lower Valley/Plain geomorphic zones;
- Indian, Rock, Sand Mound, Dutch, Piper, and Taylor Sloughs, and False River (does not include reaches in concrete channels); and
- Sand Creek and Oil Canyon Creek in the Montane geomorphic zone.

Staging Area Design

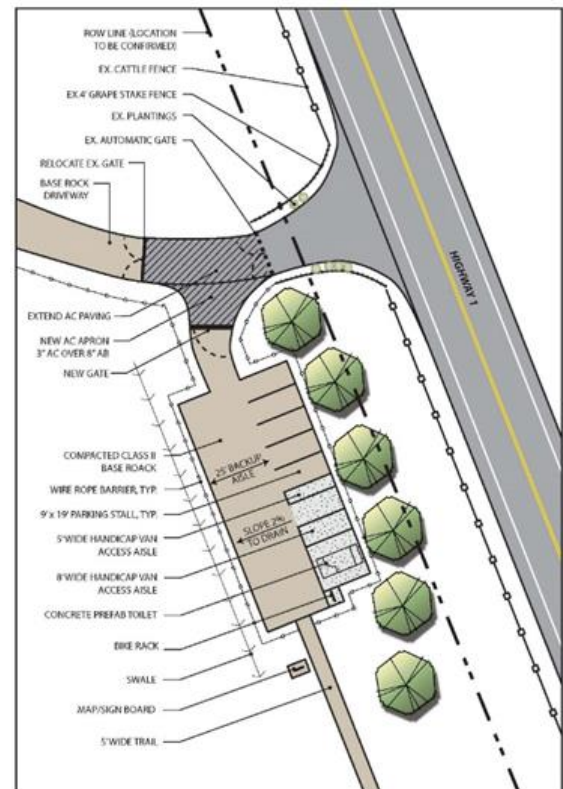
Trail staging areas, or parking areas, provide access to the trail and can be simple turnouts along the road accommodating a few vehicles, small parking areas accommodating 8 to 10 vehicles, or very large lots accommodating dozens of vehicles with additional amenities, such as the staging area for the Round Valley Regional Park near Brentwood. Staging areas need to have safe ingress and egress for vehicles, bicycles, and pedestrians, which requires a straight stretch of road with sufficient sight distance in either direction and should be situated on relatively level terrain with sufficient drainage. Most rural staging areas are surfaced with base rock/gravel, although ADA parking spaces must be paved to meet current standards. The layout may be perpendicular parking with the same lane for entering and departing, or angled parking with loop access drives. Such loop access is particularly important for accommodating horse trailers, for which there may be demand along the Marsh Creek Trail.



Small staging area at Sibley Volcanic Regional Preserve



Round Valley Regional Park Staging Area



Stewarts Point Coastal Trail Staging Area Plan

Trail Amenities

Trail amenities are elements that support user access and improve the user experience. They are often invisible to the user, except in their absence. Some amenities, such as trash receptacles, help maintain a positive experience for users. Other amenities, such as benches, make trails more usable and comfortable by providing resting places.

Trail amenities can fall into two categories: amenities found at the trailhead/staging area, and amenities found along the trail. Within the trailhead amenities category, there are those that are appropriate at larger trailheads, or staging areas, and those that are appropriate at the smaller and more typical trail access points.



Staging Area Amenities

Staging areas are the major access points to the trail system, and therefore should have the most comprehensive set of amenities. Each staging area should have:

- Vehicle parking
- Bicycle parking
- Trail rules and information
- Trailhead information kiosks
- Maps
- Trail signposts
- Restrooms
- Drinking water
- Trash and recycling receptacles
- Dog waste stations (if dogs are permitted)
- Picnic tables
- Benches



Briones Preserve Newt Hollow Picnic Area

In many cases, it is appropriate for a staging area to also have:

- Interpretive information
- Picnic shelters
- Self-guided tour information



Recommended Amenities at Staging Areas

Trailhead Amenities

Trailheads include all the access points to a given trail. In many cases, these are simply locations where the trail meets a roadway. In all cases, there are minimum elements that should be present at each access point:

- Trail rules and information
- Trail signposts and/or other identification

In some cases, the trailhead is larger than a minor access point, but not large enough to warrant an entire staging area set up. At such mid-sized trailheads, it would be appropriate to have additional facilities, such as:

- Bicycle parking
- Trailhead information kiosks
- Trash and recycling receptacles
- Dog waste stations (if dogs are permitted)
- Drinking water
- Benches



Recommended Amenities at Minor Trailheads



Recommended Amenities at Mid-Size Trailheads

On-Trail Amenities

The need for specific amenities along the trail varies greatly depending on the type and location of the trail. The only elements required for most types of trails are:

- Trail signposts
- Benches at key overlooks and rest spots

In all cases, trail signposts should be provided at every trail junction. In many cases it is beneficial to include mile markers along the trail.

Other elements that should be considered along very heavily used trails include:

- Restrooms
- Drinking water
- Trash and recycling receptacles
- Picnic shelters
- Picnic tables

Also beneficial are:

- Interpretive panels
- Dog waste stations
- Benches
- Self-guided tour



Recommended Amenities On-Trail

5. Potential Trail Typologies for Marsh Creek Corridor

The following locations illustrate different settings where the trail would require special design considerations. While specific cross sections may vary depending on the ultimate alignment of the trail, these locations illustrate typical conditions found throughout the project corridor.

Steep Slope - Retaining Wall/Switchback Location

Multiple locations will involve creating a trail across a steep slope. The example below shows a 2:1 slope with an existing narrow road (about 6' wide) overlaid by a 14' wide paved trail with a 6' to 8' high retaining wall. The envisioned route uses an existing paved access road that leads to Contra Costa Water District water tanks, with switchbacks/climbing turns before the tanks to continue the trail below them. This hillside shows evidence of prior slope failures. Figure 5-1 shows a simulation of an alternative trail configuration.

Figure 5-2 shows two alternative configurations for this steep slope trail: A separate unpaved trail at a lower elevation for mountain bikes, horses, and potentially trail runners and dog walkers, and a 14-foot-wide bench requiring a taller retaining wall that would allow the unpaved path.



Figure 5-1. Trail simulation on steep hillside

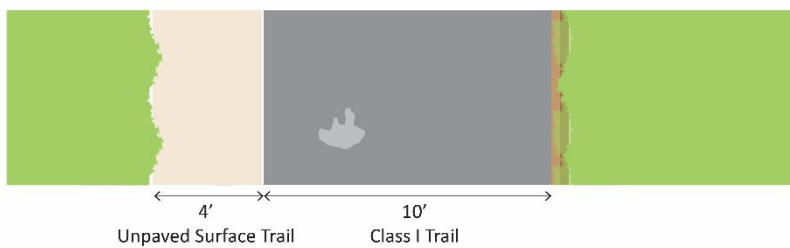
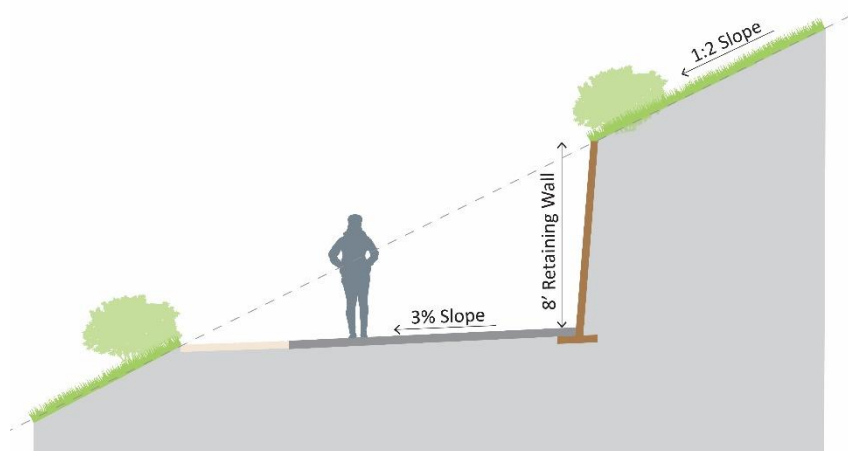
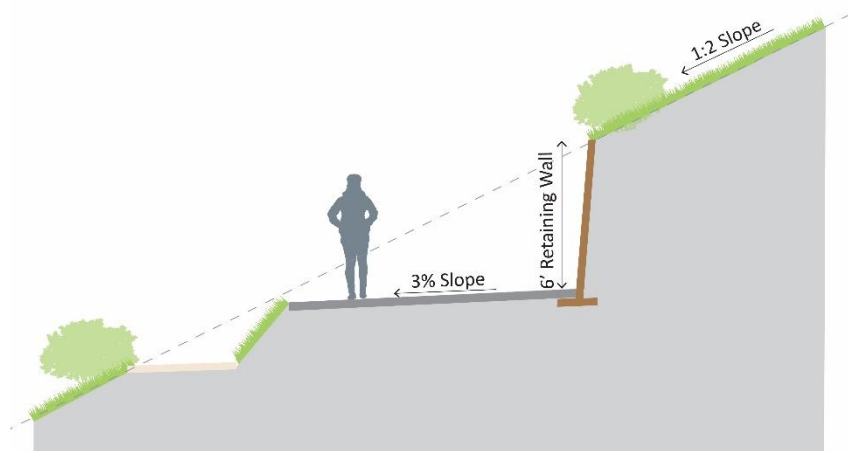


Figure 5-2. Alternative steep slope trail configurations

Road Crossings

There are several potential crossing locations of Marsh Creek Road identified in the study; the location shown in Figure 5-3 at Morgan Territory Road is a typical example. With a 45-mph speed limit (and often vehicles are traveling faster) it is important to implement a high visibility crosswalk and warning devices to alert motorists of people crossing. At this location and many others there are embankments on the side of the road that would need to have accessible ramps to facilitate access. Figure 5-3 illustrates these improvements. Sight distance to the crosswalk and visibility of warning beacons would also need to be evaluated during the design phase.



Figure 5-3. Illustrative trail road crossing near Morgan Territory Road

On Roadway

This is a typical segment where the trail would be adjacent to the road in the right-of-way. There is a steep hillside adjacent, and to create space for a multi-use trail would require significant concrete retaining walls and a barrier between the trail and the roadway. Drainage along the base of the slope would have to be accommodated. Use of this shoulder would eliminate the opportunity for motorists to pull over on this segment, and any such change to the shoulder should be coordinated with the California Highway Patrol.



Figure 5-4. Trail in the ROW along base of steep hill

Figure 5-5 shows an example of a route in the right-of-way in a more level setting, such as near the Clayton Palms Mobile Home Community. There is adequate space for a multi-use trail if a barrier between the road and the trail is provided. There is a series of utility poles and signs in the middle of the trail corridor. They would either have to be relocated or the trails would have to split around them, as illustrated in Figure 5-5. Typically, there is a ditch or swale in the right-of-way that would have to be accommodated.

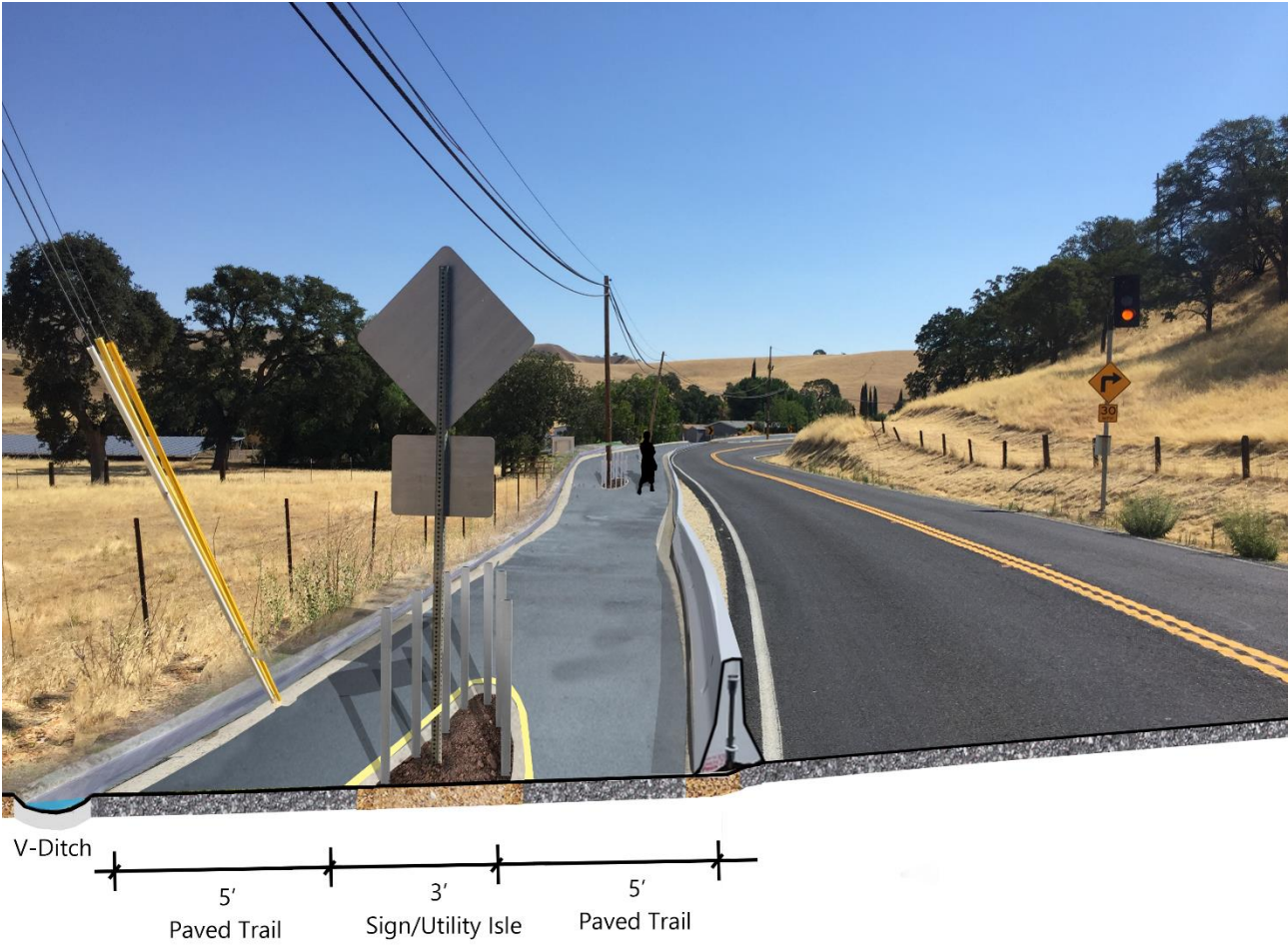


Figure 5-5. Trail in the ROW in a flat area

On Driveway or Fire Road

Where possible, the trail alignment aims to follow existing roadways to minimize impacts to undisturbed land. In this illustrative example, the proposed route alignment shows the trail following this private driveway and fire road to reach a parallel former ranch road that would bypass narrow portions of Marsh Creek Road, assuming permission/acceptance from the adjacent property owner. As a private road, recreational trail use is currently prohibited. Given the low levels of traffic, signing and pavement marking would suffice to guide trail users.



Figure 5-6. Route up a driveway/fire road

Flat Land + Trail

Figure 5-7 is an example of an unconstrained segment, where the full width of paved trail plus an unpaved side path could easily be accommodated.

Figure 5-8 illustrates a potential configuration for a trail in a wide-open flat space. Ideally it would have a separate unpaved trail for horses, mountain bikes, and potentially trail runners and dog walkers.



Figure 5-7. Trail in an unconstrained area



Mostly Flat
to Moderate Slope

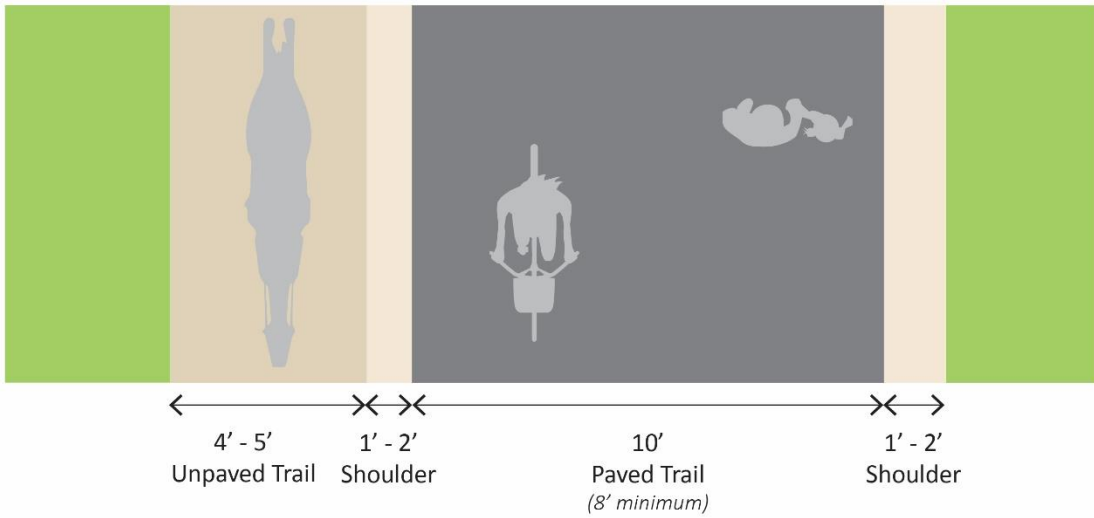
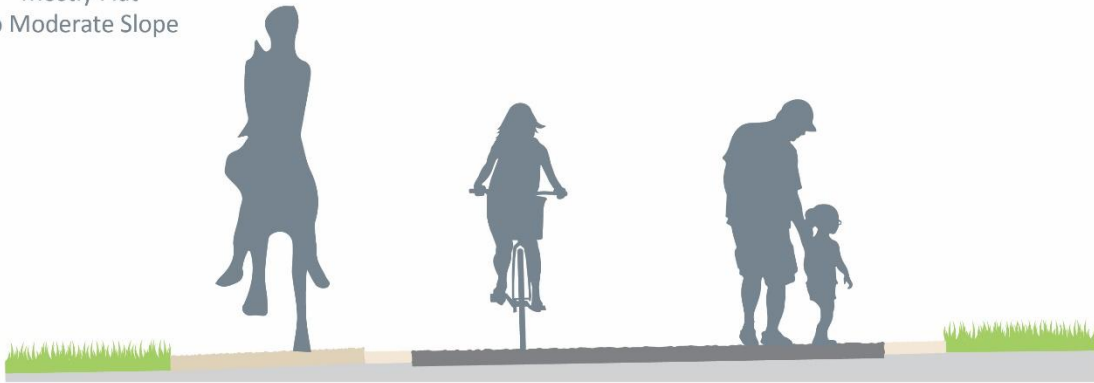


Figure 5-8. Design for a trail in unconstrained area

Detached from Road, Adjacent to Creek

The trail location shown in Figure 5-9 includes a very steep slope which may potentially exhibit slope failures. A narrower trail across the steep slope will require a robust retaining wall, which still could potentially fail given the apparent unstable soils in the area. An alternative would be a narrower trail on the shoulder of the road. Some portions of the roadway have turnouts that would accommodate even a wide trail (Figure 5-10), but some portions have no paved shoulder and berms on the outside (Figure 5-11). These would have to be removed, potentially a retaining wall and railing constructed on the slope to provide additional width, and a barrier placed between the road and the trail.

The best alternative would be to secure permission to locate the trail on the other side of the creek, where the land is relatively flat.

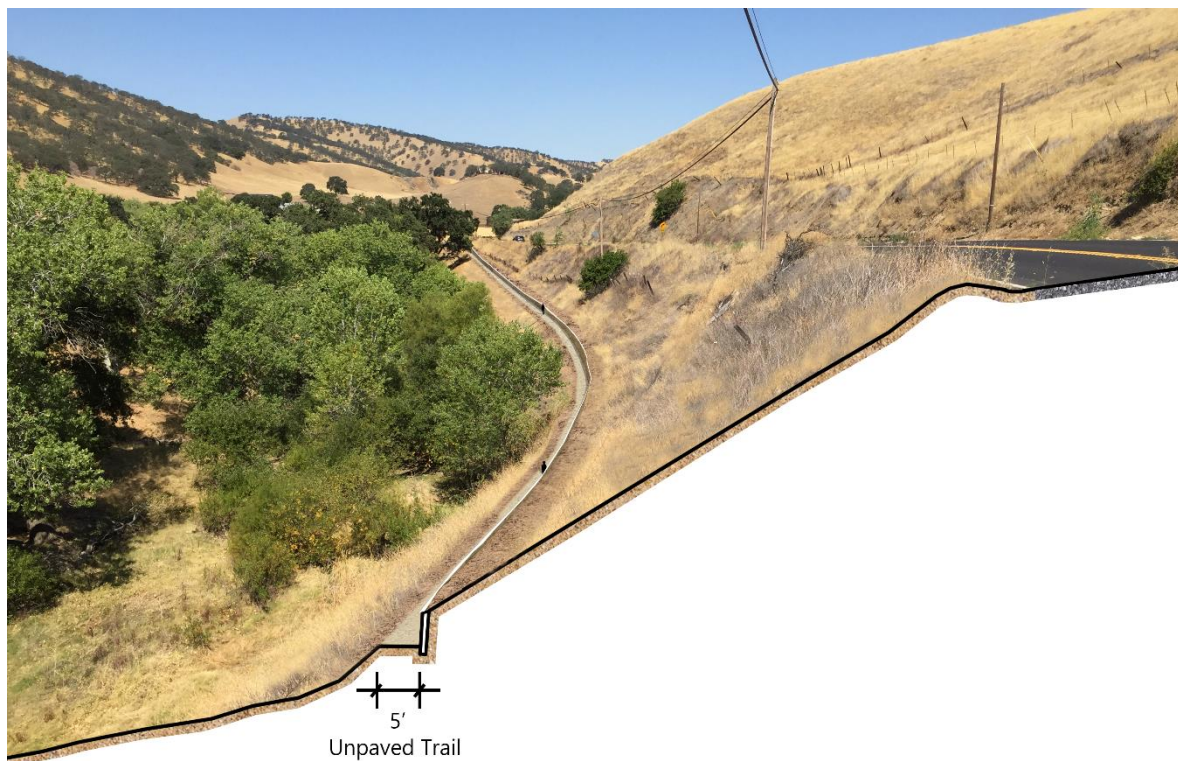


Figure 5-9. Trail at the base of a steep slope



Figure 5-10. Wide unpaved shoulder with turnout



Figure 5-11. Portion with no shoulder

Detached from Road and Creek

In select locations, the trail is unconstrained and could easily accommodate a Class I trail with a separate unpaved sidepath for horses and mountain bikes. In this example within Round Valley Regional Preserve, the former ranch road trails that this segment connects to are unpaved and do not meet ADA gradients. A new route near the dead vineyard to the right in Figure 5-13 would allow an ADA-compliant connection.

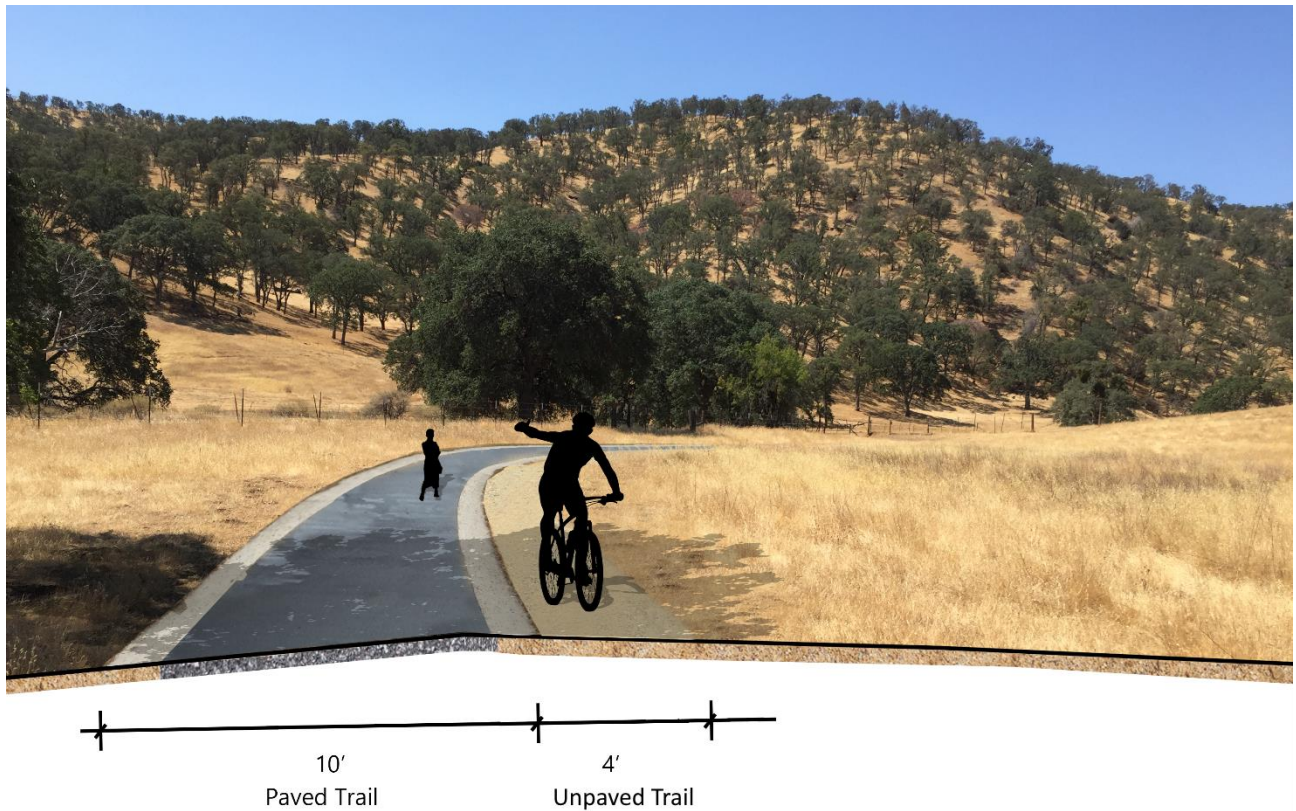


Figure 5-12. Unconstrained area detached from creek



Figure 5-13. Potential connecting trail in Round Valley Regional Preserve



Figure 5-14. View on same trail toward staging area

6. Implementation Considerations

Implementation of the Marsh Creek Trail is expected to occur over a long period of time, as funding and land for the trail become available. This section provides recommendations for a phased implementation approach by segment, cost estimates, and an overview of the environmental assessment.

Phasing

Each section of the trail has varied considerations for implementation. As such, a phased approach is recommended that prioritizes the development of one trail section at a time, starting on either end of the trail and ultimately meeting in the middle in the Dark Canyon area. An overview of the phasing is shown in Figure 6-1, with proposed alignments shown in the Corridor Maps in **Appendix C**. It is recommended that outreach and collaboration with residents, property owners, and potential users continue to occur as each phase moves through more detailed design and into implementation and construction.

Phase 1: Clayton City Limits to Clayton Ranch

The section of trail proposed for initial implementation would connect to existing bicycle and pedestrian facilities at the Clayton city limits and stretch approximately 5.7 miles to the east. The trail is recommended to connect to lands held by the East Bay Regional Parks District (EBRPD), which begin approximately 2.3 miles from the Clayton City limits. The property, known locally as Clayton Ranch, is planned for future recreational amenities including public access and hiking trails.

Phase 1 would allow for a more immediately usable section of trail that links public lands to existing bike and pedestrian facilities. Connecting to planned projects at Clayton Ranch would reduce the overall cost and effort for implementation, while also creating new access to recreational amenities. This section of the overall project also has the highest amount of land held publicly or by Save Mount Diablo, reducing the need for right-of-way acquisition. It is anticipated that the portion of the trail within Clayton Ranch would be developed by EBRPD.

Phase 2: Clayton Palms to Round Valley Regional Preserve

Similar to Phase 1, the second phase of the project would leverage existing recreational amenities at Round Valley Regional Preserve. With a length of approximately 4.7 miles, this section of trail would extend from Round Valley on the southern side of the roadway, cross at Deer Valley Road, and end just west of the Clayton Palms community, increasing recreational opportunities for residents of that community. The trail would also provide better access to Round Valley for bicyclists using the existing bike lanes on Deer Valley Road, which is a popular cycling route that connects to Brentwood.

Implementing this section of trail will require sensitivity to private land ownership given that most of the proposed alignment, while following Marsh Creek, crosses through multiple privately owned properties. As such, two alignments are proposed, with one focused on on-road improvements along Marsh Creek

Road to use public right-of-way and minimize environmental impacts, particularly in the area just east of Deer Valley Road. A second proposed alignment would veer away from the roadway to maintain the preferred off-road nature of the facility, but should be considered a long-term option if land in that area becomes available for a trail easement by willing sellers.

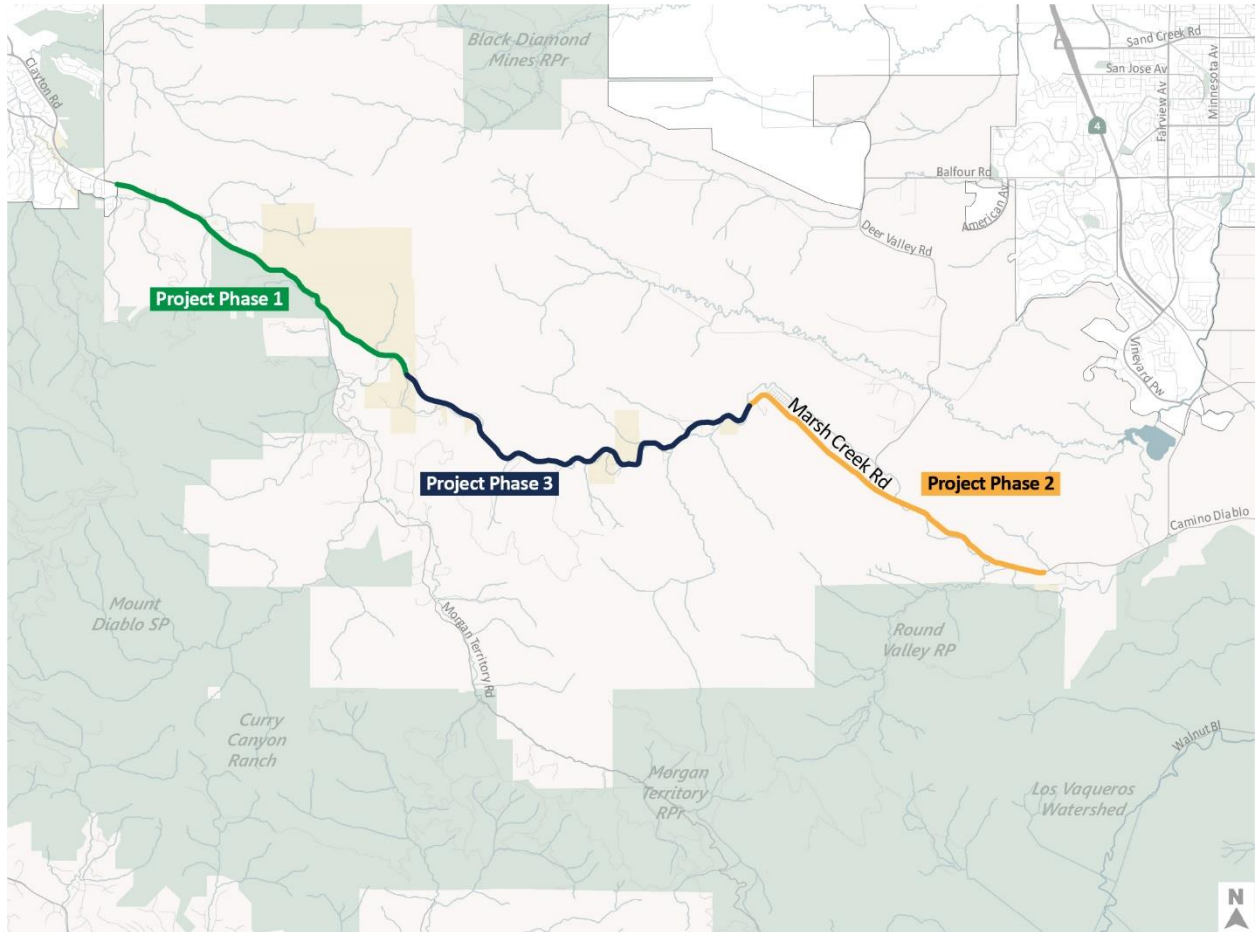
This section of trail also requires the least amount of physical disruption to the environment, as the terrain begins to flatten and fewer retaining walls will be required.

Phase 3: Dark Canyon

The third phase of the project will link both prior segments of the trail to create a continuous facility from Clayton to Round Valley Regional Preserve. Running approximately 4.7 miles through the “Dark Canyon” area of the corridor, this section of trail features the greatest number of physical constraints on the alignment due to steep terrain and will require the trail to run in close proximity to the creek on the south side of Marsh Creek Road, with a crossing back to the north side at either end of the section.

Ownership is mixed within the section. Several small parcels are held by Save Mount Diablo, and as such the trail alignment seeks to connect those areas to minimize impacts on private land. A high number of retaining walls will likely be required to provide a usable trail at even a minimum trail width. Given the need to run the trail adjacent to or near to Marsh Creek, this can also provide an opportunity for trail implementation and creek rehabilitation efforts to occur simultaneously.

Figure 6-1: Proposed Implementation Phasing



Cost Estimates

The cost estimate for Marsh Creek Trail was based on the Caltrans six-page cost estimate format for each of the three trail segments. The full estimates can be found in **Appendix D**. The first step was to identify all relevant bid items in the following five categories: earthwork, structural section, drainage, specialty items, and traffic items. Within each category, individual items were identified and unit costs were assigned to each item based on recent bid results as of 2020 and the online Caltrans unit cost database for those same items within the same district (District 4). Next, additional cost percentages were added to the previously determined items to account for varying market prices and additional construction costs. These additional cost percentages included a percentage for minor items, roadway mobilization, roadway additions, and contingencies.

Several project assumptions were made regarding the item quantities included in the cost estimate. The trail length assumes the predetermined path alignment will be generally followed; however, unforeseen constructability constraints may cause the trail length to change and thus trail material quantities could fluctuate. Another major assumption made is in respect to trail segments that require a retaining wall to construct the path. While it is likely that the height of the wall will fluctuate along the trail, a conservative assumption was made that the average height of the retaining wall required along any part of the segment will be closer to the maximum height.

Cost estimates do not include right of way acquisition or escalation over time. Given that there is no current timeframe for implementation, costs will need to be adjusted to current year values at the time of design and construction.

Estimated Costs by Phase

Trail Section	Estimated Cost
Phase 1: Clayton (west end)	\$19.1 million
Phase 2: Round Valley (east end)	\$7.1 million
Phase 3: Dark Canyon (middle)	\$16.5 million

Note: Cost estimates are based on 2020 values.

Environmental Assessment

A Phase I Environmental Site Assessment was conducted to identify Recognized Environmental Conditions (RECs), Historical Recognized Environmental Conditions (HRECs), or Controlled Recognized Environmental Conditions (CRECs) on the parcels. The full Phase I document can be found in **Appendix E**. The following conditions were identified:

- The Marsh Creek Corridor is occupied by rural residences, ranches and farms, open space and state and regional parks. Small, denser areas of suburban residences are present at the far western end of the corridor south of Marsh Road, and along the north side of Marsh Creek Road

about 3½ miles from the eastern end of the corridor. Two subsurface crude oil pipelines are present along the north side of Marsh Creek Road along the western half of the corridor, where the pipelines then cross under Marsh Creek Road and continue to the south. A Contra Costa Water District subsurface water pipeline is present in various locations along both sides of the road. If the trail alignment is proposed to cross the pipelines, the pipeline owners will need to be notified and consulted to acquire their authorization. One set of high-power transmission lines and towers cuts north-northwest to south-southeast across the western portion of the corridor. No industrial facilities or sites are present. There were no observations of discolored soil, water, or stressed vegetation due to chemical spills, above or underground storage tanks, pits, ponds, or lagoons. Minor debris and occasional trash were observed but are considered a *de minimus* condition because the materials can be recycled or disposed of at any Class III non-hazardous waste landfill as non-hazardous waste.

- Some portions of the corridor are on public property (e.g., Mt. Diablo State Park) and were entered at various locations for direct inspection. Some portions of the corridor are on private properties, which were not entered. The private properties were observed from the property lines, which provided sufficient information to identify RECs, with one exception. The property at 8990 Marsh Creek Road across the road from the southeast corner of Rodie's Feed & Pet Supply was observed to have landscaping equipment and supplies, assumed to include fertilizers, pesticides, herbicides, fuels, and lubricating oils. The property appeared to have poor housekeeping as materials were on the bare ground and not secured in sheds or within secondary containment. No spills, stained soil, or stressed vegetation were observed from the fence line, but it is unknown whether spills have occurred on this property. Although this property does not rise to the level of a REC (no spills or stressed vegetation were observed), it should be considered a business environmental risk if the proposed trail crosses this property. If the trail alignment is to cross this property, soil should be sampled and analyzed for fertilizers, pesticides, herbicides, fuels, and lubricating oils.
- The regulatory records search identified several sites that use or previously used hazardous materials. None of the listed sites are active hazardous materials spill sites and therefore are not expected to affect the proposed project.

In summary, no RECs, HRECs, or CRECs were observed relative to hazardous materials, hazardous waste, or chemical use, storage, or disposal. One business environmental concern was identified at the 8990 Marsh Creek Road property due to poor housekeeping of landscaping materials and supplies. While the trail is not anticipated to cross the property at this time, should the trail alignment change it is recommended that soil be sampled and analyzed for fertilizers, pesticides, herbicides fuels, and lubricating oils.

Property Acquisition and Access Options

Acquiring access for a trail across private property is a sensitive subject that must be approached carefully. There is no eminent domain or forced sale of property for trails; access depends on arrangements with willing sellers. This includes access across public properties. Typically, the objective is to avoid impact on residences, their access roads or agricultural facilities or operations.

Outright Acquisition – Fee Title

This is purchase of the entire property from a willing seller. Often land trusts or agencies will buy the property and then lease it out for grazing or sell it at a discount with an easement for the trail and protection against development. The continuation of dwellings and agricultural use helps maintain a revenue stream to support the maintenance and operation of the property and provides some oversight.

Easements

An easement for trail access can potentially be purchased from a willing seller. This could be a specific corridor across the property, or a broader area that allows more flexible trail layout and relocation. Easements often have conditions that help preserve agricultural operations, including potential closure of the trail during key periods of activity if trail use might interfere or cause risk for the users.

Licenses

For access across public property, often the agency owner will grant the trail organization a license that specifies the location and conditions for the trail access. A license is typically for a period of time (e.g., 5 to 10 years). A permanent easement could also be granted by the agency owner.

Funding

The implementation of the Marsh Creek Trail system will likely take many years and will require the use of a variety of funding sources. Funding sources are available from local county, regional, state, and federal agencies, as well as local organizations and non-profits.

The following list describes various grant programs and other funding sources that can be resources for developing the Marsh Creek Trail.

Local Sources

County Capital Improvement Plan (CIP). Contra Costa County could utilize funds allocated in their capital improvement plan to fund trail development. The capital improvement plan is a short-range plan which identifies capital projects and equipment purchases, provides a planning schedule, and identifies options for financing the plan.

Developer Fees and/or Transportation Impact Fees. Local or area-wide transportation impact fees can be required. In this case, a developer would pay into a fund that would be used to plan and build transportation infrastructure, such as trail projects. The nexus is often made that vehicle trip reductions can be supported through multimodal projects.

Local organizations, individuals, and non-profits. Occasionally local organizations and non-profits will help fund portions of trail projects. In this case the Save Mount Diablo organization and East Bay Regional Park District are potential project partners. There are other local organizations, private companies, or

individuals that may wish to provide funding for trail implementation or trail amenities such as benches, bike racks, wayfinding, and more.

CCTA Measure J. Measure J was approved by Contra Costa County voters in 2004, which extended the half-percent cent local transportation sales tax first established by Measure C in 1988 for another 25 years. The sales tax has funded multiple major capital projects and provides funds to cities, towns, and the County to maintain local streets and roads, help fund transportation services for the elderly and persons with disabilities, and provide bus transit services. One and a half percent of revenues from Measure J are for construction of pedestrian and bicycle facilities, including regional trails throughout Contra Costa.

Measure WW Local Grant Program. Measure WW was approved by voters in Alameda and Contra Costa Counties in November 2008. The measure extended Measure AA, approved in 1988, to enable the East Bay Regional Park District to meet the increasing demand of protecting open space for recreation and wildlife habitat. [Measure WW provided \\$500 million](#) in bonds to expand regional parks and trails, and to preserve and protect open space for recreation and wildlife habitat. It also made funding available directly to cities and special park districts for high priority community park projects. Of the \$500 million from Measure WW, \$125 million (25%) is allocated on a per-capita basis for grants to 46 cities, communities, local park and recreation districts, county service areas, and the Oakland Zoo to address local park and recreation needs.

Regional Sources

One Bay Area Grants (OBAG). The Metropolitan Transportation Commission's (MTC) [One Bay Area Grant program](#) (OBAG) is a funding approach that aligns the Commission's investments with support for focused growth. Established in 2012, OBAG taps federal funds to maintain MTC's commitments to regional transportation priorities while also advancing the Bay Area's land-use and housing goals. OBAG includes both a regional program and a county program that both targets project investments in Priority Development Areas (PDAs) and rewards cities and counties that approve new housing construction and accept allocations through the Regional Housing Need Allocation (RHNA) process. Cities and counties can use these OBAG funds to invest in local street and road maintenance, streetscape enhancements, bicycle and pedestrian improvements, transportation planning, and Safe Routes to School projects. The most recent OBAG funding cycle (OBAG 2) funded approximately \$800 million in projects from 2017/2018 through 2021/2022.

Regional Active Transportation Program. While the California Department of Transportation (Caltrans) administers statewide Active Transportation Program grants, MTC is allocated a portion of the funds to administer a regional component. MTC provides a regional supplemental application in addition to the statewide application to apply for the competitive program funds. The program allows cities, counties, transit agencies and other public agencies to compete for grants to build bicycle/pedestrian paths, install bike racks, and other projects or programs that make walking or biking easier, safer, and more convenient.

Transportation Development Act (TDA), Article 3. The Transportation Development Act, Article 3 (TDA 3) program provides funding annually for bicycle and pedestrian projects, which could include trails. Two

percent of TDA funds collected in the County are used for TDA 3. MTC allows each county to determine how to use funds in their county. Some counties competitively select projects while other counties distribute the funds to jurisdictions based on population. Each county coordinates a consolidated annual request for projects to be funded in their counties.

State Funding Sources

California State Parks. Given the Marsh Creek Trails' proximity to Mount Diablo State Park it may be feasible to partner with State Parks to build and maintain a trail that would serve the State Park.

Transportation Fund for Clean Air (TFCA). In 1991, the California State Legislature authorized the Air District to impose a \$4 surcharge on cars and trucks registered within its jurisdiction to be used to provide grant funding to eligible projects that reduce on-road motor vehicle emissions. The Air District allocates these funds to its Transportation Fund for Clean Air Program, which in turn provides funding to qualifying trip-reduction and alternative-fuel vehicle-based projects, including plug-in electric vehicles. Sixty percent of TFCA funds are awarded by the Air District to eligible programs and projects through a grant program known as the Regional Fund, through various Air District sponsored programs and projects including Spare the Air, and through certain alternative-fuel vehicle-based and bicycle facility programs. The remaining 40 percent of TFCA funds are passed through to the County Program Manager Fund and are awarded by the Congestion Management Agencies of the nine counties to TFCA-eligible projects located within those counties. Qualifying projects include "bicycle and pedestrian facility improvements", which could include the construction of trails and trail amenities.

Active Transportation Program (ATP) Grants. The Active Transportation Program consolidates existing federal and state transportation programs, including the Transportation Alternatives Program (TAP), Bicycle Transportation Account (BTA), and State Safe Routes to School (SR2S), into a single program with a focus to make California a national leader in active transportation. The ATP is administered by the Division of Local Assistance, Office of State Programs. The purpose of the ATP is to encourage increased use of active modes of transportation by increasing the proportion of trips accomplished by biking and walking, increasing safety of non-motorized users, reduce greenhouse gases, enhance public health, and ensure that under-resourced communities full share in the benefits of the program.

Recreational Trails Program (RTP). The Recreational Trails Program (RTP) provides funds annually for recreational trails and trails-related projects. The RTP is administered at the federal level by the Federal Highway Administration (FHWA). It is administered at the state level by the California Department of Parks and Recreation (DPR) and the Department of Transportation (Caltrans) Active Transportation Program (ATP). Eligible non-motorized projects include acquisition of easements and fee simple title to property for recreational trails and recreational trail corridors; and, development, or rehabilitation of trails, trailside, and trailhead facilities. The program requires a 12 percent match. FHWA must approve project recommendations before California State Parks can execute grant contracts. Prior to forwarding these projects to FHWA, each must comply with the National Historical Preservation Act of 1966 (Section 106), National Environmental Policy Act (NEPA), and be listed on the State Transportation Improvement Plan (STIP).

Environmental Enhancement and Mitigation (EEM) Grant Program. The Environmental Enhancement Mitigation program authorizes the California state legislature to allocate up to \$7 million each fiscal year from the Highway Users Tax Account. EEM projects must contribute to mitigation of the environmental effects of transportation facilities. The EEM Program does not generally fund commute-related trails or similar bicycle/pedestrian infrastructure. However, it does fund recreational and nature trails as part of stormwater management or green infrastructure projects.

Federal Sources

Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant Program. This discretionary grant program provides a unique opportunity for the Department of Transportation to invest in road, rail, transit and port projects that promise to achieve national objectives. Previously known as the Better Utilizing Investments to Leverage Development (BUILD) and Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grants, Congress has dedicated nearly \$8.9 billion for twelve rounds of National Infrastructure Investments to fund projects that have a significant local or regional impact. The eligibility requirements of RAISE grants allow project sponsors at the State and local levels to obtain funding for multi-modal, multi-jurisdictional projects that are more difficult to support through traditional DOT programs.

FHWA Congestion Mitigation and Air Quality Improvement Program (CMAQ). FHWA's CMAQ program provides a flexible funding source to State and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. Funding is available to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards.

FHWA Surface Transportation Block Grant Program (STBG). The STBG, formerly known as the Transportation Alternatives Program, authorizes funding for programs and projects defined as transportation alternatives, including on- and off-road pedestrian and bicycle facilities. The Metropolitan Transportation Commission (MTC) helps coordinate the Transportation Alternatives (TA) program in the San Francisco bay area.

Land and Water Conservation Fund (LWCF). The [LWCF provides matching grants to States and local governments](#) for the acquisition and development of public outdoor recreation areas and facilities. Over its first 49 years (1965 - 2014), LWCF has provided more than \$16.7 billion to acquire new Federal recreation lands as grants to State and local governments. Projects can include acquisition of open space, development of small city and neighborhood parks, and construction of trails or greenways.

FHWA Highway Safety Improvement Program (HSIP). The Highway Safety Improvement Program (HSIP) is a core Federal-aid program with the purpose to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned roads and roads on tribal land. Eligibility criteria for HSIP funds can be found [here](#).

Rivers, Trails, and Conservation Assistance Program. The National Park Service Rivers, Trails, and Conservation Assistance (RCTA) program supports community-led natural resource conservation and

outdoor recreation projects across the nation. The National Park Service helps community groups, nonprofits, tribes, and state and local governments to design trails and parks, conserve and improve access to rivers, protect special places, and create recreation opportunities.

Liability, Maintenance and Management

There are several important strategies and legal resources to address the concerns of underlying and adjacent property owners regarding trails. Typical concerns include liability, trespassing, privacy, vandalism, personal safety, and fire.

Liability

One concern for potential trail operators, trail landowners, and nearby landowners is whether they may be legally responsible (liable) for activities on or near the trail. State and case law both clearly indicate that landowners and trail operators are generally protected from liability for recreational trail use, with some specific exceptions, and that there are common-sense ways to reduce risks.

There are three types of individuals or organizations that are typically concerned about such liability: the entity that operates the trail; the entity that owns the trail property; and the adjacent landowners. Different laws apply if the entity is a public agency, private individual, or business, but the resulting protection is generally the same.

California State Law

Liability for injury or other harm on any portion of the proposed Marsh Creek Trail is regulated by several existing California laws. California laws, also called statutes, are organized into 29 codes which cover specific subject areas. A digital copy of all 29 codes is available free to view online.

Recreational trail use is addressed in several sections of codes, including (but not limited to):

- California Government Code Sections 830.6, 831.2, 831.4, 831.7, 835, 846, 14662.5 and 51238.5
- California Civil Code Sections 813, 846, 846.1, 1006, 1007, 1008, and 1009
- California Public Resources Code Section 5075.4
- California Code of Civil Procedure Sections 128.7 and 1038

California's Recreational Use Statute (RUS) and the Recreational Trails Act potentially offset some or all of a private landowner's increased liability associated with a trail. The text of the RUS can be found in Civil Code Section 846. The Recreational Trails Act is codified in Public Resources Code Article 6, Section 5070–5077.8. Notably, Section 5075.4 of the Recreational Trails Act states that "No adjoining property owner is liable for any actions of any type resulting from, or caused by, trail users trespassing on adjoining property, and no adjoining property owner is liable for any actions of any type started on, or taking place within, the boundaries of the trail arising out of the activities of other parties."

Duty of Care

Duty of care is a term used to describe how responsible one entity may be for injuries caused to another entity or individual. For trail purposes, this term refers to how much liability (responsibility) the trail operator or landowner has for injuries that occur on or near the trail. A higher duty of care indicates more potential responsibility for injuries incurred.

In California, a trail operator or landowner has generally not been found liable except when they willfully or maliciously failed to guard against a dangerous condition, the injured person paid to use the trail, or there was a specific invitation for use. These exceptions are covered in detail in the Recreational Use Statute (RUS), and in California Government Code Section 835, which pertains to agency awareness of a hazardous condition and failure to act to protect against it.

Indemnification

Indemnification is a term for a guarantee against potential liability or monetary loss experienced by another individual or entity. In trail development, indemnification refers to the situation in which one entity (typically a government agency or non-profit) assumes the responsibility for injury or harm that occurs on a trail managed and/or owned by another individual or entity. In California an agency or non-profit organization may agree to take responsibility for injuries or loss occurring on trails on or near private property (see Government Code Section 14662.5 and 51238.5, and California Attorney General Opinion No. 95-305). The intention of these codes and the opinion is to encourage and support public trail development while reducing potential liability for private landowners. This is typically accomplished through a memorandum of understanding (MOU), easement agreement, or license agreement between the landowner and the agency.

Risk Reduction Strategies

There are some simple, common-sense strategies that can reduce risks to trail operators and landowners. These include proper planning, design, operation, and maintenance. Successful risk reduction also requires public awareness through published rules, guidelines, and signage.

Personal Safety and Fire

Property owners have expressed concerns about personal safety and fire due to the public having new access on or near their property. Compared to travelers on the road, who may throw trash or cigarettes from their windows, trail users are typically thoughtful and polite, but there may be exceptions. Clear rules, information, and enforcement, including monitoring and rapid response, are key to mitigating potential user impacts. This includes designation and adequate representation of those responsible for enforcement (such as Contra Costa County Sheriff Department or East Bay Regional Parks Police Department) and support by parks/preserve staff and a volunteer trail patrol, as detailed under Operations and Maintenance. Homeowners should be provided with clear information about who to contact for a given issue or concern.

Planning and Design

Following design and planning best practices when planning and designing the trail will go a long way toward reducing the potential for injury to trail users and potential associated liability for those injuries. General design standards and/or guidelines related to on-road bikeways, sidewalks, or paved trails are developed by national organizations, such as the American Association of State Highway and Transportation Officials (AASHTO) and the National Association of City Transportation Officials (NACTO). State standards and/or guidelines include those issued by Caltrans, including the California version of the Manual on Uniform Traffic Control Devices (CAMUTCD). Local agencies, such as cities and counties, typically adopt the Caltrans guidelines and standards as-is, or with slight modifications.

Recreational trails, especially unpaved trails, have fewer clear standards, but the U.S. Forest Service publishes planning and design standards and details for them, as does California State Parks, and many regional park and open space agencies.

In all cases the Americans with Disabilities Act (ADA) requires certain levels of accessibility for trails, depending on the context. The Architectural and Transportation Barriers Compliance Board (Access Board) has developed detailed guidelines for pedestrian facilities, recreational areas, and more. State and local agencies may also have their own specific accessibility requirements.

In addition to following all relevant laws, guidelines, and standards, it is usually worth studying one or more alternative alignments. Specific planning and design decisions may meet all relevant standards and guidelines, but leave room for varying degrees of privacy and security for neighboring properties. By reviewing several options, the community and decision makers can weigh the benefits and drawbacks of each to find the one that best meets the community's needs.

Operation and Maintenance

Developing and following a written maintenance plan is another important strategy for reducing potential risks. The plan should include details for trail inspection, record keeping, inventory of potential hazards, and emergency response procedures as well as sources for funding and support. The trail operator would be responsible for developing and implementing the plan, but the property owner (if different than the trail operator) should review the plan and confirm that it is in place and being followed.

Entities responsible for trail construction should fund or endow operations and maintenance activities in conjunction with implementation of any specific trail plan.

Oversight and Coordination

Overseeing trail maintenance and operations and coordinating with volunteers, neighbors, and partner agencies helps to create a fully operational trail system and a safe environment for trail users. Trail operations coordination involves many partners: local government, state or federal government departments, conservation and environmental groups, user groups or potential user groups, education institutions, including local schools or universities, volunteer groups, senior groups, and health agencies. Coordinating with these entities and agencies helps to divide roles and responsibilities between partners.

Sometimes stakeholders enter into management agreements that clearly define their roles and responsibilities. The operating agency also needs to coordinate with adjacent property owners if issues arise.

Trail Operations Responsibilities

- Coordination with partner agencies and adjacent property owners
- Provide information and guidance for trail users
- Community engagement and activities (trail outings and maintenance)
- Volunteer trail docent program
- Volunteer trail projects and ongoing assistance (see Trail Ambassador Programs)
- Volunteer trail patrol (see Trail Ambassador Programs)

Volunteer Roles in Trail Maintenance and Operations

Volunteers make invaluable contributions to maintaining trail systems. Their time and dedication to trail maintenance are critical to the growth of outdoor recreation and active transportation.

Trail Ambassador Programs

Through a Trail Ambassador Program or volunteer trail patrol, local volunteers help to monitor trail systems, encourage proper use, and provide weekly reports on trail conditions and issues. The volunteers, or Trail Ambassadors, report to a coordinator or Trail Steward. The Trail Ambassadors' presence on the trails provides additional security. Trail Ambassadors wear a uniform or emblem so the public can easily identify them. When on the trail they carry notebooks, pencils, trash bags, and cellphones/cameras. This helps them to document trail conditions and issues. Some routine maintenance activities Trail Ambassadors could perform are noting dangerous conditions, removing fallen branches, and monitoring culverts for washouts or blockages. Establishing a Trail Ambassador Program engages the community in trail maintenance and trail security to encourage trail use, keep trails safe, and strengthen community engagement in trail systems.

The responsibilities of a Trail Ambassador include:

- Walking or bicycling and monitoring the condition of a trail segment at least once a week
- Observing trail conditions and potential hazards
- Reporting trail conditions
- Performing some routine, minor trail maintenance
- Meeting and greeting people on the trail
- Reminding users of trail rules and guidelines

Trail Docent Programs

Many agencies with significant trail systems also have docents who interpret and educate the public about nature and local history – especially for school children. Trail docent programs typically include advertised special events, interpretive signs and installations, and outdoor classroom areas.

Public Information

Clear and consistent published rules, guidelines, and signage can also reduce potential risks. Using a combination of words and graphics to convey only the most important information is key — signage fatigue, visual clutter, and language barriers can reduce the effectiveness of the signs. Key information includes permitted and prohibited uses; trail use behavior guidelines; potential hazards; permanent and temporary closures; and emergency contact information. Signs should be posted at the trail entry and at the location of the hazard (along with physical barriers), where appropriate.

Insurance and Waivers

Insurance and waiver forms are also typical components of risk reduction strategies, although they do not reduce the future risk of injuries, only the risk of financial losses due to injuries.